AURAVANA PROJECT

PROJECT FOR A COMMUNITY-TYPE SOCIETY

The Decision System

SSS-DS-002 | July 2022

SOCIETAL SPECIFICATION STANDARD

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GREETINGS

In an effort to provide the greatest possible clarity and value the Auravana Project has formatted the system for the proposed society (of the type, 'community') **into a series of standard publications. Each standard is both a component of the total, unified system, as well as intended to be a basis for deep reflective consideration of one's own community, or lack thereof. These formal standards are "living" in that they are continually edited and updated as new information becomes available; the society is not ever established, its design and situational operation exists in an emergent state, for it evolves, as we evolve, necessarily for our survival and flourishing.**

Together, the standards represent a replicable, scalable, and comprehensively "useful" model for the design of a society where all individual human requirements are mutually and optimally fulfilled.

The information contained within these standards represent a potential solution to the issues universally plaguing humankind, and could possibly bring about one of the greatest revolutions in living and learning in our modern time. Change on the scale that is needed can only be realized when people see and experience a better way. The purpose of the Auravana Project is to design, to create, and to sustain a more fulfilling life experience for everyone, by facilitating the realization of a better way of living.

Cooperation and learning are an integral part of what it means to be a conscious individual human. A community-type societal environment has been designed to nurture and support the understanding and experience of this valuable orientation.

The design for a community-type society provides an entirely different way of looking at the nature of life, learning, work, and human interaction. These societal standards seek to maintain an essential alignment with humankind's evolving understandings of itself, combining the world of which humans are a regenerative part, with, the optimal that can be realized for all of humanity, given what is known.

The general vision for this form of society is an urgent one considering the myriad of perceptible global societal crises. Together, we can create the next generation of regenerative and fulfilling living environments. Together, we can create a global societal-level community.

THE UNIFIED SOCIETAL SYSTEM: DECISION SPECIFICATION STANDARD

This publication is one of six representing the proposed standard operation of a type of society given the category name, 'community' (a community-type society). This document is a specification standard for a decision system.

Every society is composed of a set of core systems. Different types of societies have different internal compositions of these systems. The composition of these systems determines the type of society. The type of society described by the Auravana Project societal standard is a, community-type society. The standard is a composition of sub-system standards. The Auravana societal standard may be used to construct and duplicate community at the global level.

For any given society, there are four primary societal sub-systems. Each of these sub-systems can be specified and standardized (described and explained); each sub-system is a standard within a whole societal specification standard. The first four primary standards of the six total standards are: a Social System; a Decision System; a Material System; and a Lifestyle System. Each standard is given the name of its information system. The fifth publication is a Project Plan, and the sixth is an Overview of the whole societal system. Together, these standards are used to classify information about society, identify current and potential configurations, and operate an actual configuration. Because of the size of some of these standards, they may be split into two or more publications.

- **This societal specification standard is the Decision System for a community-type societal system.**
- **There are more figures** (and tables) associated with this standard than are presented in this document; those figures that could not fit are freely available via the Auravana Project's website in full size, and if applicable, color [auravana.org/standards/models]. Tables that are too large to include in this document are referenced with each standard via the Project's list of standards webpage [auravana.org/standards].
    - *Figures and tables on the website are named according to their placement in the standard.*

Contents

List of figures

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List of tables

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Document revision history

A.k.a., Version history, change log.

This document is updated as new information becomes available.
The following information is used to control and track modifications (transformations, changes) to this document.

<table>
<tr><th>VERSION</th><th>REVISION DATE</th><th>SECTIONS</th><th colspan="2">SUMMARY (DESCRIPTION)</th></tr>
<tr><td>002</td><td>July 2022</td><td>n/a</td><td colspan="2">Various additions and modifications have been made throughout. The structure of the standard has changed slightly. The structure is now: Approach > Calculation > Solution. Some of the articles in version 1 were removed and placed in the social system standard.

Note: The reader should understand that this document contains a high-level of conceptual linguistic detail, the reader should understand that this document is one of multiple documents that together provide a complete explanation of the proposed societal system. In order to visualize the whole societal system, its concepts and objects, and their interrelationships, must be modeled and reasoned.

Note: All figures associated with this standard, many of which are not published herein, are available via the Auravana Project’s website. Oversized figures and tables are also published on the Project’s website. It is not possible to publish via this page medium all figures and tables related to this standard.</td></tr>
<tr><th colspan="3">GENERATION ON</th><th>NAME</th><th>CONTACT DETAIL</th></tr>
<tr><td colspan="3">July 2022</td><td>Travis A. Grant</td><td>trvsgrant@gmail.com</td></tr>
</table>

The Decision System Overview

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Abstract

This publication is the Decision System for a community-type society. A decision system describes the formal structuring of decisions involving a comprehensive information system that resolves into a modification to the state-dynamic of the material environment. A decision system is a collection of information-processing components -- often involving humans and automation (e.g., computing) -- that interact toward a common set of objectives. This decision system is designed to coordinate and control the flow of resources for global accessibility to all goods and services. To navigate in common, humanity must also decide in common. Herein, individuals maintain a relationship to resources that focuses on access rather than possession, maximizing the advantages of sharing, and incentivizing cooperative, rather than competitive, interest. All requirements relevant to human fulfillment and ecological well-being are factored in to the allocation of resources, optimizing quality-of-life for all, while ensuring the persistence of the commons. The standard decision processes produce tasks that are acted upon by an intersystem (a.k.a., interdisciplinary) team involving the coordinated planning and operation of projects. Through this comprehensive and transparent decisioning process individuals know precisely what needs to be accomplished to sustain and evolve their fulfillment. Herein, through formalized decisioning and cooperation humanity may continuously restructure society toward a higher potential dynamic of life experience for all. The use of a common social approach and data set allows for the resolution of societal level decisions through common protocols and procedural algorithms, openly optimized by contributing users for aligning humanity with its stated values and requirements. The direction of a decision system is determined by the creation and execution of directional project sub-lists: needs, objectives, requirements, etc..

Graphical Abstract

Figure 1 on page 3

The [Economic] Decision System represents the set of logical relationships between processes applied to resolve issues that have opened a decision space in the real world community and may lead to the modification of the material state of the habitat.

These processes are systematically structured and represent the formally agreed upon design method by which the community arrives at economic and other decisions that impact the community's habitat. Herein, economic decisions are those decisions that concern the allocation of common heritage resources toward the design, access, and re-integrating of services and technical products to meet a set of identifiable needs using all available information. The system represents the technical encoding and re-encoding of our social information system into our habitat for a common and purposefully oriented "next iteration" of the total habitat system toward a structure of greater potential fulfillment.

The decision system is composed of systematic decisioning processes designed to address the economic movement of common resources in the fulfillment of all human needs, while sustainably optimizing and iterating designs for higher human fulfillment and ecological consideration. Therein, it is a rule set for energy exchange and transformation that defines a system for human fulfillment that accounts for a common real world information set.

The Decision System is neither static nor established, but exists in a dynamic interplay with its environment, the Real World Community Information System. Once a community is organized around a similar information system, then individuals might begin to arrive at similar social understandings and commonly formalized economic decisions. In order to accurately orient economic decisions toward an intentional direction, decision systems must keep track of the underlying environmental conditions as well as the micro / macro changes to the coordinating system itself. If the underlying conditions used to make decisions change, then the decision itself is no longer as correct as at the time it was made. And, when the underlying conditions that inform a decision change the decisions [design] space must change.

The Decision System may also be referred to as a decision[ing] model. Actions that impact the state of the various systems of the Habitat are arrived at within the bounds of this commonly developed and informed decisioning [modelled] space. It is a model that exists to support the community in taking commonly fulfilling action in the real world - "it is a model of our mutuality in a mutually ecological world".

A stable community requires a transparent and person-independent method of arriving at decisions that impact the community and the accessible, safely sustainable restructuring and redistribution of commonly inherited resources. A socially cooperative and transparently formalized decisioning method (or model) allows for the potential existence of such a decisioning system. It is a model that reduces the incentive desire, and systematically generated likelihood, of anyone "making" biased or opinionated decisions about common heritage resources. Instead, economic decisions are arrived at through a common and systematic process of parallel inquiry (enquiry) via information gathering, ordering, and synthesizing into newly feasible designs.

The Decision System is designed to meet the technical needs of the community (e.g., life, technology, and social) in a manner orientationally aligned through the community's value system. The Decision System involves the "calculation of a solution". Calculation is defined herein simply as the absence of opinion or bias in a decision (since the source of the information is verified and transparent - an information trace exists). It is the process of linking a solution to an identifiable problem based on verifiable facts and logical understandings, and synthesized responses, rather than opinions. Decisions made under a political philosophy, persuasive game or contest, stand in contrast to decisions arrived at via a process of calculation being applied as a tool for an intentionally known and fulfilling purpose. In a community with an emergent, formalized decisioning calculation process everyone has the opportunity to participate in the decision process by introducing new data, knowledge, and understandings into the Real World Community Information System from which the decisioning model acquires its inputs. Which, begs the question, who sets up the parameters for the system; who programs the system: we do, in parallel. In community, there are co-creators and design becomes co-construction (Read: ["con" = together with] + ["struction" = structure] = [with structure]). In other words, design at a social level is "socially constructed" from an information set common to the social group. Herein, "development" [of designs] occur through the organization of a lateral [collaboration] network.

If one person's ideas are empirically accurate and another persons are not, then the methods of science and critical integration select the accurate idea and not the one more people may "think" (or be lead to believe) is right. Accurate information can be verified to be so.

As highest creators in the trophic sphere on this planet we have the greatest control over the habitat; we can caretake our ecology or we can send its dynamic life-support systems into decline.

> **NOTE:** *It is very rare for family members to fight over the food on a table when they each know their needs and can see their resources. No sensible person would turn their family into a competitive market-based system. So, why would anyone consider perpetuating competitive-based decisioning among the human family?*

1 What is an economy?

INSIGHT: *Humanity can transform material resources together, or we can transform them against one another.*

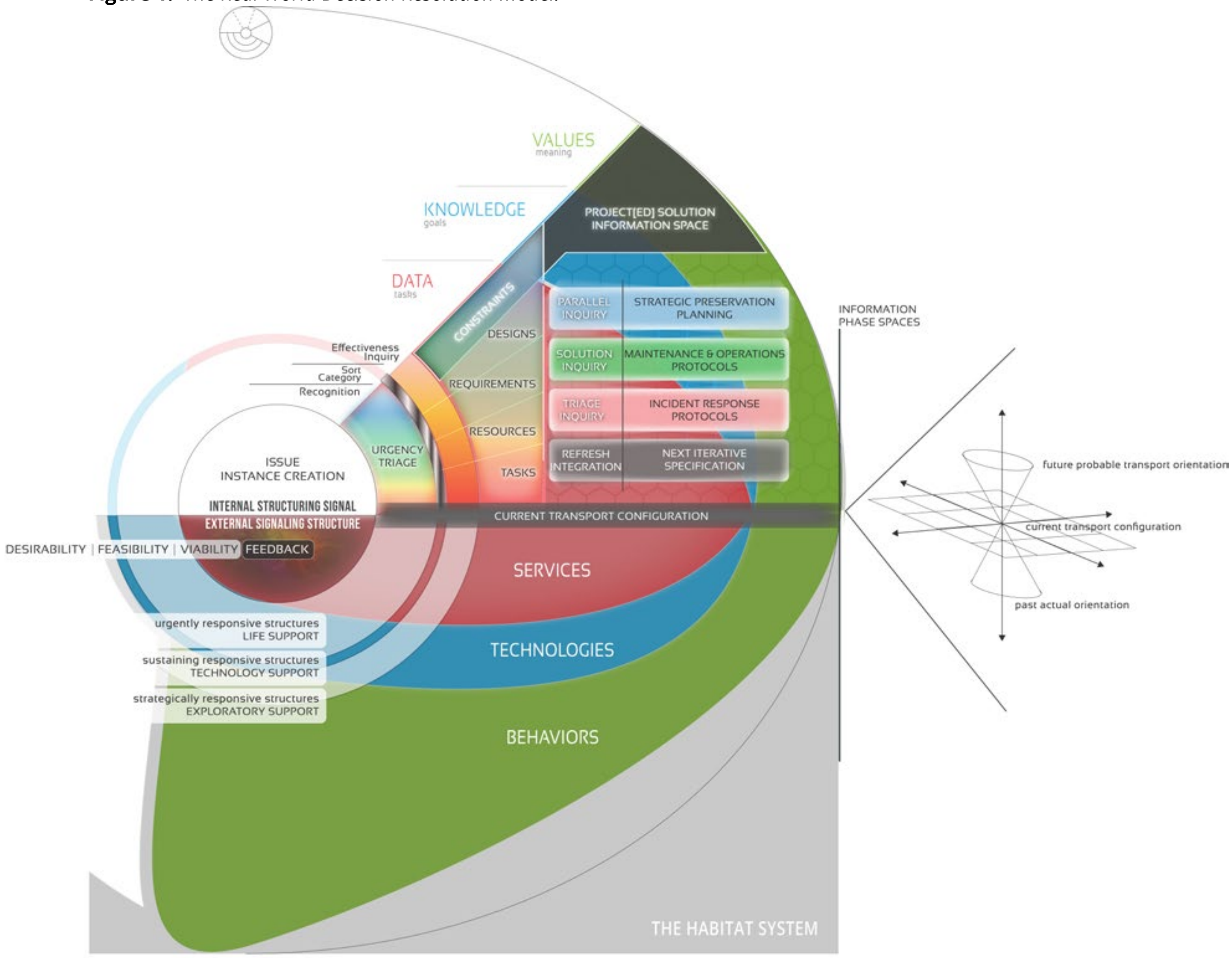
An economy is a system that includes all elements, informational and physical related to the acquisition and transformation of material resources. In community, an economy is a process of user resource contribution and cooperative decisioning -- many users contributing themselves to habitat service, which is coordinated via a contribution service system. Hence, in this way, an economy is the combination of three object qualifiers:

1. Resources.
2. Human contribution (team users).
3. Users (everyone).

In Greek, the word 'economy' means "the management of a household with an emphasis on preserving ones environmental support". A 'natural law economy' is an economy that bases decisions about resource transformations and human fulfillment on the most accurate information model of the "lawfully natural" reality presently known. By this definition there are some "economic systems" that are actually anti-economies for they are not based on models of reality that can accurately orient; and hence, they are less likely to preserve the lifeground from which all material needs are by necessity, regeneratively fulfilled. The aim of a fulfillment-oriented economic model is to "economize", or create efficiency, to conserve -- and hence preserve, to become more coherent in our recognition of our needs and more intelligent in their fulfillment. Herein, a responsive economic system responds to the coherent issuance of human needs in a fulfillment-oriented manner.

The informational environment of an economic system is primarily encompassed by its decision system

Figure 1. *The Real World Decision Resolution model.*



-- an economic system is a decision system at a higher level. An economy is a decision system that accounts for data about resources when resolving issues. An economy is the [efficient] transformation of resources (objects) into needed services and usable objects (products) through decisions. There are many ways of deciding the transformation of resources, some of which involve coercion, others involve trade, some involve contribution, and some involve transparent externalization of their algorithms.

Herein, economics refers to the decision space where human needs (demands) for resources (and their socio-technical configurations) are decided by, and for, individuals among a population. Simply, economics is concerned with the formation of a social decision space where choices are taken concerning the transformation of resources into needed goods and services. The question then arises, how do populations (people together) select the best choices for the transformation of resources into habitat services? More specifically, how does the population get the most fulfilling and optimal outcome from a situation?

An human [life] economy should be measured based upon human needs, resources, and the carry capacity of the environment. Therein, an economy can operate without a price mechanism in that the information required to make the economy work can be performed by computer simulation, extrapolation, and calculation so that the value and demand is represented within a software system. Simply, it is possible to develop a computational system to automate the analysis of human demand and environmental supply (e.g., economic computing).

The very purpose of an economy is the fulfillment of human material need. Therein, one of the functions of an economic system is to provide the capability to order and organize our fulfillment and our life[style] in a particular manner. The economy is the material foundation of social survival. Of note, the basic economy of the world is in fact photosynthesis, the stored sunlight of the world from which everything flows. In a very real sense, photosynthesis is the basic economy of the planet, not money.

An economic model is like any other model, it is a theoretical construct representing component processes as a set of variables or functions, and a description of the logical relationships between them and among a whole.

An economy is the human and technological activity involved in the production, exchange, distribution, consumption, and regeneration/recycling of resources, goods and services, in an efficient manner on the basis of all available information, including human need and a known orientationally desirable value state. In other words, an economy is a material resource transformer. It is a formalized information framework for transforming resources in a common (i.e., community) manner. It transforms resources into more fulfilling and more complex resources, while accounting for their re-integration into the larger ecological system from which further information is gathered.

An economy is a formalized approach toward the allocative transformation of resources into the fulfillment of service needs. There are a multitude of reasons why societies have difficulty in formalizing an economic model. The two most prominent issues are (1) they don't get on the "same page", they do not have a common social organization and they have not identified a functionally useful methodology (e.g., the systems methodology); and (2) they maintain pre-existing (i.e., established) structures that conceal elements of the total societal system, hindering transparency (e.g., government agencies & business entities), which negate the potential for formalizing a set of emergent and common understandings [between fulfilled individuals]. In order to maintain systematic fulfillment of human needs at the community level the individuals within the community must maintain a systems-level approach to systems level issues. The systems approach isn't effectively applied to an established economic system; such behavior is known as "patchwork", which is not systematically enabling (of new intentional system states).

In an economic sense, the social domain holds information on the practices, research & discovery, work-group standard selection, and material expressions associated with the production, use, and management of [spatial] resources'. Economic components can be, for example some of the high-level categories of flow of some-thing are: individuals, information systems, spatial systems, InterSystem Teams, and algorithmic coordinators. Some ways of coordinating an environment are better at meeting human needs and generating human flourishing, than others.

A "true economy" continuously increases in its efficiency as a process of adapting to a dynamic, governing environment. This sort of economy values actions that are scientifically correct, and hence, provide a certain probability of accurately orienting. It necessitates strategic accounting, allocation, and design as derived from proven technical parameters that assure maximum efficiency and sustainability.

What is the difference between "true economics" versus an ideological economic philosophy built upon a series of pre-suppositions that have been given the illusion of permanence? A true economic system is emergently designed and iteratively developed upon transparent empirical findings from the natural world; for if a community behaves in ignorance of existence, then it cannot orient and will "suffer" the natural consequences of the governing system dynamic (i.e., technical existence). An ideology is an orientational philosophy built upon pre-supposed ideas that may or may not have any relation to the real, existent world -- it is the difference between a systems-based approach and an approach that applies the filter of an "-ism".

The integrity of any society, of any socio-economic system, is best measured by how closely aligned its structure and functionality are to the governing regulations (laws and principles) of nature. We can biomimic functional ecological patterns more precisely with more accurate information. And, there are great benefits to this for higher potential expressive fulfillment of our community.

If a society behaves in a manner that negates nature, then it will suffer the technical consequences of nature, which cannot be anthropomorphized. If a society dumps a toxin in their water supply, then such a society will suffer the biological effects (and social ramifications) of that action. If a person consistently gets poor quality sleep, then their biological and psychological well-being will suffer.

The Decision System herein is not an "authority-based" model. It is simply an emergently agreed upon model, commonly developed and informed by a distributed, open community of sharing and cooperating users. New discovers improve the model and do not threaten "establishments" and "institutions", as there are none. Established interests generally seek to limit the transition to systems that might interrupt their establishments (e.g., "market share"). An institution is established by long practice and often develops its own rules. Institutions put up walls to prevent empathy and clear thinking with others. In particular, established institutions maintain an authority-based structure. Transition attempts in a system of established interests (of hierarchical power) are often met with great resistance by the established interests themselves.

Every economy requires at least these two inputs: (1) *human activity* and (2) *technological activity.* And, in a monetary economy *financial activity* is the 3rd input. However, we are not discussing a monetary economy here -- this is a systems-based economy (*3rd activity* = a transparent system approach), and hence, it is dynamically accountable. In a stably oriented and "true economy", an increase in technological efficiency should lead to new technological activities replacing banal human labour activities to free human individuals in the community to more greatly explore their own higher potential of fulfillment. In other words, new technological developments should lead to increases in automation and mechanization activity, services which have the potential to accomplish technical tasks with greater efficiency and to free humankind to develop itself and its capabilities toward higher potentials of existence.

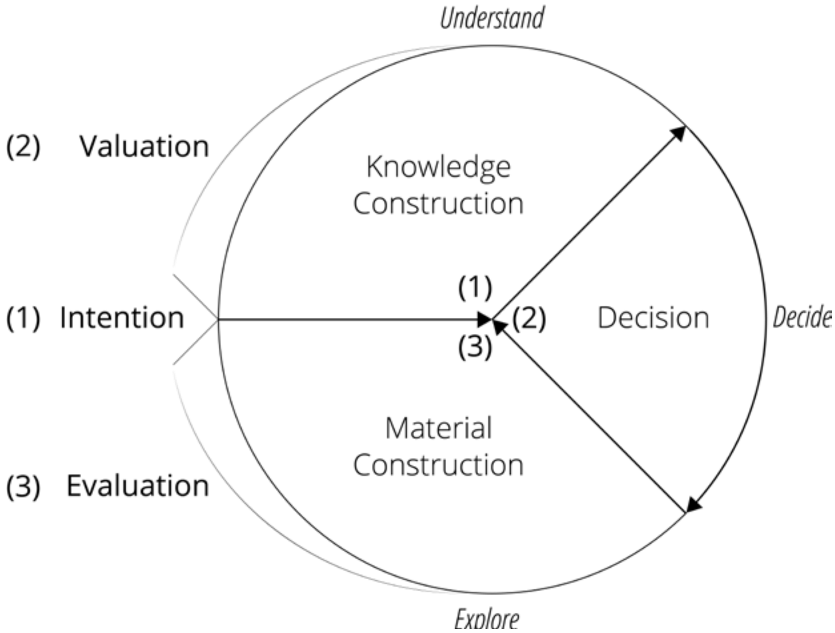
To have 100% trust in a system you must have 100% transparency of that system. Without needing to ask permission and without the belief in authority the real world is open for anyone to *inquire* into, *create* and innovate through, and to *share* mutually. A group of individuals with a shared social orientation toward real world fulfillment are likely to recognize that to act socially they need a model that comes as close to the empirical world as possible. They need a decision model whose outputs (i.e., habitat modifications) are capable of approximating desirable value conditions, those values that fulfill the community's ultimate purpose and goals.

As humanity, we can no longer have erroneous and duplicitous socio-economic systems held in place by elite establishments. A true economic system serves the habitat (i.e., caretaking) and our community (i.e., a consciously interrelated service system), which relies on the habitat for its continued existence.

The economy is ultimately the result of [a set of] core decisions about personal direction and orientation, which might involve questions about the exercise of power and control, and the design of systems that generate states of fulfillment. Herein, some common questions might be: who produces what, for whom, under what structural conditions; who benefits and who doesn't? What is the economic structure of our society and what paradigm of thought regenerates it? Economic power and social power are closely related, they are similarly encoded. And, in some countries they are so related they are almost impossible to tear apart.

Essentially, in order to understand a socio-economic system it must be examined as a whole [information] system. When discussing a society's economic system, said discussion [absolutely] must contain a description of the organization of the social system, which encodes and re-encodes the economic system. If a social system does not encode an economic system with great forethought (i.e., with "universally preferential values"), then its economic structure is likely to maintain a persistent

Figure 2. *Deciding new material resolution through intentional evaluation of old material construction.*



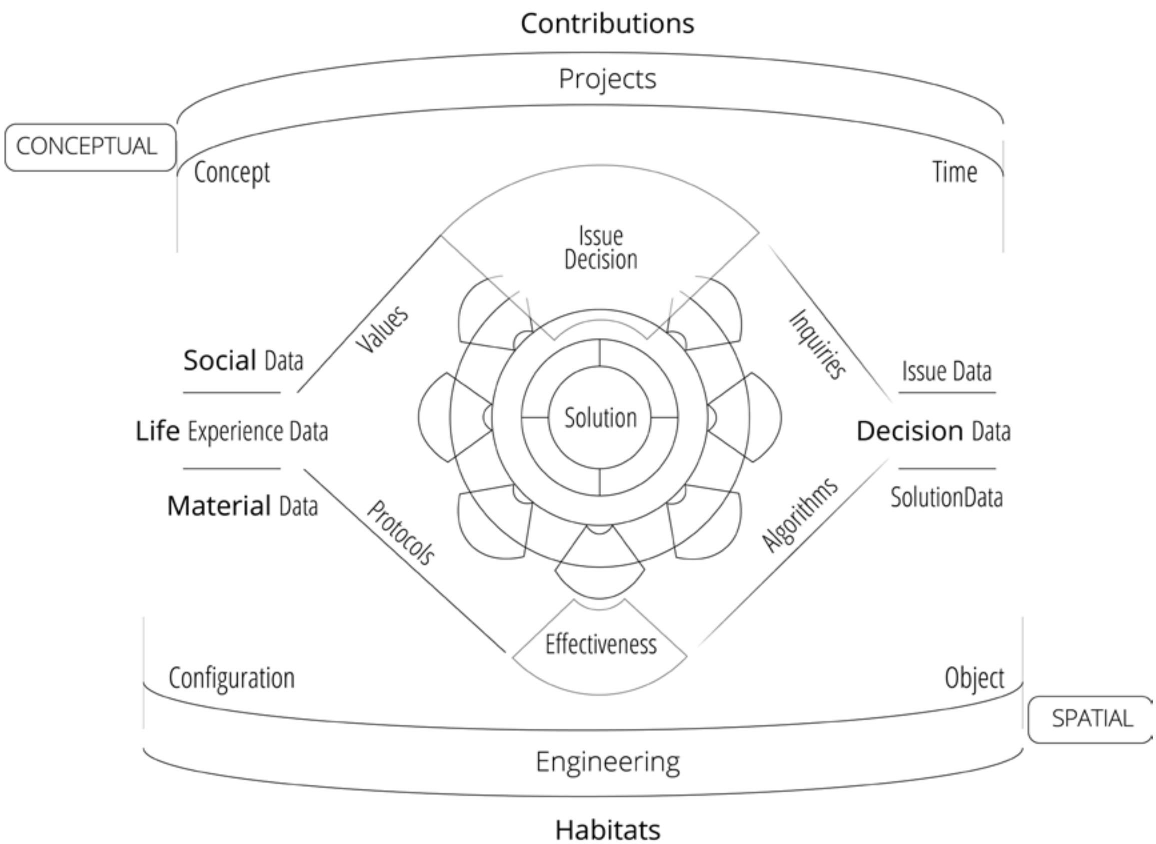
state of insufficient basic and social need fulfillment. An economic design description that does not contain a sufficient description of the social organization that foundations its design is quite unhelpful. To clarify the notion of "encoded", this refers to a system's structural attributes (e.g., values) such as needing, for example, "to compete" in order to succeed [in the market economy]. Encoding refers to structure that is built into the system's framework, or encoded and reinforces particular behaviors.

Significant questions for the generation of an economy might include:

1. How can we live and flourish within the real limits that our planet gives us?
2. What is a necessary and sufficient condition for sustained fulfillment and ecological consideration?
3. If the rules of a socio-economic environment maintain a primal state of competition among persons in a society, then what are the biological, psychological, and sociological results of that?

A true economic decision system is simply a formally engineered system, into which we feed our demands for a comprehensive service feasibility evaluation, based upon factually informed protocols (e.g., efficiency and sustainability protocols).

Figure 3. *Conceptual and spatial resolution of a common solution to optimal, mutual human life experience by means of resolving issues through contribution and project-engineering of the habitat and larger societal system.*

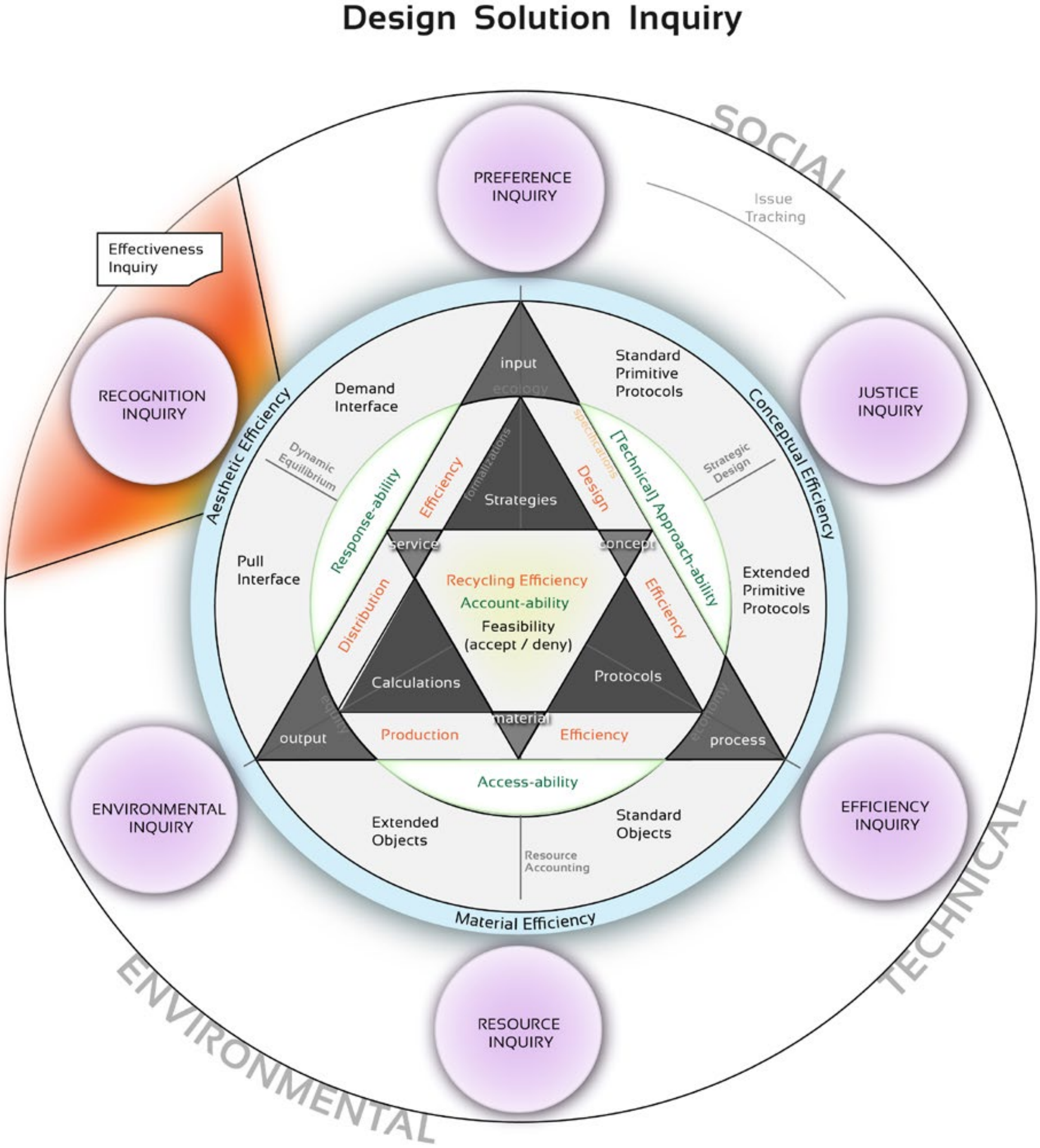


2 What is a socio-economy?

The term 'socio-economic' implies that there exists an inherent relationship between a society's social organization and its economic organization. Both social and economic relationships concern how we interrelate and to whom we relate. Herein, social interrelationships can organize, if effectively coordinated, the sufficient fulfillment of all known economic need through a commonly decisive, socio-economically frameworked systems approach.

Whereas the Social System models social issues, the

Figure 4. *The Decision System high-level inquiry-view of the global decision protocol. Design solution inquiry model - availability to everyone on an equal basis.*



Decision System models material problems, which are also social problems.

A community requires a way of thinking about society that is designed to actually meet human needs. A design that has the potential to provide every human being in the community with a shared high-quality of living, at any scale, while protecting the integrity of the environment (i.e., our home and habitat), and removing the basis for scarcity-driven sources of conflict (including war and poverty). A community necessitates a more systematic, critical and scientific approach to "economics", one whose reference is the real world, "natural law", and the Earth's resources, rather than the movements of money, and the exchange of products and gifts.

It cannot exactly be said of a true socio-economic system that within such a system "collective interests transcend the individual interest". If social and economic systems "transcend" (Read: eclipse or are superior to) the individual, then they cannot at the same time claim that they are designed to fulfill the needs of individual human beings. The statement, "transcend the individual," indicates the potential or even need for the establishment of a power hierarchy over the individual such that s/he remains in-line with the "transcendent" system. Such is the type of euphemistic claim an "authority" figure might make. In reality, social and economic systems do not "transcend" the individual interest, and the use of such language is not a correct way of describing a community's decisioning organization. The socio-economic systems of a community are an interest of each individual in the community, and they arises out of the individuals desire to have his or her needs fulfilled in a cooperatively organized manner. Systems cannot be said to "transcend" the individual when they are informed by individuals. Note that sometimes the concept "to transcend" is being used in place of the idea of "emergence"; in such a case it would be preferable to actually use the term, 'emergence'.

Economic decisions have individual, social, and ecological ramifications. And, economic decisions are the products of the encoding of social understandings.

> **NOTE:** *When corporations create [social] culture through their designs and the release of profit-oriented products, then the integration of commonality into community is unlikely to be present. It is fundamentally unwise to allow an economic system to modify its accompanying social system haphazardly, which is [in part] that which is occurring when market entities "create culture".*

Approach: Decisioning in a Community-Type Society

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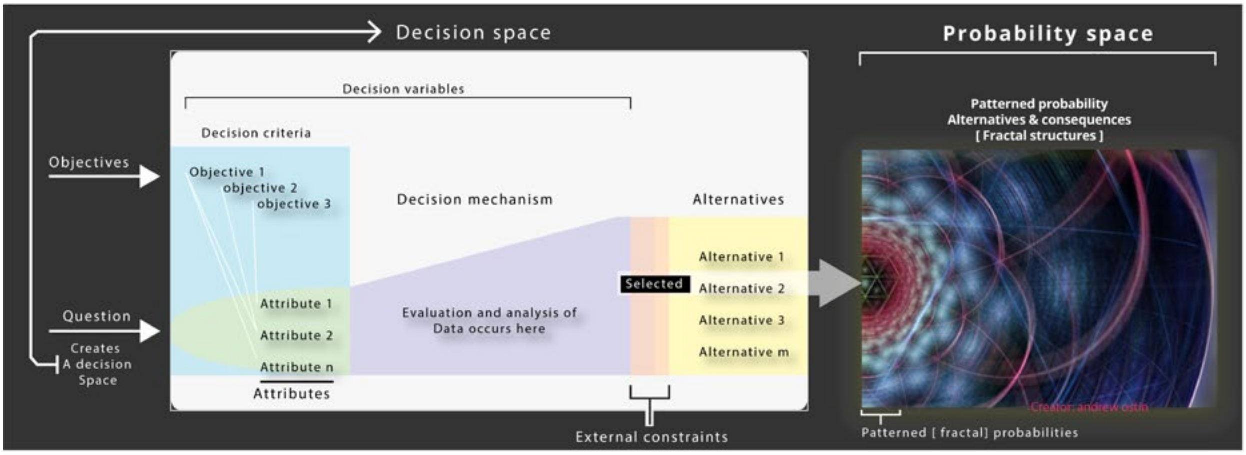
Abstract

It is likely that a community-type society would model and visualize its decision system in order to ensure an understandable and verifiable outcome. The decisioning process of a society can be described and modeled. The useful result of modeling is a decision support system by which decisions are algorithmically processed for some decisioning entity. Once there is realization of decisioning, there may emerge realization of decision support. There are decision support technologies, including computational and storage systems. By understanding what a decision is, it is possible to configure a decision system so that it embeds cleanly in an adaptive societal system. If decisions are not well understood, then behaviors are unlikely to be well understood.

Graphical Abstract

Figure 5. *The basic elements of a decision space (or decision system) with a fractal probability space on the right of the model. Here, a decision environment is resolved through the selection of one of several alternative solutions after the use of a method has been applied to integrate all relevant information and produce the alternatives.*



1 Introduction

A decision is a conceptual space within which one of two or more feasible alternatives is selected; denoting a process of "deciding". Most commonly, an alternative is selected based upon it having (1) the highest probability of success or effectiveness or (2) best matching with a particular factor(s), such as a goal, objective, or value. A decision can resolve into a determined course of action [an action], a preference, or an assumption. The space that a decision holds ends once a selection of the alternative options occurs. A decision is created and a 'decision space' opens when an answer to a particular problem or question is sought; all decisions requires a question. However, some decisions do not involve a problem. In other words, all problems involve a decision, but not all decisions involve a problem. For example, deciding whether you want dark chocolate or milk chocolate is not, in and of itself, a problem frame. Deciding how many dark chocolate bars to milk chocolate bars to manufacture does represent a problem frame. Decisioning is a means of controlling the influence of an outcome.

All decisions are decided upon within a 'decision environment' (or 'decision space'), which is defined as the collection of information, alternatives, tools, and deciding factors (e.g., goals and values) available at the time of the decision. The decision environment is bounded by these elements. And, when these bounds are "resolved" through a clarification of the information, then the decision space "resolves".

Decisions and the environment determine the potential available to the deciding entity. An ideal decision environment would include all possible information relevant to the decision, all of it accurate, and every possible alternative. Hence, the information-gathering function of the decision process is of great importance. Because decisions involve a bounded environment, it may be stated that the major challenge in deciding is that of probability, and a major goal of the deciding entity is to reduce uncertainty by gathering more accurate information. The process of deciding generally involves sufficiently reducing uncertainty (or doubt) about alternatives to allow for the selection of the most reasonable, rational, and valued alternative based on the information available. However, for most decisions uncertainty is reduced rather than eliminated. Very few decisions are made with absolute certainty because complete knowledge about the entire universe of alternatives is seldom possible. If there is no uncertainty, then all information leading to the optimal decision must already be present.

The concept of a decision allows for the selection of an option based upon both subjective and objective means. Objective decisions apply a set of objective tools (e.g., criteria, model, process, or strategy) for structuring and analyzing a decision. Subjective decisions often involves the contextual emotional state of the decider and may be based on incomplete or inaccurate information, or cultural and personal biases/opinions. Objective decisions may also, though not necessarily by intention, be based on incomplete or inaccurate information.

The act of deciding can be characterized in two distinct ways: (1) *arriving at a decision* [possibly involving an objective process] or (2) *making a determination* while discarding all other options by choosing through a contextually subjective or biased emotional state. Notice the two italicized words, "making" and "arriving". These words establish different orientational perspectives toward the decision process.

In terms of decision quantity, there are:

1. One time decisions.
2. A complex of decisions (e.g., a service system or a team).
3. Pre-determined decisions (e.g., procedures, protocols, and algorithms).
4. Repeated cyclical decisions with inertia (e.g., habits).

> **NOTE:** *It is through our choices that we grow, and if we are ignorant of the context how can we grow.*

2 Arriving versus making decision

INSIGHT: *Access to more accurate information provides the opportunity, the probable possibility of moving into a different perspective.*

The two phrases, "arriving at decisions" and "making decisions", are often used synonymously. Both phrases indicate that something is being decided. However, there exist nuances in the semantics of the verb phrase "arrive at" and the verb "to make" that have a subtle, yet distinct impact on the meaning of the decision-related phrase in which the terms are used.

The verb phrase "arrive at" [a decision] indicates the existence of a process leading to a decision. Speaking metaphorically, all decisions include a journey (process) prior to their destination (decision), and the usage of the verb "arrive" maintains this meaning. There are many viable travel metaphors when it comes to the discussion of decisions. The verb connotes some form of travel and the reaching of a destination. Its use signifies that something more substantial than just a thought, opinion, emotion or belief was used when deciding.

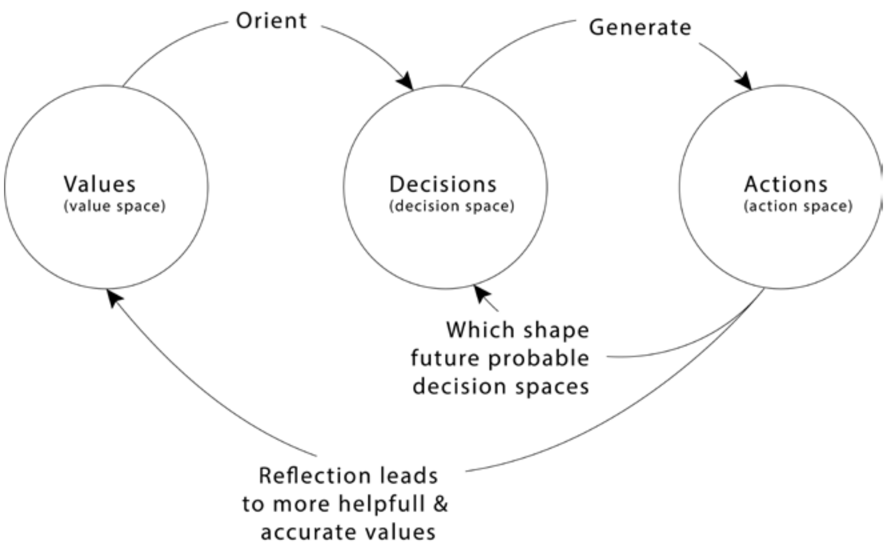
Unlike the phrase, "to arrive at a decision", the term "decision-making" does not appear to convey the idea that a process led to a decision. If someone "makes" a decision based upon their own narrow (or limited) opinion of things, then the word "make" is likely appropriate. However, if a decision involved even the faintest of analyses, of calculations, of weighing and of reasoning, then the verb phrase "arrive at" would appear more suitable. The term "decision-making", however, could be modified so that it is more descriptive. The phrases "transparent decision-making" and "decision-making process" include concepts that more clearly suggest the involvement of a process prior to the arrival of a decision.

Even the smallest of decisions by the human organism includes a process; for the process of deciding is one of the 37 fundamental cognitive processes modelled in the layered reference model of the brain (LRMB) (Wang, 2006). Thus, even if a decision was "made" based upon a single persons narrow opinion of things without any additional conscious analysis or weighing, their brain still went through some form of neural process to nevertheless "arrive" at the decision. Therefore, the difference in the usage of the terms "arrive at" and "make" in the context of deciding appears largely to speak to the degree of awareness the decider(s) has in how s/he actually came to a decision. Along this line of thinking, "decision-making" would primarily be considered an unconscious process and "arriving at a decision" a more conscious one - where the decider maintains an awareness of that which transpired during the decision process and is able to rationally explain why they selected a particular alternative.

There are a multiplicity of methods by which more than one decider may "make" a subjective decision. Voting is one of those methods. Voting involves the appearance of a process of some form prior to a final decision. However, voting is actually more of a "decision-making event" rather than a process of "arriving at a decision", for voting is a win or lose tally model in which one alternative is "won" by numbers as opposed to concern for the issue itself. Therefore, voting stands in contrast to algorithms and other decision methods that involve input and processes leading to the arrival at a final decision. In the case of voting, the process of voting is itself the final decision; even though there may have been a process of arriving at options and understandings prior to the vote. In its application, voting often appears as a contest where the majority wins the decision as opposed to the community arriving at a final decision via a reasoned and logical process of information collection, verification and processing. But then, some decisions do not have a single best outcome, as is the case with many decisions of preference (i.e., preference choice).

Mob rule is having 51% of a group overrule 49%. Does that make the 51% "socially correct"? Does it mean anything to be "socially correct"? What does it mean to be technically correct? Science transcends subjective feelings at a social level through falsifiable evidence, not just through the inter-subjective counting of heads (i.e.,

Figure 6. *Values orient a decision space for more accurately predicting future probable spaces, by means of actions generated as a result of decisions. Actions lead to different future probabilities, and reflections upon action may update values.*



voting).

The market-State has two markets, the commercial market and the political market (the market for power-over-others). In the commercial and political market, votes are cast with currency.

Is voting the best way to make a decision about what "you" need or what "you" will and won't have access to in the future? Take nutrition for example. Is there a democratic protein, a republican amino acid in the scope of what humans need and have the potential to organize? Is need fulfillment supposed to be determined by belief or by voting? Notice that the very idea of voting becomes nonsense when applied to human need. And, this is regardless of the question of how propaganda (a.k.a. public relations), commercial persuasion (a.k.a. advertising and marketing), and social influence (e.g., group think, crowd behavior) impact the effectiveness of a majority rule doctrine (such as democracy). Propaganda is far more insidious than overt control with guns for those without the ability to filter its influence do not realize how they are being changed by it, they just change. The "propagandised" often don't know what is happening to them, it just does.

In effect, majority voting is a representation of a system that values one dominant group over another, the majority over the minority. This is otherwise known as the "tyranny of the majority". Also, when a group of people agree that majority rules, such as in "issue voting", then it could be said that it is the circumstances of the situation that "make" the decision for the group. The identifiable composition of the group creates the final decision (notice the subjectivity and objectivity; subjective group preference and objective group identity). For example, when two political parties are vying for a single political office, then the voting public with the greatest representation in the vote will "make" one of the political parties the likely winner. There are a wide-variety of other situations where environmental circumstances can "make the decision", such as when only two options are available and one of the options becomes unavailable. For example, a hiker mapped out two alternative trails prior to the hiking trip and upon arrival at the trail where the alternatives diverge, one of the trails is closed due to maintenance and safety.

Fundamentally, within any organization or group of people decisions have to be made and someone or something has to make them or, preferably, arrive at them [transparently]. The subtle distinction between the terms "make" and "arrive at" becomes increasingly important the more interrelated individuals become. The usage of an "arrive at" approach leads to the adoption of a formalized, transparent, and emergent decision process.

As long as people think in terms of "who are we going to vote for", then they are looking in the wrong direction and do not understand either the scope or the source of the problem. In early 21st century society, decisioning is highly about access to the "decision maker" or "decision leader" of the day (i.e., access to politicians and executive businessmen). In contrast, in a community-type society, decisioning significantly involves transparent modeling of the overall information space and an objective decisioning process.

3 A decision space

INSIGHT: *Decisions involve the nearly ubiquitous system's process of: input > process > output.*

A 'decision space' (a.k.a., 'solution space' or 'action space') opens when a decision question is asked or a problem is presented, and it enables the resolution to a decision question. A decision space includes available choices, some of which are optimal choices and others of which are poor choices [for any given purpose]. Most decisions in social, economic, and engineering environments involve some form of a conceptual or technical problem. A decision space may also be called an 'action space' if the decision must resolve into action (or non-action). An action is something that influences an environment. A basic decision space consists of a set of *decision variables* that have a relationship with a set of *decision alternatives* being evaluated in a *decision process (or through a decision mechanism)*.

The term 'decision space' includes the word "space", which implies the existence of objects and events in an active and interrelated area where something occurs. A decision space is a place where events occur to objects and information maintains a flow [until the space is resolved]. With this consideration in mind, there are several commonly used definitions for a decision space that are semantically inaccurate. For example, the term 'decision space' is sometimes referred to as "the range or list of available alternatives". Since these "alternatives" are simply objects and do not represent activity or events they cannot by themselves be a decision space. Instead, they are information in a decision space, and are not the decision space itself. The only context in which this truncated definition for the term decision space makes rational sense is when someone is "making a choice" between potential outputs without the actual act of processing any inputs. As was noted earlier, this often happens when personal bias, opinion, or emotion, "make the choice".

Further, it is semantically imprecise if not inaccurate to use terms like "input decision space" and "output decision space". Neither input nor output represent a process; instead, they represent a one-way flow of information -- they represent objects excluding events. The same logic also renders inaccurate the definition of a decision space as "the inputs and outputs of a decision". Again, these elements are information in a decision space, but are not the decision space itself.

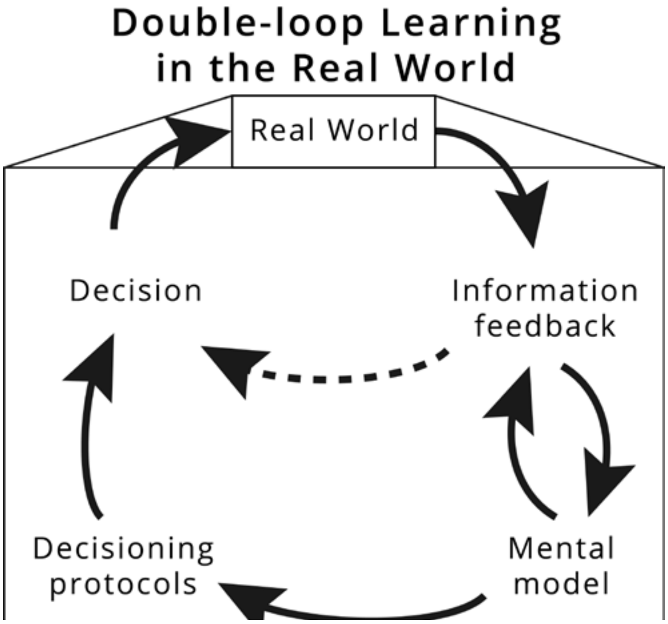
Decision spaces exist in the context of other decision spaces. The typical metaphor used to explain this is that of a stream. There are a stream of decisions surrounding any given decision; many earlier decisions have led up to this decision and made it both possible and limited. Many other decisions will follow from any given decision. Another way to describe this situation is to say that most decisions involve selecting from a group of previously known alternatives, made available from the universe of alternatives by the previous decisions. Previous decisions have "activated" or "made operable" certain alternatives and "deactivated" or "made inoperable" others. It might be said, then, that every decision space: (1) follows from previous decisions, (2) enables many future decisions, and (3) prevents other future decisions. When computers arrive at decisions within the context of other decisions the process is known as 'stream computing'. Data stream computing enables real-time analysis (or liquid analytics) of incoming information.

The very idea that a decision space exists in the context of other decision spaces leads to the inclusion of the idea of probability. In a decision space probabilistic information entropy models (i.e., patterned fractals) may be used to represent the uncertainty associated with the relevant information elements needed to resolve the decision. Understanding change is more than a linear projection, it appears as a probability patterned continuum. When a decision is taken and resolution of the decision space leads to an action, then the action will modify future probabilities [that will either help us all grow and develop, or not grow and create suffering, based on our decisions].

Some possibilities are more probable because of the decisions that have come before and the information already in the decision. In other words, past decision spaces affect the probability of future decision spaces. The future isn't set in stone; it is probable and it depends on the choices we make as individuals in society. The designs and concepts that we choose do in fact matter.

The decision space of a living organism represents its latitude to exercise free will. Therein, the information in a decision space reflects the awareness level and pattern recognition ability of the deciding entity.

Figure 7. *Rational double-loop learning applied to decisioning in the real world in order to feed back information to improve the whole system.*



When life is viewed as patterns of resonance then a spectrum of more capable relationships appears, all of which connect on a larger scale that allows for shared community/communities (of mind). A truly civilized kind of identity, although it poses new challenges. A more complex universe is within you, so you must learn to accord within a more complex universe. Evolution is in every term of the equation; it's always part of our makeup.

As individuals and society grow [in awareness and knowledge and consciousness] and lower their entropy, their decision space (by consequences) becomes larger, and therein, they can see the world from a wider perspective (i.e., one of greater integration and unification). When someone perceives the world from a wider perspective there is more of a realization that any given problem can be approached from many different angles. And possibly therein, individuals may come to see that that which was thought a/the problem is not actually a/the problem, or is just a symptom of a larger root problem. Herein, humanity may come to realize that its level of freedom depends highly on its level of awareness (or consciousness). The more conscious individuals are of themselves and their environment, the more information (i.e., data, and knowledge) they have available to their awareness to develop an optimally structured decision space. Some societies restrict awareness artificially in order to subjectively influence and control the decision space of their members. There are environmental conditions that influence our ability to make "good decisions". Herein, the notion of "personal responsibility" becomes significantly more complex when the environment is accounted for. Fundamentally, there are real limits that everyone faces when it comes to making "good" decisions in a complex and dynamic environment.

3.1 Decision space elements

A decision space is composed of multiple interrelated elements. The three most general components of a decision space are inputs, processes, and outputs. Herein, a decision space is a coherent environment for integrating input, process, and output via the nearly ubiquitous systems methodology. Essentially, a decision space allows for decisioning (i.e., arriving at decisions) in an explicitly defined and systematic manner. The output is the selection of a decision, the process is the structure used to organize the inputs and arrive at a decision, and the input is the collection of information to be used in the process of deciding.

In a decision space, a **decision variable** is a variable under the direct input control of the deciding entity applied toward the evaluation of the decision alternatives. For example, if the decision involved the purchase of a car, then some of the relevant variables of this decision might include purchase price and budget, gas mileage, driven terrain, comfort, environmental considerations and other variables relevant to purchase of an automobile. Decision variables include: (1) the attributes (and to a lesser extent objectives) used for evaluating the alternatives; and (2) the decision mechanism used in the evaluation, analysis or algorithmic process. There also exists a set of uncontrollable variables known as external constraints.

The generic usage of the term **criterion** denotes the concepts of "attribute" and "objective". In the decision space, a criteria is the clarified meaning of a decisions objective(s) and the characteristics (or attributes, attributed requirements) that each alternative must possess to a greater or lesser extent. The set of criteria in a decision should reflect all concerns relevant to the decision question or problem, and include measures for satisfying the objectives of the deciding entity. Such measures are called attributes (or metrics), which are derived from the decision's objectives. Please note that some people use the words attribute and criterion synonymously and other people use the word attribute to refer to a measurable criterion [as is the case herein].

A **decision objective** is a variable detailing the decisions intended resulting effects. Ultimate objectives (or 'terminal objectives') are usually framed in terms of their value orientation, such as economic sustainability, resource usage efficiency, and social cooperation. These are the high-level resulting effects desired from a decisions output. In a community the objective criteria are the community's orientational and operational values. The concept of an objective is made functionally operational in the decision space by assigning to each objective under consideration one or more **attributes** that, directly or indirectly, measure the level of an objective's achievement in the consequential probability space.

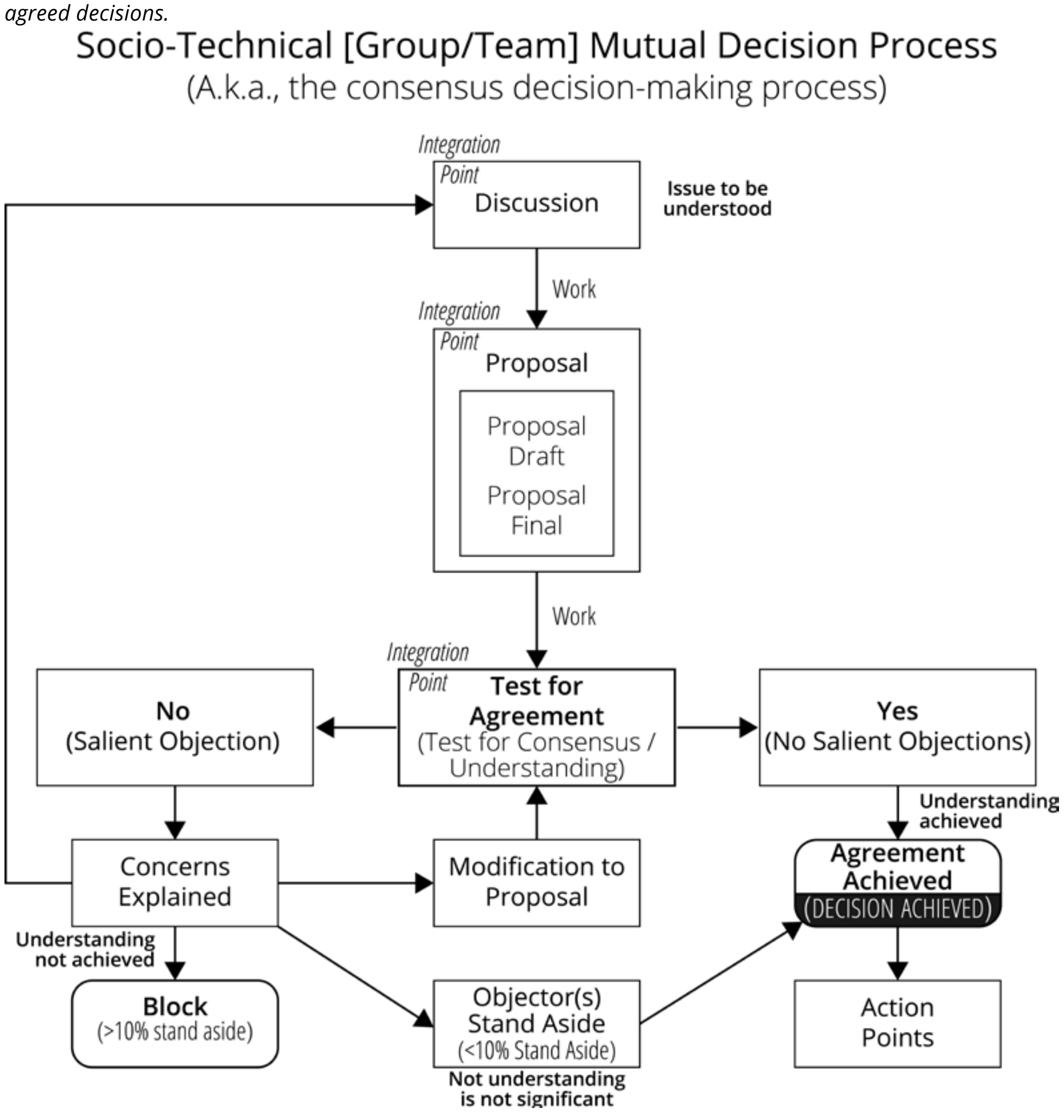
The relationship between objectives and attributes has a hierarchical structure. At the highest level are the most general objectives (root objectives, goals, purpose(s), and values). They may then be defined in terms of more specific objectives, which themselves can be further defined at still lower levels. At the lowest level of the derivative hierarchy are attributes, which function as quantifiable indicators of the extent to which associated objectives are realized within a space generated by a decision question. Attributes and objectives are both decision variables and decision criteria. Criteria have at least five desirable properties: unambiguous; comprehensive; direct; operational; and understandable. (Keeny, 2004) Regardless of the complexity of the decision, criteria may be formulated and arranged into a priority hierarchy. Also, a criterion may implicitly or explicitly imply a constraint.

Constraints are limitations imposed by the discoverable boundaries of nature or by human beings that may preclude the selection of certain alternatives in the probability space. They represent restrictive conditions and real limitations. There are various kinds of constraints, including but not limited physical constraints (e.g., the availability of resources), value and moral constraints, logical constraints, scientific and technical, and cost constraints. **External constraints** (or environmental constraints) are uncontrollable inputs (vs. criteria, which are generally considered controllable). Constraints can be used to eliminate from consideration alternatives that are characterized by certain attributes. A "constraint map" displays the set of feasible alternatives (versus the universe of known alternatives).

Decision alternatives are the list of available decision options at the disposal of the deciding entity, the "feasible set". Each alternative represents a different final decision, a different arrangement of information. For example, a clothing designer may have to decide whether to use the colors blue or green or both, which would represent a finite feasible set of three decision alternatives. Alternatives can be identified by searching for them as well as developed (created where they did not previously exist). Normally, constraints exist restricting the feasible set of alternatives to a subset of alternatives. When building a material system the constraints may originate from resource restriction, carrying capacity, and functional usage. Essentially, the application of constraints to the decision space yields an implicit definition of the feasible set of alternatives; even though the individual alternatives may not be explicitly known upon the creation of the decision spaces. From a theoretical point-of-view, there is no major difference between an explicit or implicit definition of the feasible set. However, in the latter case there is the additional problem of identifying feasible alternatives.

The **decision mechanism** refers to the process by which the decision is resolved and an alternative selected. The decision mechanism explains *how* a

Figure 8. *Flow diagram depicting the mutual decisioning process that occurs in most team settings under community-type societal conditions. Team discuss issues. Teams propose information. Teams integrate information together. Teams test/question each other for consent, agreement, and understanding. Team members may or may not have objections. Proposals may be modified once concerns are explained. Actions are based upon achieved and agreed decisions.*



decision is to be arrived at. It details the specific decision process (technique or tool) that analyses all relevant information and resolves the decision space. The decision mechanism process is frequently known as a "decision analysis".

Decision analysis is a systematic approach to deciding that involves the examining and modelling of sequences or pathways of diagnosing an issue, resolving a decision, and solving a problem. A decision analysis may be expressed graphically in the form of a decision model or decision tree. Generally, decision mechanisms identify relationships between input values, and then examine those relationships in a progressively resolving context that creates an increasingly cohesive set of information, which eventually reaches a functionally useful threshold that triggers the resolution of the decision space by a selection of one of the alternatives. In other words, the purpose of a decision analysis is to select one of two or more feasible alternatives through some form of analytic tool, of which there exist a variety of options. Analytical decision support tools include, but are not limited to: decision trees; influence diagrams; algorithms (decision algorithms); statistical tests; multi-criteria decision analysis; the analytical hierarchy process; optimization analytics (directs best possible outcome); cost-benefit analysis; naturalistic decision analysis (e.g., Bayesian models); and various other analytic tools. All analytical tools provide systematic and structured guidance; however, more advanced analytic techniques may be distinguished from traditional analytic techniques by the fact that they require a supporting data management system, which to a great extent has changed the decision analysis landscape of many organizational institutions.

This economic decision system may be described (in part) as a formalized 'decision analysis' system. Ronald Howard (2015) developed the functional idea of 'decision analysis', and it is an analytical mechanism that allows for the development of as rational a decision as possible by putting all of information about a topic into a formalized calculation system. Decision analysis involves systematic reasoning about the total known system, including the fulfillment of all individuals. In a community-type society, the Real World Community Model unifies all societal information, and therein, the decision system is the formalized and explicit computational resolver of all decisions.

Influence diagrams are a conceptual modelling tool that graphically represents the causal relationships between decisions, external factors, uncertainties and outcomes. Influence diagrams are useful for modelling and visually representing the 'problem space' (or 'decision problem'). Decision tress and influence diagrams are complementary visualization tools for modelling a decision problem.

A decision tree is a diagrammatic representation of the possible outcomes and events used in the decision analysis. It is also a way to display an algorithm. A decision diagram is composed of nodes and branches, creating an arborization effect. The steps proceed sequentially with each step depending on the decision arrived at in the preceding step. Decision trees are produced by algorithms that identify various ways of splitting a data set into branch-like segments. These segments form an inverted decision tree that originates with a root node at the top of the tree. The information object of analysis (i.e., problem question) is reflected in this root node as a simple, one-dimensional display in the decision tree interface. See Figure in-4 for a very basic example of an decision tree diagram.

A decision tree is a useful tool for the mapping of branching decisions and providing a framework for solving a problem. Whereas decision trees display the set of alternative values and variables for each decision as branches coming out of each node; the influence diagram shows the dependencies among the variables more clearly than the decision tree. The decision tree shows more details of possible paths or scenarios as sequences of branches.

A decision tree is one way to display an algorithm. An algorithm is a set of steps or rules (a protocol) that is followed to solve a decision or derive understanding. It involves a series of decisions, where input data is arranged or rearranged to lead to an outcome (or final decision selection). Although algorithms function best in decision situations where all elements of the solution are present, they may also be used under circumstances of uncertainty. A decision algorithm is a type of algorithm that answers a decision problem with either a yes or no. Such problems are central to computer science and ubiquitous to the socioeconomic and natural sciences worlds.

The process of modelling and solving a problem question with two or more non-commensurable and conflicting criterion is known in the literature as multi-criteria decision analysis (MCA). Criterion are non-commensurable if their level of attainment, with respect to given attributes cannot be measured in common units. Criterion are conflicting if an increase in the level of on criteria can only be achieved by decreasing the attainment of another. Usually, a conflict arises when the attainment of each criteria in a decision requires the shared use of limited available resources.

INSIGHT: *Models, metaphors, and premises can only be stretched, with the information available, so far, before entering into logical inconsistencies and contradictions. Therein, it is wise to perceive a contradiction or inconsistency as a knowledge gap that might be inquired more deeply into.*

4 Decision modeling

INSIGHT: *There is a higher optimization of potential when we base our decisioning upon nature, our lifeground.*

Herein, decision making refers to the directing of attention to the consequences, needs, values, data, and other factorial variables. Yet, decisioning does not just involve perceptions, but it requires analytical overlay and the systematic arrival at a decision. In truth, by the time someone comes to the end of a frameworked decisioning process the decision is very often self-evident - it frameworks the design itself. With sufficient information decisions can be somewhat rhetorically said to "design themselves". When laying things out clearly, like way-points and obstructions on a roadmap, the decision is often self-evident. The nature of the problem suggests its solution. By resonating into a larger and more universal context a problem can be seen more clearly and solved with greater grace.

A 'decision model' is a visual representation of the structured logic framework, involving processes and activities, that are followed to arrive at a decision (i.e., it is a model of the decision mechanism). It models logic and is based on the inherent structure of that logic, eliminating style and other subjective preferences, ensuring a consistent and stable representation. A decision model (or mechanism) is simply a tool that allows for a thorough analysis (and sometimes synthesis) of available decision inputs and alternatives. In general, a model is a simplified representation or abstraction of reality, and many "real world models" - models that are intended to reflect the way in which the world actually works - may be significantly accurate or inaccurate in their alignment with objective reality. Decision models are used to visualize a decision space and modelling is essential to any transparent and collaborative decision.

There exist a number of decision models, including but not limited to rational, recognition, and naturalistic, or some combination thereof. In the Community the contextual environment in which the decision arises determines the selection of a decision model. When time is available, the most accurately available, rational decision model is applied toward the selection the most reasonable (best or optimal) course of action based upon the information available at the time. When an emergency (or urgent situation) with a higher degree of uncertainty is identified, then a more naturalistic decision model is applied.

A decision model must adapt to new information when it becomes available, otherwise the model is likely to become an increasingly inaccurate representation of the real world, and clearly, less rational. The ability to adapt to new information when it becomes available is commonly known as 'strategic adaptation'. If an entity does not adapt its decision process as it receives new information, then its decisions are likely to become increasingly unpredictable and potentially less aligned with its desired outcomes. Imagine for a moment an archer who for several seconds before releasing an arrow toward a target, fails to account for the abrupt change in wind speed and direction. The final resting place of the arrow becomes unpredictable as soon as the archer stops accounting for incoming sense data about the wind. Also, as an archer is learning archery s/he will be introduced to new information that will cause him or her to revise and update the decision model being used to accurately hit the centre of the target. The archer might first be introduced to the concept of wind and then later the concept of rain -- additional concepts modify the archer's decision model so that it more accurately reflects the consequential realities of archery in the material world.

Real world decision problems are characterized by the following conditions:

1. A list of all possible alternatives (the actions/ decisions).
2. A list of possible future states (the outcomes; states of nature, of a system).
   A. A "state of nature" is an outcome over which the decision taker has little or no control.
3. Impact associated with each alternative/state (of nature) combination.
4. An assessment of the degree of certainty of possible future events.
5. A decision criterion (rules, a ruleset, requirements, etc.).

Decision problems can be formed into tables (decision matrices), for example:

Matrix Z		State of Nature (j)		
	$a_i \setminus s_j$	s_1	s_2	s_3
Alternative (i)	a_1	Z_{11}	Z_{12}	Z_{13}
	a_2	Z_{21}	Z_{22}	Z_{23}
	a_3	Z_{31}	Z_{32}	Z_{33}

- Wherein,
  - a_i - i^{th} alternative.
  - s_j - the j^{th} state of nature (event).
  - V_{ij} - the impact that will be realized if the alternative i is chosen and event j occurs.
  - $Z_{11}...Z_{33}$ - the matrix coefficients

4.1 Visualization

A.k.a., Visual modeling.

Visualization provides a visual model that everyone across an organization can point to in order to identify objects and relationships, and thus, facilitate decision alignment (between individuals). Visualization of data is essential for decisioning in community in order to ensure a shared understanding to determine a shared resolution. Making a structure visible (as well as traceable); it is possible to immediately see which parts are important and how they interconnect. Through visualization and standardization a proof-of-concept may be developed and tested. All systems can be visualized, and ought to be visualized prior to integration into a common life-support, habitat service, system. Community modeling can solve many of the world's current problems. For example, resource coordination will resolve most resource shortages when demand is filtered through human need prioritization, rather than market privatization. It is possible to visualize object and information flows. Therein, technology is not a panacea. However, it can be extremely useful in solving many kinds of problems. Fundamentally, it is important to visualize the model (Read: the system) so the users know what it is doing, how it influences, and what it is likely to create.

> **INSIGHT:** *It is possible to visualize and model common human fulfillment ("collective welfare").*

Decision visualization objectives in a community environment may include, but are not limited to:

1. Cognition objective:
   A. The objective is to model the construction of the system as a conceptual specification by investigating the potential of all alternatives. The result is:
      1. Documentation objective:
         i. The objective is to describe and explain the possibilities and constructabilities of the solution specification.
            1. Kernel specification
            2. Handbooks
      2. Illustration/drawing/visualization objective:
         i. The objective is to demonstrate the possibilities and uses of the solution specification.
            1. Drawing (physical model).
            2. Concept model (conceptual model).
            3. Animation (physical and/or conceptual model in 3D and over time).
            4. Simulation (physical model in 3D, over time, and with variable parameters).
2. Construction objective:
   A. The objective is to assemble the construction to specification.
3. Operations objective:
   A. The objective is to operate the construction to specification of which there are two types of sub-component objectives (values, at the highest level):

4.2 Rational decision modeling

> **QUESTION:** *How might a society "delegate" the process of deciding to one of rational thought and logical calculation using verifiable information toward everyone's fulfillment?*

Rational decision models must at least involve a cognitive process (i.e., a decision mechanism) where each step follows in a logical order and the model is designed to rationally develop and identify a desired resolution to the decision space. Herein, the term cognitive refers to thinking through, processing and assessing, inputs and alternatives in a larger information context to arrive at a decision. As the word rational suggests, this approach means that there must exist a non-contradictory rationale for the selection of a decision. Any approach that uses non-contradictory identification and logical relationships must also use visualization tools, such as charts, flow charts, diagrams, modelling, and systems & concept mapping. (Novak, 2008) The utilization of a rational decision model ensures that consistency and efficacy exist as conceptual attributes of the decision process. Rational decision models can be visualized, and thus, more clearly communicated. And, clear communication is a necessity for transparency in a community.

Take note here that in the rational scientific method, modeling always involves objects (in relationship to one another). In this sense, all rational decisioning must account for objects. In the case of decisioning, objects are referred to, generally, as resources. Resources, like objects, can be pointed to, are "objective" (i.e., they are objects, as that with shape, that can be pointed to).

Other decision models are more subjective, and therefore, less consistent, structured, shareable and transparent. A rational decision model supports consideration of the full range of factors relating to a decision, in a logical and comprehensive manner. It presupposes that it is possible to consider every available option if given sufficient time as well as access to all relevant information.

Further, a rational decision model presumes that there is at least one best outcome, or result most aligned with a set of criteria. Because of this it is sometimes called an 'optimizing decision model' or 'holistic decision model'.

However, it is not true to state that rational models presuppose to know the future consequences of every option. Impact studies may be completed and probable consequences may be reasoned and calculated, but to state that rational models presuppose knowing every future consequence is incorrect and negates the idea inherent in the model that there must exist an identifiable and non-contradictory relationship between all objects and events in the decision space. All decision models have their limits. A rational decision model is limited by the availability of information and time, and the robustness and accuracy of the applied methods.

The predictability of a rational decision model is at least partially determined by the accuracy of the available information. Objective scientific inquiry is one means of arriving at accurate information.

4.3 Decision tables

A decision table represents the conditions in relationship to action/outputs. A decision table is a [visual, objective] framework for describing a set of related decision rules. The decision table is the structure for defining the rules between conditions and actions. Decision tables allow for a functional visual layout of decisioning information. A decision table is a precise way to model complicated logic in the context of decisioning. Decision tables are a way to model the "if, then, else" conceptual construction of action interrelationship (i.e., cause and effect). Generally, a decision table displays what actions are to be taken when certain conditions are met. Here, conditions must be related to actions (or, non-actions), where the table is filled in with all possible interrelationships.

Decision tables (flow charts, trees, and other diagrams) may be used to represent decisions. A decision table documents (complicated) logic. Decision tables allow for the organization of information such that testing all combinations of the possible conditions becomes possible. Decision tables are used derive a value that has one of a few possible outcomes, where each outcome can be detected by a test condition. A decision table lists two or more rows, each containing test conditions, optional actions, and a result.

A decision table is a test technique that visually presents combinations of inputs and outputs, where inputs are conditions (or cases), and outputs are actions (or effects). A full decision table contains all combinations of conditions and actions. A test is simply execution of an operation on the table, either testing the logic within the table itself, or adding additional logic (formula) and running (computing) the test.

A test is a question that can be answered using the data in the table and some logic (which mus be capable of being validly applied to the table). An inquiry could be viewed as a test. In fact, each of the inquiry processes in the decision system are test run on available data to ensure solutions are as expect by society.

Tables can be used to test and to derive tests. Tests can be run on tables to identify faults in the system under test and interrelationships between data. Each test will verify that certain object conditions (condition values) lead to certain expected actions or results (e.g.,as in a decision system).

All computer programs use logic (i.e., have a mechanism for expressing logic). Decision tables allow for the precise and visual representation of logic. Tables are so useful and intuitive at representing complex, logical information that they are sometimes called self-document forms of information.

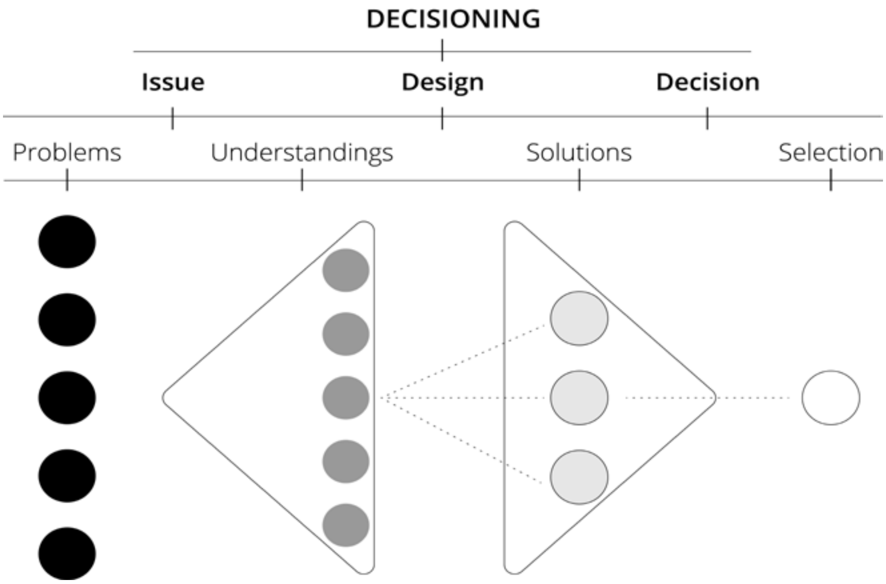
A decision table associates conditions with actions to perform. A decision table contains two initial data inputs:

1. The conditions - an "if" statement.
2. The actions - a "do" statement.

A limited entry decision table is composed of:

1. Conditions - a condition is a logical statement that may have only one of two values -- true or false.
2. Actions - an action is an operation.
3. Rules - a rule is a statement that describes a set of conditions in order that a specific action can be performed. Here, a rule statement is an "if", then

Figure 9. *This is a high-level flow-type chart of a linear process of: being presented with a problem that becomes and issue (on the left), which requires some set of understanding to design a solution (by comparison) in order to determine the finalized and single selection of a solution among those available, which are understood as completely as possible. And then, there is feedback upon whether or not the solution, when acted upon and/or operated resolved the problem as expected. An economy can be formalized and calculated as a matrix of informational (conceptual) and material (numerical) systems. When there is sufficient information to input into (Read: to inform) an open software system, based on a deeper conceptual system, then decisions about the allocation of global resources become possible. When there is sufficient contribution, together with the necessary information, and the necessary accessibility of resources, then global economic planning becomes possible, if not probable. Global economic planning necessitates the acceptance and contribution to a global socio-technical standard of specification and operation. In the early 21st century, there are technical standards accepted to ensure the efficient and inter-operative nature of a technical society. Rights and other political standards and legislation govern, significantly, the social operation and potential adaptation of society.*



"do" statement (i.e., "if" condition is present, then "do" action). Fundamentally, the decision table is a structure for defining a set of rules.

However, every completed decision table has four primary parts:

1. **The condition [stub*]** - lists the individual inputs upon which the decision depends. The conditions stub (the conditions) is equivalent to a test or question, and in some computer simulations, the if section of the if, then, else logic.
2. **The action [stub*]** - lists the alternative actions that may be taken (the actions that could be taken depending on the conditions) . These are the procedures or operations are to be performed depending on the conditions.
3. **The entry [parts]** - show the conditions under which each action is selected.
   A. **Entry part for conditions.**
   B. **Entry part for action.**
4. **The rules -** each rule gives a test case.

** "Stub" stands for (is short for) structured programming.*

Wherein, all conditions relate to actions, and all actions relate to conditions. Actions and conditions are related via the logic of rules (or requirements). Afterward, evaluations of actions ensure future actions relate more closely to expected conditions, by updating the ruleset.

There are several categories decision table, which the extent of the conditions present:

1. Limited-entry decision tables - Decision tables in which all of the conditions are binary. Limited-entry decision table with *n* conditions has 2^n distinct rules.
2. Extended-entry decision tables - Decision tables in which all of the conditions have a finite number of alternative values.
3. Mixed-entry decision tables - Decision tables in which some of the conditions have a finite number of alternative values and others are strictly binary.

4.4 Decisioning perspectives

A decision space may be experienced from several perspectives. From a *psychosomatic perspective* it is necessary to examine decisions in the context of a set of individual and collective needs, beliefs, emotions, preferences and values. Alternatively, a *cognitive perspective* involves an examination of the environment in which a decision question is posed. This perspective is based on three fundamental concepts: *knowledge*, *understanding*, and *preference*. From a socio-economic *normative perspective*, the analysis of decisions is concerned with the logic of the decision process, its rationality, and its invariant consequences. Yet, at another level, a decision process is simply a logical *problem solving* activity which is terminated when an optimal, aligned, and sufficiently resolved information set is reached. Decisions may also be approached from a *holistic perspective*, which involves the collection of and attention to all relevant information. And, when information is unavailable the holistic approach inquires into the knowledge gap.

Additional notes on decisions include:

- Studies indicate that differences (i.e., diversities) in perception, attitudes, values and beliefs can lead to different approaches to the decision process, and therefore, different decision spaces and different final decisions.
- An ideology is a conceptual framework through which people pre-process reality and it represents a 'bias' in a decision process.
- The process by which decisions are logically arrived at is an important part of all science-based professions, where empirical knowledge in a given area is used to derive informed decisions. Empirical refers to that which is observed or experienced; capable of being verified or disproved by observation or experiment.

4.5 Restoration and decision stability

A stable social environment is necessarily an environment that accounts for the *restoration* of the individual, such that stress and 'decision fatigue' do not exist at a continuously sufficient threshold to cause a reduction in optimum human decision making capacity. When decision fatigue (a.k.a., ego-fatigue and willpower fatigue) and other fatiguing stressors set-in, then individuals naturally become less likely to make value-based and fulfillment-oriented decisions in personal, social, and economic contexts. And, they are more likely to turn their decisions over to someone else to make. Effortful choice is bio-physiologically costly, and humans [individualistically] have a energy resource requirement for quality decisioning. The amount of willpower that we have to apply to effort is limited. Willpower is a finite and daily regenerative resource affected by [at least] belief and nutrition intake. When decision fatigue sets in it doesn't differentiate between big decisions and small decisions. Basically, each individual has a "budget" of daily decisions, which can be modified a little by when and how one eats, and how one thinks about themselves. (Vohs, 2005)

As decision fatigue sets in it is associated with increasingly poorer decisions - more and more indecision, fatigue, and stress, and less and less of an ability to make rational and clear decisions [as the day progresses]. Experiments show that individuals have a qualified, finite store of mental energy for exerting self-control toward decisioning. Generally, with every decision it becomes harder for our brain to continue to make decisions. The result is that by the end of a "long day", when someone is low on mental energy, that person is going to be more likely to give in to impulse (i.e., to have their self-directed freedom reduced). Also, it is interesting to note that planning [contextually] reduces the likelihood of decision fatigue because the decisions are already made (i.e., they are already planned for).

Fundamentally, our health, though particularly the healthy functioning of our neurophysiology, affects our ability to arrive at optimal decisions toward our fulfillment. Neurological damage and malfunctioning can impair our decisioning capabilities.

4.6 Who makes decisions in a community-type society?

The very question, "Who makes decisions?" is devoid of logic. It is not who makes decisions, it is by what method are decisions arrived at? The question of who makes decisions is a biased attribute that we have concocted because of our irrationally found fear of each other and groups which continue to jockey for power based on the rewards/incentives of the current system that is used as a tool for control. This blueprint describes the decisioning system in detail.

In community, tasked actions are then carried out through revolving and voluntary interdisciplinary systems teams, which assist in aspects of society that basically cannot yet be automated. The goal is to increase objective and value oriented decisioning as much as possible, and when we understand that our problems in life are technical the merit of this approach is without parallel.

4.7 Decision resolvability categorization

I concern to the resolvability of a decision, decisions be categorized in the following ways:

1. Problem or opportunity
2. Sufficient or insufficient data
3. Understand situation/issue
    - A. High likelihood/consequence
        1. Correlate knowledge
        2. Develop
            - i. Standards
            - ii. Technologies/countermeasures
            - iii. Operational/tactical guidelines
    - B. Medium likelihood/consequence
        1. Correlate knowledge
        2. Validate
            - i. Standards
            - ii. Technologies/countermeasures
            - iii. Operational/tactical guidelines
    - C. Low likelihood/consequence
        1. Optimize/iterate (Habitat Service System specific)
            - i. Standards
            - ii. Technologies/countermeasures
            - iii. Operational/tactical guidelines

5 A decision support system

A.k.a., Decision support systems (dss), expert system, and executive information systems, executive support system (ess), machine learning systems, automation systems, information coordination system.

Whenever there is a decision, there is a problem/issue. A problem/issue is identified and data is collected with the basic purpose of solving the problem/decision. Data is evaluated in the context of a problem-solution to determine all possible ways to resolve the problem-solution. Identify and/or generate alternative solutions with the data available. The alternatives are evaluated to identify the most suitable/appropriate solution(s), by some critical method. Every alternative is compared with every other alternative so that the evaluation is accurate and gives more clarity toward the decision. The best alternative amongst the available alternatives is selected. The best selected alternative is implemented. The results of the implementation are fed back into the decision space, which then adapts appropriately. Follow-up reviews occur continuously and/or at every stage. I there a need for a modification to the selected solution; is the solution still required; has the issue changed? A decision system is, in part, a data solution resolution evaluation system.

A decision support system is an information system application that assists decisioning, from minor assistant e to possible full automation of decision. The informational and material elements of a decision support system include:

- **Hardware** - materials composed to function as part of an information system.
- **Database** - collection of current or past data.
- **Model base** - logic and organizing rules; selection of analytical and mathematical models that can be made accessible to the decision system.
  - **Physical model** - model of machine.
  - **Mathematical model** - equation, formula.
  - **Verbal model** - description of a procedure for doing work.
- **Software (computer programs)** - applied computational language for use as interfaceable and functional application. Computer programs are applied through a programming language; computer programs are also known as software.
  - **Compiler (interpreter)** - translates programming language statements into machine language.

In this sense, it could be said that a decision system processes data to convert it into information (intelligence, etc.). A decision support system processes information to support the decisioning process of a control or coordinating element. Decision support systems may help a decisioning entity use data, documents, knowledge, and/or models to successfully complete decision process tasks

The purpose of a collaborative support system is to give people the tools to design information and material flows together. The purpose of a decision support system is to give people the tools to select the optimal informational and material compositions give all prior and probable input. A decision support system is a structured approach to decisions, which may be structured, semi-structured, or un-structured.

Project coordination (management system information) is the integration of the information sets of people, technology, procedures, resources, and time...for mutually beneficial work, for collaboration. This integration data is useful, but not sufficient in solving societal issue/problems. There is information system coordination and material system coordination (logistics). An information system is a planned system of collecting, storing, processing, and disseminating/ sharing data in the form of I formation. A material system is a planned system of collecting, storing, processing, and disseminating information in the form of material surfaces. Informational and material systems carry out the functions of society. A coordination information system is a group of information coordination methods tied to the automation, or support, of human decisioning. Note: In the market-State, management is getting things done through or with the people in the organization. In community, coordination is most appropriate (in place of management), because it does not carry with it the idea of extrinsic motivation. Whereas, collaborators coordinate because everyone is intrinsically motivated, managers "incentivize" with extrinsic motivation (i.e., with rewards punishment; coercion).

The basic functions performed by a coordinator are:

- Planning decisions, tasks, and information and material flows.
- Controlling and information flows
- Staffing tasks
- Organizing information and material flows.
- Directing information and material flows

Coordination decision models include:

- Optimization models - provide guidance for action by generating optimal solutions consistent with a series of constraints.
- Forecasting models - provide guidance on resource supply, service demand, and probable action.

A system is a set of elements joined together to achieve a common objective; such as the joining together of all elements that form society to meet our mutual need for global access to well-being and all that humanity and the biosphere have to offer. Every system is composed of subsystems. In this model of society there are four core societal sub systems, the publications, and then the conceptual model itself into which those specifications fit in a spiral, and highly varied, manner. Systems have inputs that are processed through a transformation process that converts these inputs to outputs. The outputs of a useful societal system are beneficial services, service objects, and conditions, as specified by needs, objectives, and requirements.

Information systems may communicate information [via channels] transparently, or not. In the market-State, transparent information systems are called open source systems, named so because their code, construction and operation are open to inspection, understanding, and duplicable use.

Information generated by an information system may be for planning and control of operations, and other problem solving. Information system coordination involves processing in support of a wide range of possible organizational functions and operational processes. Information system coordination is capable of providing analysis, planning, and decision support.

A sufficiently information system must have at least the following subsystems, including not limited to,

- Sensory, storage, and computation/processing systems
- Query systems
- Analysis systems
- Modeling systems
- Decision support systems

Note that knowledge-based systems use knowledge about a specific application areas to facilitate decisioning.

5.1 Actionable information

> **INSIGHT:** *The information must exist in the information system if action is to be coordinated that necessary involves that information.*

Everything is data/information. To separate data and information, it is possible to state that information is data that has been processed, analyzed, and presented in a form that facilitates decisioning. In the market-State, actionable information is known as "intelligence"; where, there is political intelligence, business intelligence (competitive intelligence), military intelligence, etc. A decision support system uses actionable information to inform its decision space, so that the results of decisions align with intentions and objectives.

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TABLES

Table 1. <u>Decisioning > Decision Table Parts:</u> *The parts of a decision table.*

	Stub (programming)	Entry
Condition / Inquiry	Condition / Inquiry Stub	Condition Entry
Action	Action Stub	Action Entry

Table 2. <u>Decisioning > Decision Table Parts:</u> *The parts of a decision table.*

Decision Table		Requirements (Rules) *Part*		
		Rule 1	**Rule 2**	**Rule 3**
Stub *Part*	**Condition 1**		Condition Entry *Part*	
	Condition 2			
	Action 1		Action Entry *Part*	
	Action 2			

Table 3. <u>Decisioning > Decision Table Parts:</u> *The parts of a decision table.*

Decision table		Requirements *(Rules Part)*		
		Requirement 1	**Requirement 2**	**Requirement 3**
If, Then *(Stub Part)*	**Condition 1** *or* **Inquiry 1**			
	Condition 2 *or* **Inquiry 2**		Entry *Part*	
	Action 1 *or* **Solution 1**			
	Action 2 *or* **Solution 2**			

Table 4. <u>Decisioning > Decision Table Parts:</u> *The parts of a decision table showing the if, then, else statement. The "IF" part are the conditions 1 ... n. The "THEN" part is the actions 1 ... n. Sometimes a decision table will contain an ELSE column at the far right. This is a single decision rule that essentially says that if any of the previous rules in table (to the left of the ELSE column) were not triggered, than take the action(s) specified in the ELSE column. This is a way of simplifying a decision table where only certain condition sets require specialized responses and all other conditions can be responded to with the same action.*

	Rules			
IF	**Decision Rule 1**	**Decision Rule 2**	**Decision Rule 3**	ELSE
Condition 1				
Condition 2		*Entries*		
Condition 3				
THEN				
Action 1				
Action 2		*Entries*		
Action 3				

TABLES

Table 8. Decisioning > Decision Table Parts: *The parts of a decision table.*

Objects	Conditions			Decision
	Distance	Capacity	Requirements	Acceptance
S1	short	yes	low	yes
S2	shortest	yes	high	yes
S3	long	no	high	yes
S4	shortest	no	low	no
S5	longest	yes	low	no
S6	short	no	high	no

Table 5. Decisioning > Simple Decision Table: *The left column is the stub portion. The c letter represents conditions (c1,c2,...) and the a letter represents actions (a1,a2,...). The top row is the condition portion; it is the requirements or rules. Each column in the entry portion is a rule (i.e., rule 1, 2, ...). Rules indicate which actions, if any, are taken for the circumstances indicated in the condition portion of the rule. In this example, when conditions c1,c2,c3 are all true, then actions a1 and a2 occur. When conditions c1 and c2 are true, then action a3 occurs. The pattern continues forward in this manner.*

	Entry Portion				
Stub Portion	**Rule 1**	**Rule 2**	**Rule 3**	**Rule 4**	**Rule 5**
Condition 1	T	T	T	F	F
Condition 2	T	T	F	T	F
Condition 3	T	F	T	T	F
Action 1	x	...	x	x	...
Action 2	x	...	...	x	...
Action 3	...	x	...	...	...

Table 6. Decisioning > Simple Decision Table: *The parts of a decision table. This is illustrative of the decision system in this standard.*

	Entry Portion				**Total**
Stub Portion	**Objective 1**	**Objective 2**	**Objective 3**	**Objective 4**	
Inquiry 1	T	T	T	F	3
Inquiry 2	T	T	F	F	2
Inquiry 3	T	F	T	F	2
Solution 1	x	...	...	...	1
Solution 2	...	...	...	...	0
Solution 3	...	...	...	...	0

Table 7. Decisioning > Decision Table Parts: *The parts of a decision table.*

Decision Table	*Entry Portion (Condition Entries; Habitat Service Case Rules)*				
Stub Portion	Rule 1	Rule 2	Rule 3	Rule 4	Rule 5
Conditions					
Condition 1	choice 1a	choice 1b	choice 1a	choice 1b	choice 1b
Condition 2	choice 2a	choice 2b	choice 2a	choice 2a	choice 2b
Outcomes					
Outcome 1	x	...	...	x	...
Outcome 2	...	x	...	...	...

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Table 9. Decisioning > Decision Table: *A decision table showing the conditions (value alignment objectives), service systems, and service system solutions. The entries are fictitious.*

Conditions ⇩ / Solutions ⇨		Habitat Service Solutions									
		Life Support Service				Technology Support Service				Exploratory Service	
		Solution 1	Solution 2	...	Solution n	Solution 1	Solution 2	...	Solution n	Solution 1	Solution n
Value Alignment Planning	Justice Inquiry	T	T	...	F	F	F	...	F	T	F
	Social Inquiry	F	T	...	T	T	F	...	F	T	T
	...	...	...	...	...	...	...	...	...	...	...
	Inquiry n	F	F	...	T	T	T	...	F	T	F
Economic Sector Calculation Planning Matrix	Life Support Resources	3	4	...	3	1	1	...	1	5	9
	Technology Support Resources	1	2	...	4	1	1	...	1	2	8
	Exploratory Resources	5	5	...	9	5	7	...	4	8	8
Contribution		3	5	...	5	4	3	...	1	1	5
Priority (Urgency Spectrum) Determination		1	1	...	1	5	5	...	5	8	8
Total Solution Inputs		∑	∑	...	∑	∑	∑	...	∑	∑	∑
Actions											
Action 1 (Accept)		x	-	...	x	-	x	...	x	-	x
Action 2 (Reject)		-	x	...	-	x	-	...	-	x	-

Table 10. Decisioning > Decision Table: *A decision table showing the conditions (design acceptability protocol), the acceptable actions (reject or accept), and a series of solution options from solution Case 1A to 3A. In this example, only 1 solution is acceptable, 2A. Only one solution passes all the inquiries:*

DECISION TABLE Solution Options ⇨ Design Acceptability Protocol ⇩		Technical Solution Inquiry					
		Solution Case 1A	Solution Case 1B	Solution Case 2A	Solution Case 2B	Solution Case 2C	Solution Case 3A
Parallel Value Alignment Inquiry	Justice Inquiry	T	T	T	T	F	T
	Resource Inquiry	F	T	T	T	T	T
	Environmental Inquiry	F	T	T	T	F	T
	Efficiency Inquiry	T	F	T	T	T	F
	Preference Inquiry	F	F	T	T	T	T
	Effectiveness Inquiry	T	T	T	F	T	T
Actions							
Action 1 (Accept Solution)		-	-	X	-	-	-
Action 2 (Reject Solution)		X	X	-	X	X	X

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Table 12. Decisioning > Decision Table: *An example decision table with the conditions (inquiries) as rows and the potential solutions as columns. The inquires are conducted on each solution, and the solution is scored.*

DECISION TABLE		Design Options (Solutions)						
		Design Option 1		Design Option 2		...	Design Option *n*	
Priority		Weight	Score	Weight	Score	...	Weight	Score
Decision Inquiry Processes	Inquiry 1	#	#	#	#	...	#	#
	Inquiry 2	#	#	#	#	...	#	#
	...	...	...	..	...	...	...	...
	Inquiry *n*	#	#	#	#	...	#	#
Total		#	#	#	#	...	#	#

Table 11. Decisioning > Decision Table: *An example decision table with the value alignment objective criteria to the left and the solution scores on the right.*

Criterion type *(eliminatory or ranking only)*	Criterion *(objective)*	Criterion Weight	Threshold *(accept, go OR not accept, no go)*	Solution Scores		
				Score for solution 1	Score for solution 2	Score for solution 3
Eliminatory	Effectiveness	2	3	2	4	2
Ranking only	Justice	2	5	6	2	1
...	...	...	...	...	...	...
Ranking only	Social	4	2	3	5	7
Ranking only	Power usage	2	*Does not apply*	1	3	6
Ranking only	Availability	3	7	3	9	2
Ranking only	Manufacturability	3	5	2	4	1

TABLES

Approach: Classification of the Decision System for a Community-Type Society

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Last Working Integration Point: *Project coordinator integration*

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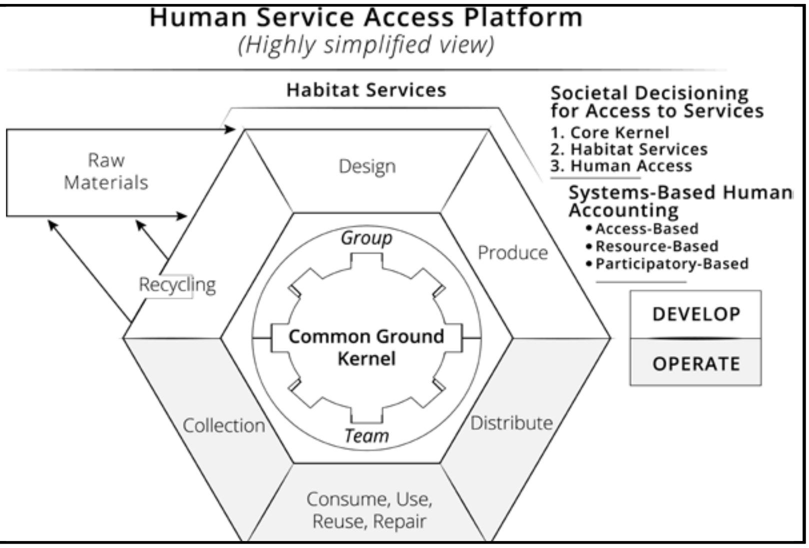
Abstract

The decision system for a community-type society may be sub-classified in four primary ways. A decision system at the level of resources is an economic system, and at the level of the user it is an access system. However, before a community-type societal system can usefully encode the concepts of access and economics, it must first apply the fundamental methodology from the social system, the systems approach. The decision system for a community-type society is a systems-based model; it is also an access-based model, a resource-based model, and a participatory-based model. These are the decision system's primary economic classification types. The decision system is a system's based system, because it accounts, systematically, for all societal-level (or, societal-significant) decisions. The outputs of decisions of the societal system are accessible by users. The outputs of decisions reshape the material and informational environment, and in doing so, resources are moved and transitioned. In order for a community-type society to function, the individuals therein must participate in the system's sustained operation. Contribution optimizes demands in a social resource environment.

Graphical Abstract

Figure 10. *A common kernel is designed and operated in order to solve for the optimal production of a life-cycling habitat service platform for humanity, developed and sustained by a working team.*



1 Introduction

Economic decision models may be classified by the [architectural] function(s) they serve. The decision system model herein functions to provide a community population with access to common resources while operating a habitat service system based upon servicing the needs of individuals as they expend effort toward their higher potentials. Herein, humans have a need for common heritage resources to be transformed into accessible goods and services through contribution to a systems-based approach.

The model may be classified (categorized) in four principal ways:

1. **Systems-based model** - Essentially, the model is a "true" systems-based model as it applies technical system's principles to inform the programmatically systematic method it uses to arrive at, or "framework", economic decisions toward the engineered fulfillment of human needs. It models systems dynamics and is systematically adaptable; it is solutions-based. A solutions-based system presumes the answer to a problem is possible, and that a platform is needed for its discovery from an existent environment that may be experienced with some degree of [navigational] accuracy. In its functional role as a systems-based economic model for human fulfillment, the decision system may also be referred to as a *needs-based model*, because living systems have needs (have requirements for living, and specific requirements for living well).
    - The economic decision system is structured from a systems perspective, and following systems-based principles and practices.
    - The model provides a systems-based function.
2. **Access-based model** - The term 'economy' is not uni-dimensional, uni-conceptual or uni-factorial. Hence, an economy is not just capitalism or socialism. To claim that it is would be a bit disingenuous; and to believe that it is would mean buying into a conditioned illusory reality that is not systematically open to a greater commonly verifiable experience. Instead of polarity, it may be easier to think of the socio-economic system herein as a complex interplay of applied conceptualizations and dynamic processes, which form an access system of some type (the type that allows embodied consciousness to access common material resources in abundance). There are many forms of access, and hence, many types (or classifications) of access system.
    - The [economic] decision system accounts for access.
    - The model provides an access-based function.
3. **Resource-based model** - A resource-based economy is one type of access system. It is an access system that caretakes (or stewards) and accounts for a common resource pool while providing access fulfillment to economic needs without exchange (i.e., without the market) in an optimized technical manner forming [at scale] into an integrated city-living habitat environment.
    - The [economic] decision system accounts for resource.
    - The model provides a resource-based function.
4. **Participatory-based model** - Here, participation means contribution (willing, intention participation). Participation is necessary for the continuation of any common material system. A resource-based economy is a voluntary (or volitional) participation / contribution model. Herein, the decision system is designed to transparently account for the existence or non-existence of participation in the system by which economic needs are fulfilled. This is a direct, participatory economic system. There is participation in the form of contribution and in the form of human need and preference accounting.
    - The [economic] decision system accounts for participation.
    - The model provides a contribution-based function.

This economic decision system is designed to "do away with" all forms of politics and political systems of thinking, all forms of market economics, and all State (governmental) control; it is not a game of persuasion, ownership, or coercion. It involves a different conceptual set of understandings. These understandings form a type of economy that behaves like a holistic unit to materialize mutually beneficial and optimized fulfillment for everyone with consideration given to the environment in which the materialization is occurring. Herein, if problems exist, then they exist to challenge everyone to develop a comprehensive solution without reducing anyone's fulfillment in the process.

2 A systems-based model

CLARIFICATION: *The decision system is system-of-systems [science] based.*

Like every other model in our community, this economic model is a systems-based model, and it involves multiple different inputs, processes, and outputs. It is a system that allows for the continuous interplay of dynamical[ly designed and replaced] systems principles, a 'systems-system'. It is a system whose inputs include data from the commonly developed Real World Community Information System as well as the contextual elements of a particular issue (or problem). Its outputs involve, though are not limited to: (1) the allocation of system resources toward the access of goods and services; and (2) habitat design decisions.

Systems-based models recognize and adhere to systems principles (systems dynamics) in the application of effort. Herein, the system [dynamic] is seen as the source of its own problems, which allows for a volitionally iterative design orientation (e.g., intrinsic motivation). From the perspective of understanding the underlying causations to problems in our fulfillment it is imperative to examine the problems more closely. Because, if we do not understand the causations to the problems we cannot hope to solve them. Similarly, if the structure of a difficult problem is not understood, then the problem cannot be solved.

This economic decision model is understood through its relation to the larger model (or system) of which it is a part, The Real World Community Model.

Every systems-based approach requires a recognition of the recurring patterns of relationships (i.e., intuitive thinking) within and between systems. A systems approach necessitates a perspective that accounts for the overall architectural structure, patterns and cycles in a system rather than seeing only specific events in the system in isolation. This leads to issue resolutions (as solution orientations) that account for problems throughout the system, while recognizing the interaction between a particular system and its environment.

A system is classified as robust when it does not oscillate between conservatism and fire-fighting. A functioning system must have a way of knowing if it is neglecting information, it must be open and accept feedback. A system is negligent (or "ignoring") when it is excluding information necessary for its most effective operation.

The decision system is a system that recognizes that there exist technical systems principles that when integrated into an encodable system, maintain the potential for an adaptive, optimal and regenerative state of fulfillment - a system capable of fulfilling our highest potential needs.

All systems are composed of individual parts. Something arranges the parts into a structure (a "constructor"). The structure determines the behavior of the system. *System analysis* is a matter of identifying the relevant structure of the system and its most important parts. From that knowledge consciousness may synthesize an understanding of the system's generative behaviors (i.e., the behaviors it is likely to generate in a consciousness experiencing it). Fundamentally, we know the system by the [behavioral] results it produces.

The idea of an emergent behavior concerns the arrangement of the parts, and not just the parts themselves. The chemicals in the human body can be purchased. Buying them and mixing them up in a bucket would not create a person. It is structure that makes all the difference. It is important to know how an environment is structured if its emergent behaviors are to have some degree of [design] predictability. The concept of emergent behavior is crucially important in solving systemic sustainability problems, for it is in fact emergent behaviors that drive such problems. The structure of the system as a whole must be examined if root causes are to be understood and the community's orientation redefined toward states of greater fulfillment and sustainability.

At the core of the concept of 'systems thinking' is the concept that the behavior of a system is an emergent property of its structure, not its parts. Thus, problem-symptoms are emergent behaviors. Each behavioral symptom can be traced to particular aspects of the structure. It follows that if someone does not know the structure of a complex social issue or system problem, then they will be unable to re-solve the root problem. Hence, a community with a solution orientation seeks to understand the root source(s) that generate the manifestation of a particular set of materialized behaviors.

The purpose of a system is what it does. If a system produces war, then it is structured to do so. People may imagine that the system they live under, their society, has not been designed to produce conflict and competition and violence, but if that is the result, then their imaginings are just that, imaginings. People can imagine what they like, their imaginations do not have to accord in any way with the reality and behavioral consequences of the societal structure that they live within [and may have been conditioned to accept and believe to be different than that which it actually is].

The consequences of the system are just that, the consequences of the system; the consequences cannot be said to arise "just because we are not doing it right" (i.e., are not doing democracy, government, and the market right). If we are to understand the world around us, then we need to cut through (i.e., discern) the nonsense and propaganda that is used to describe any system. The sense of offense that one might feel over this stated understanding is in fact the system reinforcing itself -- a system that lacks a mechanism for corrective feedback. Once the non-corrective paradigm of thought has been integrated into someone's thinking processes, then those too will lack corrective feedback, which maintains the establishment of a self-reinforcing paradigm of thought based on limitation.

Information in an optimized economic system is radically distributed wherein computation, storage, and communications capacity are "in the hands" of practically every connected person sharing in the community. In truth, these are the basic "capital needs" necessary for producing the persistence of community - common access to information organization generates an **information economy**. In an open-source community all important activities concerning the core [information] economy are in the hands of the population; not only *content* and *process*, but *relevance* also. An information economy has the potential to become one emergently discovered and applied system. In an information-based society, the decisions taken are based upon the information available.

In a system, a 'governing mechanism' (or 'governing dynamic mechanism') coordinates the flow of resources through the system by means of access to correctable fed-back information from an environment. In a system, the idea of 'governing' refers to the re-formalized modulation of the dynamics of the system to meet the objective(s) of the system itself.

Fundamentally, systems-based decisioning involves the following three elements:

1. **Systems have dynamics.** Systems have processes that may be active or inactive.
2. **Systems have preferential outcomes** (objectives or goals), which are regulated to some degree by the dynamics of the system. In other words, there are outcomes that the system would like to see expressed and the system maintains processes to facilitate its desired outcomes. In the case of competing market entities, the outcome the entities would like to see expressed is profit. In the case of a corporation, the desired outcome is profit maximization. In the case of an entity that monopolizes power (i.e., a government), the outcome is social control. In the case of the Community it is human fulfillment and well-being.
3. **Systems have a decision space** with decision variables, which are the choices that the entity (or system) has to make (or can probabilistically arrive at). For example, in the case of a business a basic variable is that of hiring and firing labor. A rational system wants to make these choices in such a way that the result is the maximization of its purpose, goals, and values. In the case of a business, the purpose is to make money -- the fundamental and direct purpose of a business is to make money. If you ask a business owner, "If you don't make money, what will happen?" The business owner will tell you, "I will go out of business". If you ask a business owner, "Would you like to make more money, while maintaining the value set and quality of product you currently maintain?" A rational business owner is more than likely going to say, "Yes, of course; that which will allow a business to survive is that which will make the most profit." To survive a business must look out for its own interests. Therefore, logically speaking, business doesn't want people to know when their products cause bad outcomes because that would be "bad for business". Rationality will create corrupt incentives within a corrupted decision space.

An economic system based on systems principles will adapt itself based on evidence. If humanity wants different outcomes from a situation, humanity has to change the system that underpins the situation in such a way that it delivers different outputs.

If you know the dynamics of a system and you can build a simulator for it, then all you have to do [conceptually] for all the different possible actions you can take, is to model them out (or 'simulate' them) and see which ones are more likely to lead to the goals which you want. Essentially, simulation leads to better modeling, understanding, and performance, as well as more precise engineering solutions, and in general, more rationally decisive action [through visual analysis and logical feedback]. Fundamentally, an integrated simulation leads to better design solutions. Also, a visual display of the different components in the simulation leads to better communication between all the people involved.

At the community level it is unwise to deal with the parts of a situation in isolation; we ought to handle them in concert. We have to deal with both the elements of a situation and how they interact with one another -- we can simulate their synthesis.

This decision system could be named a "deterministic system" because an individual with sufficient knowledge about the operation of the system, its inputs and processes, could determine to some "certain" degree the outcomes and outputs of the system. In a "deterministic system", if starting conditions are known in enough detail, then the outcomes of events from the system can be predicted [by variable degree]. Technically engineered systems are deterministic systems. They are deterministically designed through systematic organization and structuring of cause and effect. It is relevant to note herein that the concept of a "deterministic system" should not be confused with the belief system known as "determinism". Instead, all engineered systems are intentionally determined systems (i.e., deterministic systems).

The five systems principles for a stable economy include, but are not limited to:

1. The economy serves the individuals in a community; the individual does not serve the economy.
2. Development is about the individual and the social,

and not about objects.

3. Growth is not the same as development, and development does not necessarily require [economic] growth. Growth is a quantitative acquisition. Every living system in nature grows up to a certain point, and then stops growing; but we (individuals) continue developing ourselves. Development has no limits; growth has limits.
4. No economy is possible in the absence of ecosystem services.
5. The economy is a subsystem of a larger finite system, the biosphere; hence, infinite growth is impossible.

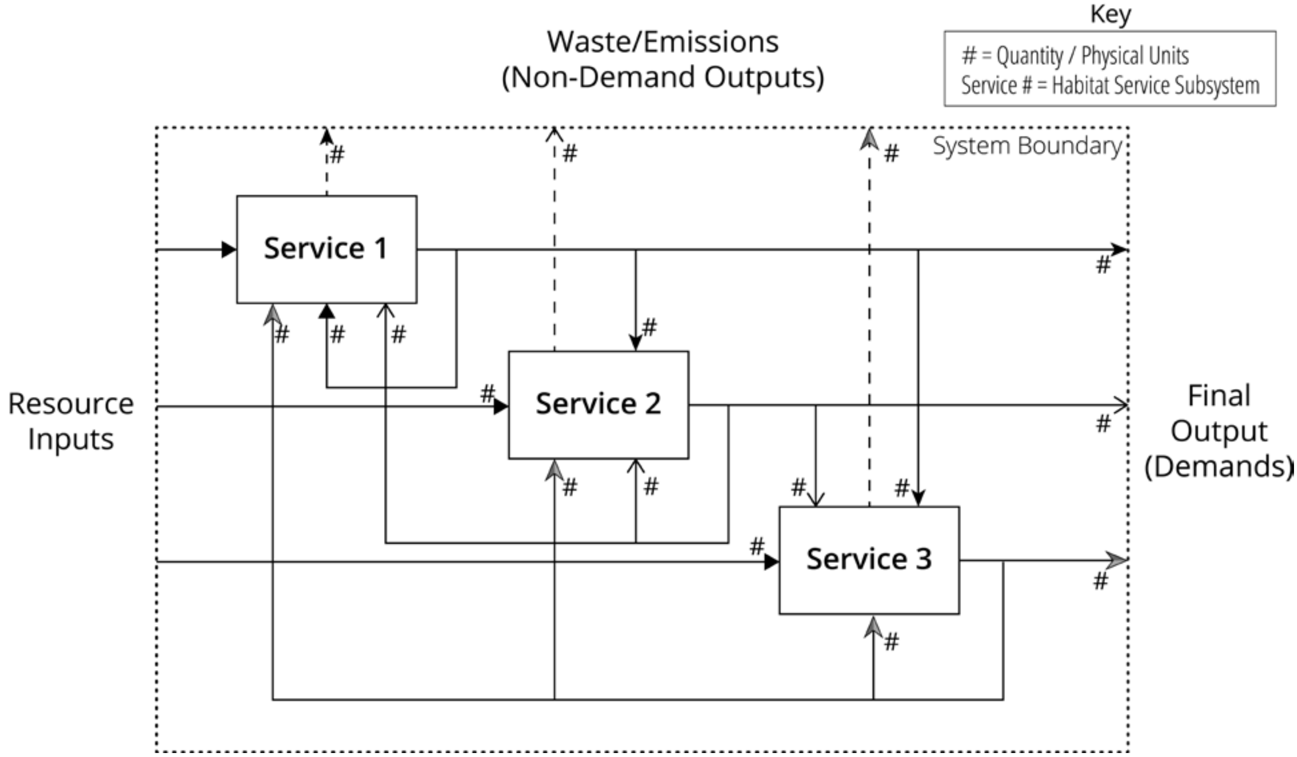
Donella Meadows (2013) observed:

> *"To a systems thinker, it is just crazy to talk about tradeoffs between the economy and the environment. It's just even a thinkable thing, because the economy and the environment are so clearly one integrated system. It is surprising, once you really get into systems, how often you hear people talking about trading off one part of a system with another, when you see very clearly that there is an assumed reductionism, separation between parts of the system, that just aren't so in the real world.*

To effect real/actual system change (i.e., systemic change), the function or purpose of the system itself must be changed. The following system components determine a system's behavior and identify where to intervene (Meadows, 2013):

1. **Function** or **purpose** - The function/purpose fundamentally determines a systems behaviors. Note that a system may not be able to achieve its function/or purpose. If it can, the system will do what it is set up to do. To fundamentally change a system, this must be changed.
2. **Interconnections, relationships** - In other words, the structure, processes, feedbacks. and information flows. The behavior of a system can often be changed significantly just by changing the way information flows within it, or what information is available.
3. **Elements** - A change to elements is a low-level way of changing a system. Rarely, if nothing has changed above will a change here make a

Figure 11. *Conceptual framework of an input–output system. Three service systems are shown. These service systems take in resources (left system boundary). The service systems have two outputs: non-demanded outputs that are a byproduct of the service systems processes (a.k.a., wastes/emissions); these are connected to the top system boundary. These wastes/emissions may be inputs into other service systems, or they may be recycled or disposed of. Then, there are the demanded outputs of the service system (a.k.a., final outputs); shown at the right system boundary. Source: Tan, R.R., Aviso, K.B., Promentilla, M.A.B., Yu, K.D.S., antos, J.R. (2018). Introduction to Input–Output Models. Input-Output Models for Sustainable Industrial Systems, 1–8. doi:10.1007/978-981-13-1873-3_1*



difference. Occasionally, however, a change here could affect the above components of a system, which will have a more significant impact on changing the system.

4. **Behaviors** - Everything above produces (given an environment) the behavior of a system. Simplistically, behaviors are general effect tendencies of a system over time.
5. **Events** - If the system is frozen at any point in time, it will be observed to be doing something, which is an event. Events are isolated "snippets" of the behavior of a system.

INSIGHT: *There is no need to hoard; humanity can organize and share. There is no need to consume infinitely; humanity can prioritize and reach fulfillment.*

2.1 Planning

INSIGHT: *If you don't make a plan then someone else is libel to make one for you.*

Changes to an adaptive societal system must be planned for, and new systems need to reflect more accurate models and up-to-date information. Hence, planning must be done in the presence of the whole. When it is done in isolation from the rest of the environment (from ecological concern and human interest) we cannot effectively prepare the next iteration of our habitat service system for the fulfillment of the whole of the community. Herein, planning is an element of any systems model that seeks to account for resource usage under conditions of technical economic efficiency. In other words, whatever planning we do, we must have the resources. As models evolve, so too do plans. All coordinated systems plan the allocation of their resources. Fundamental societal systems planning means to view society as an operational project that forms habitat services as planned.

A failure to plan for the future is a failure to plan for our own survival. We need a healthy environment to survive and we need a healthy mind in order to survive in our environment. This is the basis of logic as a tool which predicates human survival. What would happen if our ability to effectively plan for the future were undermined? We would have what we have here today in early 21st century society; a failure to facilitate community. A community needs intellectual fortitude to face uncertainty and wring from it the drops of knowledge which lead to understanding of its designs.

The decision system is part of a structure that is collaborative at the "global" systems level, at the level of the Habitat and larger ecology.

The degree to which individuals in a community have to plan their access (i.e., "consumption" - market economy term) depends upon a variety of factors, including but not limited to resource availability, technological capability, the prioritization and trending of particular needs, capacity and regeneration rates, and anticipatory emergency incidents.

And, it is interesting to note that planning [contextually] reduces the likelihood of decision fatigue (i.e., willpower fatigue) because the decisions are already made.

Each habitat service system maintains an integrated strategic plan to provide for the functional needs of the community and maintain alignment with the community's value system over time (i.e., temporally). In essence, a plan is simply a "next" iterative design (or iteration) of the total habitat service support system design.

Herein, planning is systematically organized (i.e., central and de-central; it is distributed) by an ecological habitat service system. At the habitat service system-level, planning occurs centrally to the habitat service system. The habitat service systems maintain interrelated strategic plans to ensure the continued fulfillment of human needs through dynamic design. There are plans, but there is also voluntary participation in the planning environment. Humankind's social and economic systems are not an exception to interdisciplinary ecological design.

There are many elements of early 21st century society that are planned, and that fact is not considered controversial. The existence of businesses, which plan their activities, demonstrates that so called "free market economies" are to a significant extent planned [in a hierarchical and industrially centralized manner (i.e., top-down vs. parallel planning)]. Who would argue for an unplanned rail or communications system? Who would argue for the unplanned design of a commercial electronic good? Who would argue that service-distribution requires planning? Who in their professional life does not work to a plan as a business plan or something similar? Who does not plan their travel? Who does not plan a design improvement or the modification of any system? Is city planning wrong in principle? What type of organization or system would take action without planning? Planning is essential for all organized effort toward a common objective, or purpose. It seems that we plan everything even remotely serious in our lives, or at least accept that we ought to plan for those things, but for some reason we draw the line at planning how we sustainably live on this finite planet and in our communities.

In every society, some actions are planned and others are not. Intrinsic spontaneity can be a joyful personal experience, but to base the organization of a society on it is folly. Fundamentally, it is rational to plan for the fulfillment of a community, and to not do so is likely to create anxiety, harmful levels of uncertainty and stress in the community, such that irrational actions are of a greater certainty. Chronic states of stress degrade optimal decisioning and interpersonal trust by provoking reactive (or "irrational") emotional responses -- they de-construct community.

It is true that personal spontaneity and future uncertainty can lead to emotional excitement; however, it is unwise for a community to maintain an economy based upon spontaneity and a high degree of uncertainty. The emotional excitement that stems from personally chosen spontaneity has the potential to add to the joy that someone experiences in their life, but when this emotional excitement comes at the expense of more primal fulfillment because the economic services and products are not planned for, then the community has a serious need/value prioritization issue on its hands.

Also, a functional system must maintain an adaptive feedback mechanism (i.e., a learning mechanism). When learning does not occur, plans do not improve and adaptation does not persist. When adaptation ceases, then 'self-preservation potential' decreases. The acquisition of new and relevant information must be allowed to evolve and update any existent plans -- information transparency and sharing is salient. When a community forsakes planning, then it is essentially forsaking the concept of organized and coordinated effort toward a purpose. A failure to plan for the future is a failure to plan for our own survival.

Planning is necessary to ensure the strategic preservation of our community and our common heritage resources (i.e., a common pool of resources; resources that are commonly unowned). The preservation of resources is part of a larger community strategic preservation strategy for each of the habitats' systems. Such a preservation strategy is the opposite of the modern day profit strategy known as "planned obsolescence".

> **INSIGHT:** *If you have a plan in life, and you are using someone else's energy to accomplish it, then it is not a plan, it is a problem. Our goal should be to create our masterpiece (our self potential) from our passions and our efforts, which is a potential that nature provides.*

2.1.1 Uncertainty

> **INSIGHT:** *Individuals in a community do not necessarily seek to systematizing life or freedom, but instead systematize humankind's support structure so that everyone can live a free and more self-directed life.*

In the real world, when deciding and planning, there will still exist uncertainties as decisions that need arrival at with [some degree of] incomplete information and not enough time. We design systems so that accurate information about all decisioning in the community is available to all people. Economic goods and services ought to fulfill human needs, not pseudo-satisfy them.

Any form of system design must have a blueprint to work toward, or the designer(s) are engaging in wishful thinking; and, society is no different. As with all technical plans humanity must have a design apparatus and blueprint or the work is destined to fail.

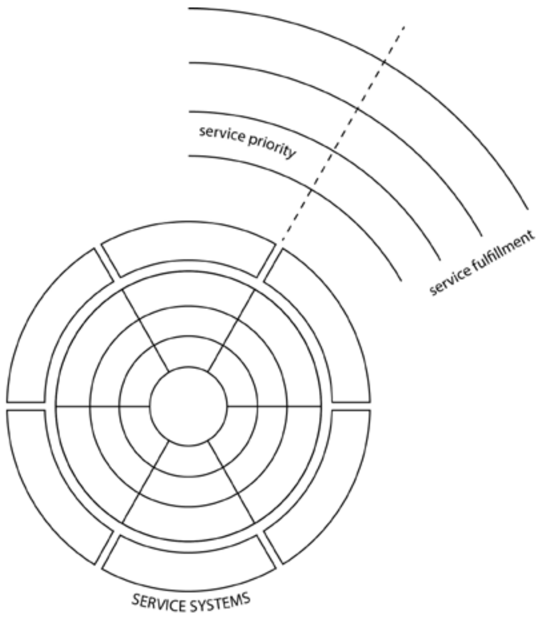
> *"The major problems of the world are the result of the difference between the way nature works and the way people are conditioned to think."*
> *- adapted from Gregory Bateson*

2.2 Economic planning

> *A.k.a., Economic calculation, economic plan, economic sciences, economic decisioning, economic matrix diagrammatic decisioning, mathematical economics, , centralized planning, economic cybernetics, operation research, optimization econometrics, industrial ecology, global resource accounting model.*

Every externalized service system has some degree of forethought. Herein, economic planning is a mechanism for calculable allocation of common resources between and within socio-technical organizations to meet user demand directly; and, because it is cooperative and direct, it is held in contrast to the market [price] mechanism for economic calculation. Whereas economic planning can occur within a cooperating structure, the market mechanism specifically occurs within a competing organizational structure. In a planned economy, the allocation of resources is determined by a comprehensive plan of services and production that specifies and probabilistically configures all service

Figure 12. *Concept diagram depicting service systems with service priority (i.e., some services are prioritized) and service fulfillment (accountable degree of completion of service system demand).*



entities with the allocation of resources in time. Note that all large corporations [in the market] do central economic planning internally for their own benefit. Many State authorities centrally plan their governments and socialized jurisdictions.

The Soviet Union performed a type of early economic planning under a project called "Gozplan". Therein, all calculation were done manually and included prices. Gozplan is considered an early form economic planning because it used "the method of material balances", which predates Kantorovitch's work on economic input-output planning from the 1950s-1960s. The method of material balances accounts for a certain amount of output from a given industry, and then, calculates the spread across multiple industries.

Whereas market economists claim that in order to compare different ways of producing things (via outputs & inputs), their optimal method of comparison is the price mechanism (i.e., the items costs in the market where there is trade and competition over supply and demand). Kantorovich showed that if you agree on the mix of outputs, then it is possible to design a structure to arrive at an optimal (or, equally rational/more rational), allocation of resources than the market, using a dimensional matrix of inputs and outputs (a database layout and operational technique) revealing the ratio of inputs to outputs.

A economy can be represented as a network configuration (or "network architecture") of the cycle of resource flows and transformation from source to production to usage, and its return cycle.

> **INSIGHT:** *A total city system approach requires overall planning to attain a higher standard of living for everyone.*

2.2.1 Rational economic decisioning

A.k.a., Rational economic planning, automated economic planning, planning in-natura.

At a higher level, an economic system is a decision system. It is a decision system about the transformation of resources into final usages. Rational systems use reason and exhibit universal drives toward self-preservation (self-protection), resource acquisition, replication, adaptation, and efficiency. In other words, rational systems apply [reason-able] safety scaffolding strategies toward their decisioning methods [in order to meet their drives and fulfill their needs]. Herein, a rational plan involves [at least] the conceptions of definition, formulation, implementation, evaluation, and modification (based on feedback).

This economic model may be known as a 'rational economic model'. The rational economic decisioning principally states that if we understand the environment that we are in, then decisioning involves imagining the different actions we might take, visualizing and otherwise simulating the state-dynamic that those actions are going to lead to (i.e., the action space), and then, taking the one that leads to the outcomes that are best for us (and our goal, purpose, or objective). And, if we don't know the environment, then we need to both visualize it and test it out; we need to 'learn'. In other words, this form of decisioning is a systematic way of perceiving forward. This economic system encapsulates this understanding into a series of algorithmic micro-calculations and a set of capability inquires. Also, rational economic decisioning asks two additional questions in order to orient decisions in it environment: What is our goal (intention)? What do we have to do to fulfill our goal (task)?

An efficient economy is the creation of a system and then an optimization within the system until a new system replaces it. Remember, efficiency needs direction: we can optimize for profit or for fulfillment, which are contradictory [structural] directions. And, how many tiers of profit extraction and monetary making is there in your society?

"Failure to plan, is planning for failure" is an absolute misquote of the original quote, which is, "We don't plan to fail, we just fail to plan." The two are poles apart in meaning. A failure to plan cannot be a plan for failure, because every plan is built to achieve an objective. Failure cannot be an objective for a rational person, unless that failure is some kind of ulterior way to gain a larger objective. For example, an unscrupulous person may deliberately sabotage a meeting in order to gain importance (you people couldn't achieve the objective through a meeting, but I achieved it my own way). In normal circumstances failure is not an objective, and therefore, there cannot be any plan for it (unless the failure was intentional). When we see the original quote, we see the significance of the way it is phrased. It implies that failing to plan leads to failure. However, in the misquoted version, there is an implication that failing to plan is a deliberate, mapped out effort to fail. This, as any rational person can testify, is simply not so.

> **INSIGHT:** *The more prepared we are, the greater our potential to accelerate our personal growth and navigate a responsive environment.*

2.2.2 Logistics

A.k.a., Logistical economics.

Logistics refers to the wide set of activities dedicated to the transportation and distribution of products, such as the material supply of production, as well as related information flows. These activities are grouped into two major functions: physical distribution and materialization coordination (a.k.a., materials coordination/management). Physical distribution is the collective term for the set of activities involved in the movement of products from points of production to final usage. Materialization considers all the activities related to the production of products in all their stages of production along a supply chain.

Depending upon its specific application the term logistics has a variety of related definitions. Herein, logistics refers to the flow and storage (i.e., inventorying) of goods, services, and related information (i.e., material service information) between the point of origin and the point of destination in order to meet user requirements. Logistical processes involve information, communication, and transportation systems. It is essentially the planning and carrying out of the movement of resources to, and sometimes through, a system. In other words, logistics is the process of identifying the optimal means by which to move material service information - information which has entered the presence of the material service system. There are two logistical service systems: communications (digital service information) and trans-distribution (transportation and distribution - material service information). Logistical processes control the movement and direction of matter and electromagnetic flow. These two physical service flows move matter and energy within the unified, materializing information field. In the material system these service flows form a coordinated network of pathways, conduits and technologies for the movement of information (e.g., humans, electricity, data, and objects) within the field.

2.3 Lifespan

All dynamic systems have lives, no system is eternal. All systems have lives because all systems have internal contradiction and over time they move off from equilibrium, and when they move far enough from equilibrium they begin to oscillate. The oscillation becomes so great that it causes the system to destabilize into what in the science of complexity is known as a 'bifurcation'. The system does not survive, but where it will go is uncertain because there are two alternative possibilities. Either the system can be born again with a new model, a model that makes the old model obsolete, or the system can be left to its collapse and eventual decay.

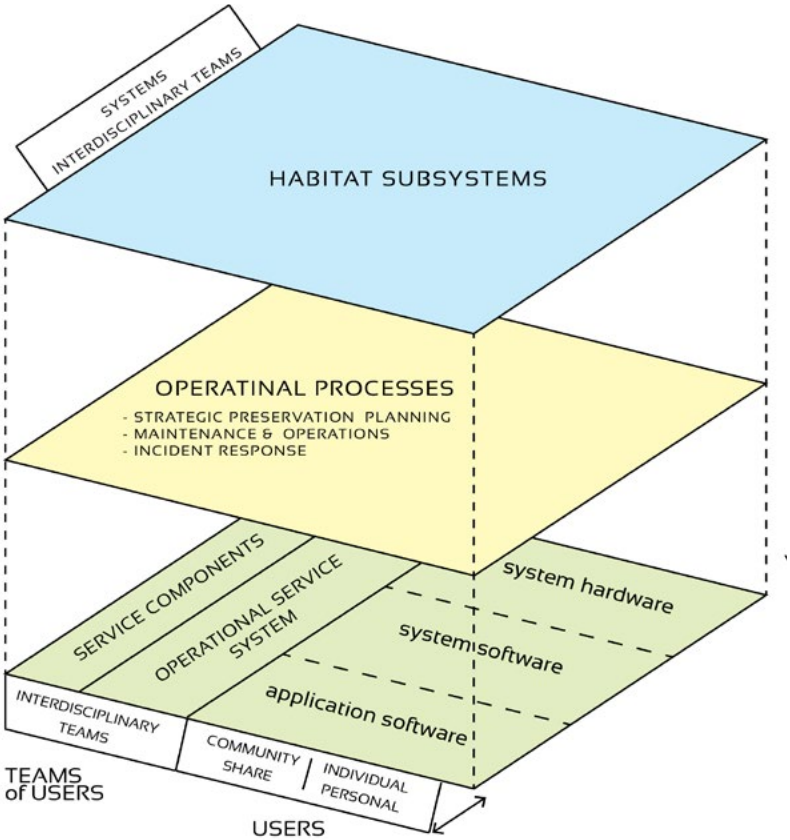
Aging (or 'senescence') is an intrinsic side effect of the normal operation of a material body (or technological good / service) due to the presence of entropy in the system. The normal operation of a material system generates side effects, generates damage, molecular and cellular (in living systems) causing changes to the structure and composition. Those changes accumulate over time and throughout the life of the system; they are generated as a side effect of even simple operations that are non-negotiable to the system. The operational life of a material system is known as its 'lifespan'. Lifespan is multi-factorial (i.e., there are multiples of factors that influence lifespan).

Aging is possibly inevitable in a material system, regardless of extropy (i.e., the replacement of parts). There is, however, a minimum rate at which these changes can occur. What is not inevitable is that such damage should remain unrepaired. We can intervene and provide an external influence to facilitate a longer lifespan of the system. For example, medicine is supposed to be about restoring health to a living biological system. The essence of medicine is the facilitation of restorative mechanisms as well as repair to the ongoing and accumulating molecular and cellular damage in the human body system, and thereby, keep it below a level that causes disease, disability, and malfunction.

Some systems are set up to tolerate a certain amount of damage, and it is only when the damage accumulates beyond a certain threshold that things start to go wrong. Hence, medicine may not only be restorative, but it may also be preventative (i.e., preventative maintenance that prevents damage before it builds up) -- periodic preventative maintenance.

CLARIFICATION: *Lifespan is generally discussed in terms of "protected conditions of operation"*

Figure 13. *Habitat service subsystem decomposition model.*



and "normal environmental conditions of operation".

In some sense, it could be said that the 'homeodynamic space' of a system determines its lifespan, and that the homeodynamic space shrinks as the system ages, becoming lesser over time. It becomes more prone to "things going wrong" over time and with age. Herein, aging is the shrinkage of the homeodynamic space which makes the system more prone to the diseases of age (in humans) associated with the system under observation. In designing a system we must ask ourselves, What is the most fundamental reason for shrinkage of the homeodynamic space? It is the occurrence and accumulation of molecular damage. Imperfect maintenance and repair systems allow the accumulation of molecular damage, including damage in the repair systems themselves.

Also, life can export entropy. We can remove entropy as a mechanic would repair a part of a car to keep it going. At times, functioning can be maintained and restored through replacement.

2.4 Life cycle assessment

A.k.a., Life cycle analysis, cradle-to-grave analysis, or more recently cradle-to-cradle analysis, environmental impact analysis.

All systems have a life cycle. Life cycle assessment (LCA) is a systematic technique for the analysis the environmental impacts associated with all the stages of a life-cycle of a product systems from a "cradle-to-grave" perspective. Note that a life-cycle analysis can also be conducted from a cradle-to-cradle perspective. Life cycle assessment is a measurement, planning, and decision tool. LCA is focused on studying the whole product system, including the complete chain of production over the lifetime of the product system. A product system can be broadly defined as the network of processes or activities needed to deliver a product (or service) to an end user. Life cycle assessment seeks an objective and rational evaluation of the environmental impacts of a product system. Life cycle assessment is similar to input-output modeling and has related computational aspects. (Tan et al., 2018:91)

There are several forms of life-cycle analysis, each of which is related to resource positioning:

1. Cradle-to-grave is the full life cycle assessment from resource extraction ('cradle') to the use phase and disposal phase ('grave') of the product's resource composition.
2. Cradle-to-gate is an assessment of a partial product life cycle from resource extraction (cradle) to the production output gate (i.e., before it is transported to the user).
3. Cradle-to-cradle is a specific kind of cradle-to-grave assessment, where the end-of-life disposal step for the product (as a composition of resources) is a recycling process.

In a life cycle analysis, each product system is analyzed by tracing all upstream process chains to their ultimate sources (i.e., extraction of resources from the natural environment) and likewise by tracing all downstream process chains to their final destinations. In principle, the analysis should encompass the entire life cycle of the product and its resources. Analysis is also done on the basis of a predefined unit of output of a product system, known as the functional unit. The functional unit represents a specific unit something, such as service (or value delivered; e.g., life, technology, or exploratory) and/ or physical quantity (e.g., measured in mass or energy units). The functional unit allows proper benchmarking in cases where LCA results are used for comparison of alternatives. (Tan et al., 2018:92)

Thus, LCA naturally necessitates a quantitative approach, analogous to input-output modeling. The four components of LCA as outlined in the ISO 14040 and ISO 14044 standards are (Matthias et al., 2006):

1. Goal and scope definition - Identification of purpose, system boundaries, functional unit, technological assumptions, the natural resources, pollutants and environmental impacts of interest, data sources, and other relevant assumptions.
2. Life cycle inventory analysis (LCI) - Estimation of flows of natural resources into and pollutants from the product system per functional unit.
3. Life cycle impact assessment (LCIA) - Estimation of environmental impacts of the product system per functional unit.
4. Interpretation - Use of information derived from previous steps to address the purpose of the LCA and to determine whether or not the results are sufficiently conclusive given the errors and uncertainties that occur in the analysis.

2.4.1 Linear and circular economies

Simplistically speaking, a "linear economy" refers to an economic flow in which raw materials are used to make a product, and after use, it is wasted (i.e., disposed of in a landfill). Such waste may include, for example, the product itself and its packaging. In contrast, products in a "circular economy" are designed to be reused and recycled. In an economy based on recycling, materials are reused and decomposed.

Original input-output models were highly linear, which is problematic in two respects:

1. There is an assumption that labor (work) requirements will scale linearly with production

demands. This assumption is false as more advanced technologies allows for ephemeralization (Read: doing more work with less effort and/or resource input).

2. There is the assumption that raw materials are used to make a product, and after the product's use, it is disposed of, and not, reused or recycled. This assumption is false because some products can be reused and most materials can be recycled.

2.5 Societal sustainability

The earth is a semi-closed system. The earth is closed to the flows of material input and output, but open to the flows of energy (and work). Note that in general, the only cosmic input is solar energy, and the earth's only cosmic output is heat. Herein arises a general problem for human health and reproduction, all of the resource materials needed by human society must be obtained from a finite, non-renewable supply within the earth boundary as a supra-system, without denying other necessary earth sub-systems access to those resources. Similarly, the outputs from human society must be absorbed by other societal and ecological sub-systems so as not to become sequestered as unusable waste or worse, toxic to other subsystems. (Mobus, 2017:545-546)

The human societal system (i.e., social, decision, lifestyle, and material systems) is a sub-system of a whole environmental earth-hominid system (e.g., the Real World Community Model). Sub-systems of a semi-closed supra-system must fulfil a 'purpose' in the context of the larger [societal] supra-system in order for the system to remain efficient, and ultimately, sustainable. The success of a system in interacting with its environment over an extended timeframe depends on that system's ability to regulate its activities, both internal and external so as to remain effective and adaptive, which are necessary conditions for its sustained continuance. Whereas an effective system is a system that meets its purpose (or function), an adaptive system is capable of modifying its behaviour in order to accommodate some variation in environmental conditions that places the entity under stress. (Mobus, 2015:6) The roles of effectivity and adaptivity, and the mechanisms of a cybernetic control subsystem ("governance") in maintaining these, are the means for achieving sustainability in all types of complex societal systems. (Mobus, 2017)

In order to regulate activities, a system/entity may apply principles associated with control and coordination ("governance") within its decisioning process. Therein, a priority-based (adaptive) and hierarchical-based (veridical) cybernetic societal system (PCSS and HCSS) provides the potential for (Mobus, 2017):

- The internal regulation of subsystem interactions (*operations*).
- Coordination of a subsystem of interest with other subsystems in the [societal] supra-system (*operations*).
- The design of subsystems (*development*).
- The potential for strategic evolution of the whole societal system in anticipation of future changes (*development*).

Mobus (2015) argues that a hierarchical cybernetic decision system (HCDS), when properly architected and constructed, and working with veridical decision agents [with sufficient decision models], is how natural systems such as cells and higher organisms (including eusocial colonies) persist over evolutionary time.

Mobus (2015, 2016, 2017) uses the acronym HCGS instead of HCDS - hierarchical cybernetic governance system (HCGS) versus hierarchical cybernetic decision system (HCDS). The societal system described herein seeks to remove and replace the conception of "governance" as much as possible, since it carries market-State connotations that do not apply under a community-type societal system. When Mobus (2015:4) uses the term 'governance', he means 'hierarchical cybernetics'. Since a cybernetic system is a combination of a controlled dynamic system and a control system (Parin et al., 1966), the term 'decision' is used herein in place of 'governance'. Alternatively, it may be possible to refer to the system as a hierarchical cybernetic control system (HCCS) or hierarchical cybernetic societal system (HCSS).

The decision system herein is both adaptive (PCSS) and veridical (HCSS). Veridical decisioning is based on the identification of a correct response, which is intrinsic to the external situation and may be subject-independent (a.k.a., actor-independent). Adaptive decisioning is subject-centered (a.k.a., actor-centered) and is guided by the subject's (actor or actors') priorities. (Goldberg et al., 1999:364) Within the decision system for a community-type society, the Value Inquiries processes represent adaptive [priority] decisioning, and the Solution Inquiry process represents veridical decisioning. A whole decision system for a complex and adaptive societal system must account for both guiding priorities and the optimal selection of the next solution iteration of the state of the society (and its services).

For a complex socio-technical society, a designed and appropriately informed cybernetic societal system (CSS) is a prerequisite for achieving adaptability, resilience, and [individual human] fulfillment, which are the necessary capabilities of societal systems that seek a sustained existence.

All designed control systems have a purpose. Systems designed with a purpose are sometimes called purposive systems; they are goal-oriented. The term 'purposive' signifies that the system actively seeks a goal that will provide it with some kind of completion, reward, or fulfillment, which gives rise to the concept of a social fulfillment (completion or reward) function. The market, and competitive/hierarchical societal systems in general, incentivize by rewarding with an abstraction, 'money'. In a community-type society, the result of fulfillment/

completion is 'access', directly.

All truly purposive systems obtain resources (e.g., material and energy) from sources in the supra-system. These systems do real work using energy to transform materials for their own internal use, and they output products to other systems and wastes to sinks. Mobus (2017:3) states, "A purposive complex adaptive and evolvable system produces outputs that are acceptable to environmental sinks." Therein, growth potential is ultimately a function of availability of resources and the capacity for waste sinks to absorb and nullify wastes. In addition, systems produce outputs that fit the criteria of acceptance by environmental entities by virtue of their structures and functions arrived at by either evolution or design. Such systems are capable of recovering from disturbances within limits. (Mobus, 2016)

A properly functioning sustainable societal system provides [at least] three capabilities:

- Adaptable to environmental changes.
- Resilience for maintaining functionality despite such changes, and repair when those stresses are extreme.
- Effective fulfillment of each sub-system's purpose to provide requisite functionality.

Sustainability is sometimes defined through a developmental viewpoint:

> *Sustainable development is the kind of development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*

This definition contains within it two key concepts:

- The concept of 'needs' (requirements for life); and
- The conception of 'limitations' (constraints for living).

Although useful for societal service subsystems, this definition fails to address the necessary conditions that would have to be met for the persistence of a societal system as a whole; that is, what would be needed for humanity to say the societal system is currently sustainable as a whole.

Mobus (2017) provides an working definition of sustainability of all complex systems:

> *A system persists in structural, functional, and purposive conditions into an indefinite future. Sustainable processes are those that can continue into an indefinite future.*

Then, Mobus (2017) describes the necessary conditions for the sustainability of all complex systems -- a system persists by meeting the following set of necessary conditions:

1. **Fulfil a purpose** - produce valuable outputs.
    - All material flows in a semi-closed system must by cyclical (Daly, 1996). There can be no build-up of waste materials or the exporting of materials that would be toxic to other subsystems. For a sub-system to serve its purpose, its outputs should be useful to other subsystems. They should be produced at a rate commensurate with that at which the other subsystems can absorb and use them. Every subsystem within a supra-system has co-evolved to provide some other subsystems with products or services that contribute to the sustaining of those recipient subsystems. The subsystem can accomplish this function only if it can maintain its own sub-processes in working order. It must have internal regulatory functions that detect deviations from normal working and correct them as quickly as possible. It must be able to repair itself using some of the inputs.
2. **Receive inputs** - to produce and to know what to produce.
    - The subsystem must be able to obtain all the resources it needs to: (1) maintain itself, and (2) produce the desired outputs to the rest of the supra-system (i.e. fulfil its purpose). Because the resources it needs are actually outputs from other subsystems and those subsystems can only produce those resources at rates determined by the mass balance of the whole system, the subsystem is constrained to obtain such resources at the 'natural' rates at which they are made available. A condition 2 corollary is that in order to ensure stable fulfilment of purpose, the subsystem must have a capacity to measure those rates and adjust its internal rates of usage in accordance. Subsystems must 'measure' the efficacy of their inputs and that of their outputs (relative to the absorption capacity of the sinks with which they are coupled) and regulate their activities accordingly
3. **Be adaptable** - The subsystem must be adaptive within the ranges of variation in extant conditions in the larger supra-system.
4. **Be evolvable** - A complex adaptive and evolvable system (CAES) subsystems are, over the long run, challenged to undergo evolutionary changes (Mobus, 2015) to adjust their workings to the changed needs. This may mean a simple readjustment of the norms and ranges of their adaptive capacities (e.g. the predator evolves faster running capacity in response to faster prey). Or it may mean creating new internal capacities to obtain substitute (or better) resources or produce

new goods and services (i.e., in the market, products or services for new 'customers').

If these four conditions are met, any subsystem should be sustainable indefinitely, until one of the conditions is not met. These four conditions can be derived from Miller's Living Systems Theory (1978), that is, subsystems identified by Miller work to provide the processes that produce these conditions. (Mobus, 2017)

3 An access-based model

CLARIFICATION: *The decision system is based on access to [habitat] services.*

The [economic] decision system described herein may be characterized as an access-based model whose functional purpose is to facilitate strategic and shared access to economic services through intentional and integrated design, rather than ownership of economic inputs, processes, and outputs. Herein, 'strategic access' (or 'strategically designed access') refers to the free and equitable access of a population to economic services (or resources) on an as needed or used basis (Read: on an *access* and *use[-time]* basis) through coordinated information and resource sharing with consideration given to future availability (Read: strategic future access and natural service regeneration). Access-based models are sometimes also known as use-base models.

This "shared" access-based model is the product of a rational value system; in particular, a value system that acknowledges the potential for intentional adaptation and cooperatively integrated design. Fundamentally, the survival of individuals is only limited by their [enabled] *access* to life-serving and life-fulfilling necessities. Similarly, the ability to learn (and adapt) is only limited by a learner's *access* to learnable content, learning materials, and learning experiences. Therein, if all of a community's life support needs are met and individuals are pursuing their highest potential direction, then what they require is not ownership, but access to those items that enable creative and desirable life-learning experiences. When humans have access to the necessities of life, and have adopted a rational and systematically relational value system, then the possibility for an intentionally adaptive common[unity] space opens. Basically, there is no need to "control people" or apply force against the individual (e.g., legislative law) in a society designed to adapt to the fulfillment of everyone's' needs through access-oriented design.

The access model described here is divided into three interrelated subsections:

1. A discussion of 'common heritage' from which a pool of resources originates.
2. The logistical movement and repositioning (or reorganization) of the resources themselves.
3. The utilization of resources by needed services.

This section further details why 'access' has been chosen over 'property', and then describes the foundational structure of the socio-economic model as viewed from an access perspective.

An access-based system might be referred to as a process management system (a.k.a., process coordination system). "What's in charge" is the participatively formalized system itself, not people or subjective whim. What provides access is the process, with the assistance of humans and other technical systems.

It is possible to identify three types of goals/objectives of logistical measurement:

1. **Local availability (local access)** - Local availability is defined as whether or not access is available at the trip origin or destination, or within a city. This refers to the actual availability of an object within a city.
2. **Network availability (network access)** - Network availability is defined as whether or not access is available between origin and destination, or between cities. This refers to the actual availability of an object within a city network.
3. **Comfort and convenience (customization and preferential-type access)** - The avail-ability/access-ability to edit and customize with the certain confidence of not violating others access during or after the process. This refers to subject-taken actions that do not violate others access.

These three types of measurement goals/objectives are the most relevant to operational performance from a users perspective:

1. Can it be acquired?
2. When can it be acquired?
3. Once acquired, how can it be changed?

Both local and network availability may refer to spatial availability (wherein, a transit service is used to move objects for service access) or temporal availability (i.e., how often, and for how long is the transit service used), or both.

3.1 Access calculation

Use is access, and it may be graphed and computed. That which is being accessed are service-objects, which are productions of a global habitat access system. Access (use) can be calculated with just the habitat array (technical array) using the "Leontief" input-output method:

p	=	d	+	(	Z	•	p	)
access	=	demands	+	(	habitat service array	•	access	)

- Wherein,
  - Access is the total production for a user population of a habitat service system (i.e., their current and planned/potential usage of a coordinated service system operated by contributors using compositions of resources).
  - p = total production (total output access)
  - d = demands (total needs)
  - Z = habitat array; a matrix composed of multiple habitat service matrices:
    1. Objectives matrix
    2. Requirements matrix
    3. Contribution matrix
    4. Schedule matrix
    5. Procedures matrix
    6. User access matrix
    7. Resource matrix
    8. Technology matrix

A decision chart for an economic system may be calculated as a complete economic (social array) access calculation:

access = demand (d) + priority (r) + urgency (u) + (habitat matrix Z • access)

- Wherein, access could be resource capacities, or access could be total issue resolution for a user population. The user accesses service-objects from some environment in some socio-technically organized manner. Some of those service-objects can significantly change other objects, and the users accesses those as part of an [intersystem] team.

As the result of a decision within the unified information system, access is the selected optimal-acceptable solution upon which operations by contributors service all users. Ultimately, to users, access is the selected optimal-acceptable solution, which is planned for and engineered.

3.2 Common heritage

INSIGHT: *Resource sharing is required to stop economic hierarchy, to prevent individual distortion, and to phase out social pathology.*

This access-based economic model views all resources as the common heritage of the whole of the community, and hence, all services as common to all individuals in their utilization of the common resources. In other words, access refers to the access a community maintains to a common pool of resources -- this is “heritage normality”.

Whenever common heritage resources are involved, then it is necessary for purposes of ecological stability for a community to turn toward an [egalitarian] access-based model for the management, allocation and distribution of those resources that are commonly accessible, for shared coordination.

Note, herein, the term ‘management’ is applied to common [heritage] resources, and not to people management. It is not the type of “management”, which shall be referred to as ‘human management’ that makes the claim that “leaders mobilize other people to get important things done” - this is ‘human management’, and it is the type of management that “gets things done through other[s] human beings" - it is a parasitical form of organizational structuring that uses others' energies for personal and righteous ends, and is not too far akin from slavery or "human farming". Think about this for a moment: the goal of 'human management' is not the empowerment of other humans to do things for themselves and for their communities that regenerate fulfilled, self-directed, and self-sufficient lives; it has other ends. Resource management does not have to involve human management; it may involve human coordination, which is not equivalent to human management by a leader or some other [managerial] authority figure. The organization of this economic decisioning system is not based upon social leadership, but is instead, design-led (i.e., it is a design-led vs. a leadership form of organization). "Great design" is a symptom of a design-led organizational structure and an experience-driven development processes.

Fundamentally, to maintain a steady and dynamic relationship with the life ground that factually services the fulfillment off our community, resource management (as a system) must maintain the clarity of humankind's relationship with its lifeground [in the way in which it arrives at decisions that impact that common heritage lifeground]. The very idea of human management breaks that lifeground connection by ignoring human needs and ecological concerns. Instead of managing "human resources" for economic gain and politically powered purposes, a systematically designed access-based system organizes access to information and resources for transparent contribution to human fulfillment. A natural law/resource-based economy could be said to be a time and [renewable] energy management system, but it is not a 'human management system'.

When individuals share in the recognition that there exist common heritage resources in a mutually life-grounded ecological system, then it becomes more likely that they will recognize the necessity for economizing (i.e., managing the efficient and effective strategic use of) those resources. Without a collaboratively developed and commonly formalized method for arriving at decisions about common resources, then the clear repercussion is a loss in our synergy as a community, and possibly, the 'tragedy of the commons'.

A "tragedy of the commons" is a state where individuals have lost their awareness that the resources in a locale are commonly connected to the well-being of all local lifeforms (and species). And, the "tragedy of the commons" is, itself, a market-paradigm deduction - it is deduced from the observation that the "tragedy of the commons" is frequently observed "in the market"; it may even be said to be premised on the presence of a market, The "tragedy" is actually a misunderstanding from the ecological systems perspective. In other words, the tragedy of the commons is [at least] a market tragedy - unorganized commercialization of nature has the potential of leading to the exploitation, excessive [over] consumption, and pollution of nature to reduce total resource regeneration and life capacity. The market is the commercialized organization of nature. The market doesn't recognize an ongoing relationship between individuals among community and nature; instead, it presupposes every transaction (or, most transactions) as finite things with no ongoing ecological and interpersonal relationships.

In his work, "Tragedy of the Commons", Garrett Hardin was not, in fact, describing a 'commons'; instead, he was describing a free-for-all where there is no structural or coordinated organization of any kind (i.e., no rules). The "tragedy of the commons" is a free-for-all without community. In the real world, a 'commons' is in fact a bounded community that coordinates and manages shared resources in a sustainable manner. The 'commons' is a different concept than what Hardin was describing. In Hardin's essay, everyone just springs into existence and they all "go to town" as rational economic actors maximizing their own utility with a limited but open resource, which is a bizarre notion to contemplate. Except, it is the normative conventional point of view. In the essay, he was projecting his economic premises onto the world in a fictional way, but in a compelling parable.

Garrett Hardin's famous allegory of the "tragedy of the commons" has been modeled as a variant of the Prisoner's Dilemma, labeled the Herder Problem (or, sometimes, the Commons Dilemma). Cole et al. (2008) wrote a brief paper arguing that important differences in the institutional structures of the standard Prisoner's Dilemma and Herder Problem render the two games different in kind.

Oddly enough, the tragedy of the commons has been interpreted to mean that private property is the only means of protecting finite resources from ruin or depletion. And, this is a tragically inaccurate interpretation of what Garrett Hardin initially meant when he explored the acclaimed 'social dilemma' in his literature work entitled, "The Tragedy of the Commons". Therein, Hardin explicitly stated that society should exorcise the "dominant tendency of thought that has ... interfered with positive action based on rational analysis, namely, the tendency to assume that decisions reached individually will, in fact, be the best decisions for an entire society". (Hardin, 1968)

Originally, the "tragedy of the commons" argument was a reaction against (and not for) the contemporary laissez-faire interpretation of Adam Smith's "invisible hand of the marketplace". Adam Smith's laissez-faire doctrine of the invisible hand tempts us to think that a system of individuals pursuing their private interests will automatically serve the social interest. In the essay, Hardin employed a key metaphor, the Tragedy of the Commons (ToC) to show why. When a resource is held "in common" [in a market], with many people having "ownership" and access to it, then Hardin reasoned that a self-interested "rational" actor would decide to increase his or her "exploitation" of the resource since he or she receives the full benefit of the increase, but the costs are spread among all users. The remorseless and tragic result of each person thinking this way (i.e., thinking in competition) is the ruin of the commons, and thus, of everyone using it.

The tragedy of the commons has become a truism, not only in economics, but in political science and public life. The two terms (i.e., commons & tragedy) become so linked in their paradigm that there is no moving beyond them while in that paradigm.

In the essay, and in later writings, Hardin's rejection of more cooperative and systemic design-oriented solutions stems from the individualistically competitive assumptions in the argumentation for his metaphor.

Many years later in Hardin's 1998 essay in "Science", he writes, somewhat unwittingly it might be said, that in a structurally coercive society (i.e., market capitalism), the only way to save society is through a frank policy of "mutual coercion, mutually agreed upon". He goes on to state,

> *"Under conditions of scarcity, ego-centered impulses naturally impose costs on the group, and hence on all its members. Individualism is cherished because it produces freedom, but the gift is conditional: The more the population exceeds the carrying capacity of the environment, the more freedoms must be given up." (Hardin, 1998)*

It is somewhat unfortunate that Hardin's collaboratively developed and formalized method for managing the commons involves the coercive use of force. For in truth, the coercion of the State plus the structural violence of the market is unlikely to preserve anything in the long run. Hardin's misunderstanding of the situation becomes more clear in the final paragraph of the essay where he writes, "Science has been defined as a self-correcting system. In this struggle, our primary adversary should be *the nature of things*." There are many points that could be made here, but the three that might come first to someone's attention are: (1) any struggle against nature will always end in one's own more quick demise; (2) the market does not have to be the nature of things; and (3) "individualism" as a concept is an "-ism", and therefore, it is separated from nature and unlikely to produce the cooperative, iterative design of more free systems using the discoverable principles of nature to do so. Science is self-correcting, but science must be explored from the perspective of an emergent system.

Fundamentally, the idea that "the problem of the commons" can be solved through "government" is tenuous. The "government" can print its own money, the government can go into debt, the government's primary tool is the violence (i.e., destructiveness), and the government can change agendas - a political government is opinion-based. Are these things problems of the commons? Should we bring "organization" to the commons through coercion by government, through money, debt or force, competition, or capital, or through opinion? The idea that we need a commercially protectionist "public" entity to solve a supposed problem of common lands is likely to spawn a whole host of additional problems. Unorganized common un/ownership is not solvable through the creation and empowerment of a State of Government, which is a massive and generally unowned, exploitable and protectionist, resource.

In general, a 'commons' is a space where people have equal access to the resources and information required to fulfill their needs. A commons-oriented community represents a structure where everyone, all of the time, has the opportunity to participate in maintaining and evolving the community.

Herein, **common access** is access to resources, goods and services that are the common heritage of everyone, the property of no one, and potentially accessible to everyone.

> **INSIGHT:** *If goods are only as relevant as their use, then a system of shared and open access is most efficient.*

3.3 Commons-oriented design principles

The following 8 design principles for managing the commons have been adapted from the 8 principles given by Elinor Ostrom who sought to investigate how communities succeed or fail at managing common pool, finite resources.

1. Define clear system boundaries. Without exception, we all are a part of our community, and we each have an equal stake in what happens.
2. Match decisioning protocols to local needs and conditions. Fundamentally, the things that we all have access to may be organized into a fulfillment-oriented structure, for all of our benefit. We have a mutual responsibility to take care of these commons and pass them on to the next generation in better shape than we found them.
3. Ensure the continuation of transparency and participation in protocol creation and decisioning modification. Everyone must have the opportunity to participate in defining, restoring, and creating anything that is important to the future of the community.
4. Reduce the existence of authority structures and enhance parallel forms of cooperative creation.
5. Monitor resource usage and pollution in real-time.
6. Facilitate restorative justice practices; we must recognize and repair the damage that has been done, and the inequities that have been created through systematic restructuring.
7. Account for the possibility of disputes in the structural design of the decisioning system (i.e., design-in mechanisms for conflict resolution), and facilitate the self-efficacy and self-direction of individuals in the community.

8. Define responsibilities and make them explicit for every systems task.

To create a commons-based (or community-oriented) society people need more than just exposure to new ideas; they need tangible ways of experiencing, practicing and living out possibilities. People can change when they see and experience a better way. To ensure the survival of the community and of our common environment, we must create new systems and structures more closely aligned with nature.

For reference only, the following are Elinor Ostrom's original 8 principles for "governing the commons":

1. Define clear group boundaries.
2. Match rules governing use of common goods to local needs and conditions.
3. Ensure that those affected by the rules can participate in modifying the rules.
4. Make sure the rule-making rights of community members are respected by outside authorities.
5. Develop a system, carried out by community members, for monitoring members' behavior.
6. Use graduated sanctions for rule violators.
7. Provide accessible, low-cost means for dispute resolution.
8. Build responsibility for governing the common resource in nested tiers from the lowest level up to the entire interconnected system.

3.4 Two forms of access

There are two paths that an access-based economic model can take:

1. Everyone collectively owns everything; or
2. No one owns anything.

The most efficient of the two paths is for no one to own anything. This community has been designed along the second of the two paths, such that no one owns anything.

A community-type society is a user supported effort. We among community return resources for others to use, because that sustains an equitable economy. In some cases this "return" looks like a library return. In the habitat context, it appears as an integrated materials cycling service system.

> **INSIGHT:** *At the end of the day everyone wants to live somewhere nice, everyone wants to develop their potentials, to enjoy and share in a community of higher potential interrelations, choices, and experiences. We all want [access to] the highest service level.*

3.5 Economic distribution and configuration (or, economic network system architectures)

When considering an economic configuration it is important to consider the flow of decisions and information, and the existence or non-existence of an authority-driven management structure (or powered social hierarchy). Remember, herein, that a given structure will produce a given set of probable behaviors.

There are [at least] three principal forms of economic [access] distribution (or economic configuration) that a society can take. It should be noted here that a socio-economy generally includes some combination of these configurations with a leaning toward one, or possibly, two of them. For example, modern global society is composed of both political centralization as well as market decentralization, with hierarchical social power centralization occurring within the organization of the market. The access-type system described herein is more akin to a form of systems distribution involving decentralization as a "market of competing ideated designs" and not a "market of competing products". The decentralized structure involves "market sharing" (i.e., the movement of information without price) and not "market advantage" (i.e., with price). In community, ideas are shared openly and the most accurate and systematically fulfilling ones are tested, integrated, and then, temporarily adopted.

1. **Political centralization:** One player or a small number of partnered (or federated) [game] players control the economy. In other words, there is a structurally centralized capability given to a group of entities in a competing leadership-power market (i.e., politics) for whom may be given the privilege to decide how resources are to be controlled (and distributed) in society. Centralized organizational structures focus "management" authority and "leadership" decision-making into a single "executive" unit with a bureaucracy of hierarchical and laterally competing units, with information flowing from top "leaders" (or "managers") to various lower units. In this sense, a centralized economic structure is 'autocratic' [though it may have the appearance of looking otherwise].

   In a centralized network all nodes send their data to one central node (a "server"), which may then sends the data to the intended recipient. In a system of secrecy and confidentiality, and hence, low accountability, that which happens to the data in between (i.e., at the central server) is anyone's guess. Herein, the idea of 'probable deniability' becomes formed.

Comments on centralization:

- In centralized organizational structures decisions are made at the top and communicated down through the layers where there is not necessarily accountability. Hierarchies are not necessarily structured to maintain accountability; and, this is particularly the case in a dynamic of competition over lifespace.

- In a centralized politically power system, the program from authority (or "policy" and legislative "regulation") is [possibly] not to be questioned.
- Factions [of belief] and political parties tend to favor the centralization (or consolidation) of all [political] power for their own ends.
- Centralized systems have a single point of weakness and become weaker over time due to their inflexibility to adapt efficiently. In this sense, centralized systems are always "wrong" (because of their single point of failure).
- The centralization of power [in a social system] into a social hierarchy increases operative control while reducing accountability.

2. **Market decentralization:** Groups compete with each other [in a power hierarchy] over property ownership and for influence in a market [with varying levels of social and economic control], and they [are said to] "share" the power [by currency] - purchasing power buys influence in a lifespace of price. Decentralized organizational structures look more like multiple smaller representations of a single structure, featuring management *redundancies* and more close-knit chains of command. The theoretical "market" [without State influence] is essentially a decentralized hierarchy.

   In a decentralized network architecture data passes through multiple connected computing systems. The two most common types of a decentralized network are: a mesh network and a peer-to-peer network. A 'mesh network' (or "meshnet") is a type of network architecture where each computer is connected to neighbouring computers, this is common with WiFi. Mesh networks have a "self-healing" capability — they continue to work even if participating computers drop out. As a result, the network is typically quite reliable and cannot be easily shut down, as there is often more than one path between a source and a destination in the network. A 'peer-to-peer' (P2P) network is another form of decentralized network architecture. In a peer-to-peer network, the "peers" are computers which are connected to each other via the Internet. Files can be shared directly between systems on the network without the need of a central server. And with an 'open internet' new nodes can be added as needed. In other words, each computer on a P2P network becomes a file server as well as a client. P2P is an example of a social peer-to-peer process where each individual shares resources to build a group resource.

   In a sense, a decentralized network could be characterized as a distributed network of centralized networks. It is important to note that when a decentralized network is scaled or "zoomed out" it resembles a distributed network. But, zooming in on the nodes of a distributed network reveals that the nodes in the network are centralized (or "common") in their communications system and control, in some manner. To this degree, a distributed network does not rely on one single server, but splits the risk by having multiple nodes with a common means of communicating (or "controlling"). In the "market decentralized network" there are industries with their own competing command, control and communications systems [for influence over the acquisition and distribution of resources]. Hence, the market system is fractured in its decentralized distribution; it is not [a] common[unity].

Comments on decentralization:

- It is important to note that ownership is a form of centralization (i.e., it is the centralization of resources around the "owner", as oneself separate from other selves in his/her "right" to the access and "defense" of a resource). This idea is part of the argument toward the observation that a market will always create some version of the State (i.e., political centralization). When ownership and competition are encoded into a socio-economic system, which represent its value orientation, as the system iterates over time, there will exist an increasing monopolization of that which is owned into an organization that is capable of monopolizing conflict and creating a "State".
- When decentralized systems scale they either collapse or become seen as a distributed (or distributed-decentralized) system.
- Decentralized organization may refer to the distribution of administrative functions or powers of (a central authority) among multiple local authorities (i.e., management or the lateral element in a bureaucratic ruler ship). In the monetary market this lateral organization is competitive, not cooperative. Yet, cooperation improves resource utilization (i.e., usage efficiency) at scale, through sharing. The monetary market reduces

the coordinated utilization of resources through competition at scale.

- Market decentralization is a reference to competition. Yet, network decentralization doesn't necessarily involve competition; it simply involves the exchange and sharing of information along a medium.

3. **Equalitarian systems distribution (a.k.a., distributed access, egalitarian access, mutually beneficial access):** When individuals are both the "providers" as well as the "users" and can directly participate in the information acquisition, service design, and production and distribution (i.e., productive distribution) processes of an economy on a transparent, systems basis. Herein, no socially constructed separator exists to divide the providing creators (i.e., "providers") from the accessing users such that everyone [in the community] remains an unbiased "stakeholder". The transparent application of systems principles to the entire economic process maintains the potential for a state of equalitarian access to the distribution of economic services by the stakeholders, who are both the creative [service] providers and the service users. An equalitarian distribution system is necessarily participative in nature and founded in the idea of "openly formalized access". An economic system based upon systems distribution has attributes of both centralization and de-centralization for it is a systems-oriented form of economic distribution - it is neither based on political principles (i.e., not politically-based) nor market principles (i.e., not market-based); instead, it is based on systems principles (i.e., it is systems-based).

   In a distributed network there is no central server, and each node is connected to various other nodes; data simply "hops" through whichever nodes allow for the shortest (or otherwise most efficient) route to the recipient. New nodes may be "dropped in" at any time.

   A centralized system has a single point of failure. What we see with the Internet is the distributed production of knowledge, and with economic systems can come distributed computation and material production (e.g., 3D printing technology, p2p physible sharing, and even integrated permaculture). Herein, cloud-computing [in principle] is an excellent example of systems distribution (i.e., it is both centralized and decentralized). Consider a simple web-application: parts of it are running decentralized in your browser (e.g., Ajax). The data may be stored in a single data-center – centralized, but the database is replicated on different virtual machines and in different spatially remote locations – decentralized. The design of the Internet prevents it from being shut off from one switch. The web-application may make use of other services – decentralized, but provides its features via the same URL to thousands of users – centralized. Note that cloud computing is "in principle" (as previously stated) an example of systems distribution; however, cloud-computing services owned by a business entity [in the market or by a government] are still economically centralized (or monopolized) by the business entity and are therefore not an example of systems distribution at an economic scale. This is an important issues, for when social decisioning systems do not progress at the same rate as technology, then a host of unpleasant consequences emerge.

A paper entitled *Cloud Computing: Centralization and Data Sovereignty* (de Filippi, 2012) summarizes the concerns of this form of mixed [value] techno-economic system quite neatly when it states,

"The implications are many: users are giving away their content under a false ideal of community; they are giving away their privacy for the sake of a more personalized service; they are giving away their rights [to the rights of competing and leveraging entities] in the name of comfort and accessibility; but, most importantly, they are giving away their freedoms [to legitimized exploitation] and, very frequently, they do not even realize it."

It is true that shifts in values tend to follow advances in knowledge and technology, but when established and competing interests are involved, then appropriate value shifts can be suppressed for competitive leverage and protectionism [of a power base] to the detriment of all individuals in a society. A distributed system is "centralized" only in the sense that the system keeps track (or trace) of information on a comprehensive habitat-community system basis and information transfer protocols are standardized to allow for the very transfer of information. A unified distributed system is capable of communicating and transferring (or relaying) information between its component parts. The standards for communication are "centralized" (i.e., the same across the whole of the structure) -- functions are centralized. This is, by the way, why you can view a website that may be hosted in Brazil and not have to translate protocols (or standards) manually. One could equate the "centralization" present in a systems-distributed configuration to a stream, which runs in all directions equally and with the same "laws". Hence, a more accurate term for the type of "centralization" described herein might be "coordinated design standardization".

Decentralization can exist at the distributed level also. For example, oil, coal, natural gas, and nuclear industries are highly centralized providers of energy as electricity. Solar, wind, and to a lesser extent hydro, geothermal, and biomass, can be localised and provide the energy requirements of a community that seeks to use them at a distributed level; and therein, the energy derived from these sources could be laterally decentralized into a series of backup batteries.

Comments on systems distribution:

- We now have a methodology for massively paralleled distributed design and production.
- Distributed horizontal arrangement among cooperating and trusted entities versus a pyramidal or hierarchical "scheme"-atic structure. A distributed system is not "run from central command". A Community is a dynamic fulfillment system designed by its users and run by its users. Access-based systems are naturally distributed in their nature.
- In a distributed configuration all the nodes can connect to each other; there are no centers. New nodes can enter at any time.
- Distributed interlinking reduces the potential of [competitors] playing one social service against the other.
- A systems form of distribution is community-global in scope (i.e., unifying); whereas a political configuration is factional in scope (i.e., divided) and a market is inter-factional in scope (i.e., more divided) -- political affiliations are divided by State nationality and then party affiliation; market affiliations are divided by industry, business entity, profession, lifestyle, and also, national/international affiliation.
- In a distributed self-organizing system all the elements are, by definition, autonomous: there is no leader that drives the organisation of the system.
- Redundancy and multiplicity is efficiency in the network world.
- A distributed system is less likely to encounter system wide blackouts of information, energy and service; its networked design configuration makes it is less vulnerable to natural and man-made disasters – which can be in the form of malfunctioning, natural disaster, or attack. In concern to energy, when localization is applied to such a configuration, it allows for a minimization of energy loss by avoidance of large distances between energy production components and energy usage components.
- Naturally, as information becomes more available and distributed, then an access-based model becomes more probable.

The following are several notes on economic configuration design:

- One may also speak of the idea of centralization in terms of outcome(s) and vision. Therein, a "centralized" outcome might be seen as the 'purpose' of a specific system or structured organization. Yet, in the case of the Community, the term 'centralization' seems inaccurate and inappropriate, for the purpose for the Community's existence is in fact emergent in its semantic form; and its orientation is distributively adaptive to its environment.
- The Internet, by definition, is centrally planned in the sense that it has relays, common technologies, and standardized protocols (e.g., http, ftp, arp, smtp, tcp). In other words, the Internet utilizes a set of shared, common and centrally developed standard protocols. Without these "central" and commonly designed systems information could not pass from one end point to another. Herein, the centralization is in the systems logic, which allows for systems to communicate effectively and efficiently with one another. There is a fundamental difference between political centralization and systematic design centralization.
- In a self-organizing system the control is distributed [amongst the localized actions of individuals], and all parts of the system contribute to the emergence of the system's organization[al behavior]. The system's resulting behavior is a result of the numerous interactions among the system components.

Fundamentally, humankind now has a methodology (i.e., the systems methodology; systems architecture) for massively paralleled distributed design and production by users for users [without the addition of politics or the market]. Herein, an economically distributed system is "centralized" only in the sense that the system keeps track (or trace) of information on a comprehensive habitat-community systems basis -- information and processing are systematized, distribution is distributed and decentralized, and production is localized where technically possible.

Note, there exists a point of confusion amongst defenders of the market system that in criticizing the decentralization of the market, one must be advocating for [authority-driven] centralization in another form. In the free-market thought paradigm, if you criticize market-decentralization, then you are for socialist-political-centralization -- there is no other option that can be computed in the paradigm; hence, a false dichotomy is created and the idea of the "economic calculation problem" arises (or is reinforced).

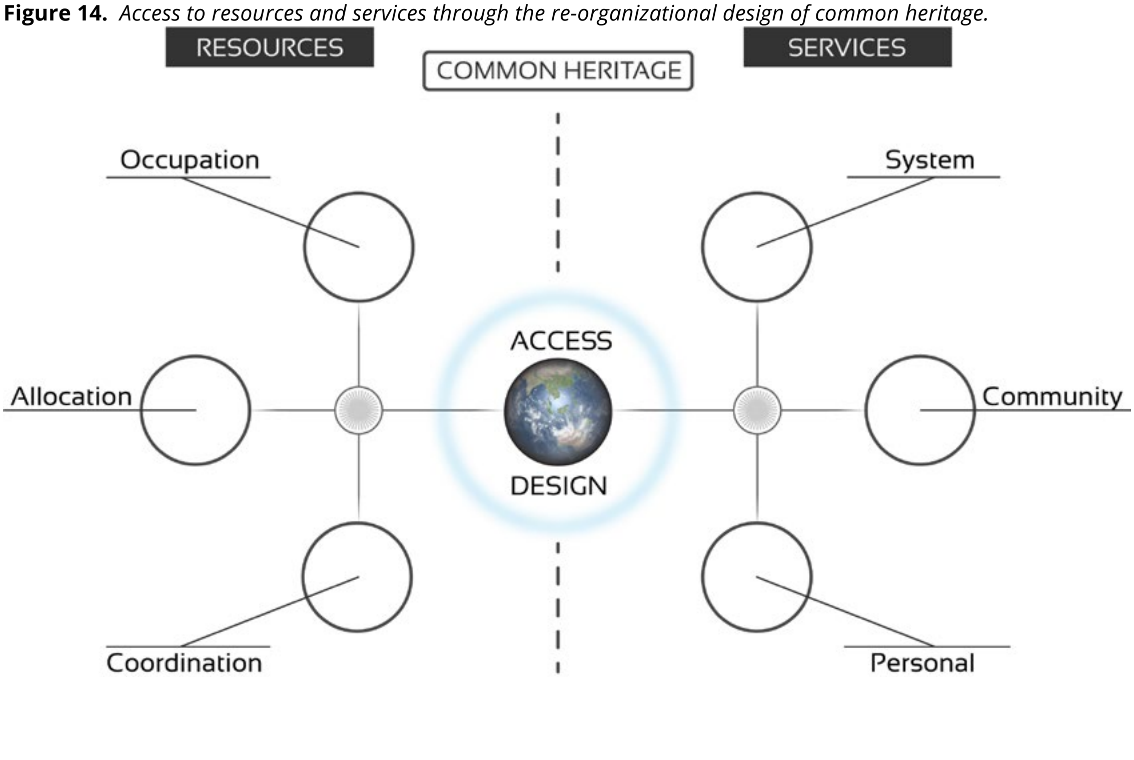
An access-based system represents a move from owning one of everything to a larger economic system designed for access to goods and services as needed and otherwise desired. The so-called "sovereignty of ownership" is a distortion of the reality of the situation. If John Locke were alive today and understood systems thinking then he might quietly be revising his claim that liberty cannot exist without private property. Truly, the understanding is arising that ownership (Read: external restriction on a particular good, service, or other lifegrounded form of individual need) is not in fact itself a "right", but that ownership is in fact the resulting behavior of a technical limitation of the ability to access said good or service in any other way. Before networked computing, the possibility of the "zip car" was impractical. Before social networking, airbnb could not have existed. Before the emergence of 3D printing and the "maker movement" the idea of shared schematics for making products available free as "physibles" from the Pirate Bay and other telecommunications platforms (and online sources) was simply not conceived of. As such, the great shift in *production*, *access*, and *interaction* is towards a *unifyingly distributed method* of global resource management, accounting and coordinated access.

A great deal of wealth exists when resources are coherently organized and made available. Herein, information acquires greater coherency and solutions become more transparent when life is shared. And yet, it is important to remember that in early 21st century society there continues to exist industries and establishments that benefit off of the back of a structure of restriction, scarcity regeneration, and the division of unification.

3.6 The concept of "for the greater good"

This access-based model is designed to facilitate the sharing of economic resources -- its design is egalitarian / equalitarian in form (*see the* Social System specification > value system > justice > distributive justice). An egalitarian [strategic economic] design is one of the few economic designs that has the potential for providing a high-standard of known living (i.e., a high quality-of-life) to an entire community's population through the recognition of commonality among humankind (e.g., needs and environment) and organization based upon cooperative coordination. In other words, this system is designed to strategically provide for the greatest

Figure 14. *Access to resources and services through the re-organizational design of common heritage.*



fulfillment of everyone's common needs and individual preferences (among the whole community of individuals in a systematic manner), and not the greater/est good for the greater/est number, which often leads to political systems and a tyranny of the majority.

The phrases, "for the greater good" and "for the greater number", are predominantly deployed by governments in justification of aggressive and violent actions "for the greater good". Statements indicating a "greater good" mentality include, "some of us must get sick for all of us to get fed; some innocent people must be caged for the greater good; some people must be punished for the greater number; some people must die for the greater good; some peoples' children must develop birth defects for the greater good; some people must be poisoned for the greater number; and some people must serve other people for the greater good". A "greater/est good" mentality is closely associated with [self-]righteousness and a reduction in systematic and critical thinking processes, lower social intelligence.

A self-righteous mindset (i.e., the belief that one's thinking and actions are right for everyone) fails to pay attention to evidence while frequently establishing an ideology [that the self-righteous desire to force upon others]. A righteous attitude leans toward the engagement of emotion in decision making as opposed to the application of a systems methodology for understanding problems holistically prior to cooperative action. Allowing the self-righteous to come into positions of power and prominence is highly likely to generate disastrous circumstances for everyone. Whenever the "common good" is put (or more accurately, forced) above the "individual good", then the individual (and the individual's needs) gets sacrificed "for the greater good". Individual choice has little to do with unanimous consent, and has no relation to economic models that involve winning and losing (and competition in general). In a political system, the greatest good for the greatest number is nearly always (if not always) about human management (rather than the coordination of fulfillment for everyone).

3.7 Socio-economic access sharing

At the core of the access system is the Earth, the common heritage, which is an existing "thing", a complex interconnected systems "thing" that sustains us all. The sharing of knowledge about this "thing" and our relationship to it is essential, not just for the Community, but for each and every one of us as an intrinsically motivated individual. Therein, the sharing of information and of access comes naturally from a common perception of connection to nature, and it creates the potential for community. Wherein, the persistence of a community necessitates the sharing of knowledge and technical ability to maintain fulfillment and optimize well-being.

The idea of accessibility [to a service or a good] carries both a spatial and temporal nature. In other words, access can be sub-divided into spatial elements and temporal elements, and in logistics these factorial [data] elements are modeled together in what is known as a spatial-temporal model of the engineered [logistical] service system. In other words, time and space form an 'accessibility dynamic' in the engineering of an economic system for service fulfillment. It is important to note here that most, if not all, "living" self-organizing systems express such dynamics [that create different 'emergent behaviors' as the system changes over time].

Socio-economic systems have dynamics that are strongly correlated and coordinated in space and time, and all typically display a multiplicity of spatial [localization] and temporal [prioritization] scales, dependent upon their drives, values, methods, encodings, and possible paradigmatic assumptions.

Therein, a distributed and integrated economic system may be said to be composed of interacting spatial networks representing a mixture of individuals and technical computing systems, each having (1) one or more inputs, (2) an internal state variable $x(t)$ that evolves in time in response to inputs, and (3) one or more outputs. In the case of individuals, we are highly complex living systems and at a very basic physiological level we have inputs, processes and outputs, which should not be taken to purport that as embodied beings we are mechanistic in the totality of our nature. In the case of computing systems, there are many different kinds of computing system from development systems to integrity testing systems; wherever computer processing occurs [spatially] there is computing [in iterative time, Δt].

In such a system, material goods and service structures have a spatial location that you can point to and say, "that is a car, which is part of this transportation network that includes both people and computing hardware as well as a material infrastructure of which that road is a spatial part upon which there is transport at some frequency". Processes and organizational services maintain a primarily [iterative] temporal nature; they are purely information systems, the representation of which for computing systems may be said to be the electron and for embodied consciousness it may be said to be the body. Just like the ledger of a digital blockchain (e.g., bitcoin), each state of the economic system is modeled and distributed in time. It may be said of a particular service, once the information model is visualized, that it had "this" *specified* organization at "this" *specified* point in time, designed for "this" *specified* functional purpose with "these" [negative feedback] consequences. In essence, services are temporal, spatial, and conceptual information organizations.

Herein, service systems are strategically designed for access, which enables the modeling of the utilization [of resources as they move through a service system] based on actual use time. Along with data on actual demand, the patterns of use of any given service/good may be analyzed to determine how regularly (or intermittently) it is being used (or accessed). Transport vehicles, recreational equipment, project equipment and various other genres of goods are commonly accessed at relatively distant time intervals, making the task of ownership not only somewhat of an inconvenience given the need to store these items, but also clearly inefficient in the context of true economic integrity (i.e., an economic-orientation that seeks a reduction of waste at all times). If properly configured, an economic system based on access and the efficient allocation of natural resources would maximize societal benefit per unit of natural resource.

In the Community, users are designers and designers are users; everyone is a "stakeholder" and everyone knows it; they don't have to be conditioned to believe it; instead, they are intrinsically motivated to experience it. Wherefore, if there is a weakness in the economic logistical distribution system, then everyone has an incentive to fix it. A decision system designed to generate systematic access must substantially share information and problems, it must organize transparently, formally, and in a person-independent manner.

INSIGHT: *A distributed system distributes information over space and time, and in so doing it becomes increasingly resilient.*

3.8 Access-based vs. property-based

MAXIM: *Nature becomes disconnected through ownership. Property disconnects social relationships. Profit disconnects self-relationship.*

An access-based model exists in contrast to an ownership-based model (i.e., property-based model). An access-based model is a more accurate conceptual model of the real world, involving the verifiable observation that all physical resources are, in actuality, transiently accessible in nature. Conversely, "ownership" is a social construct and exists outside of the nature of the real world where access is universal. The encoding of the socially constructed idea of "property" into an economic system establishes destabilizing systems properties where useful and accessible objects that are actually transient in nature (i.e., natural resources) become the exclusive access and use of one entity. In a system, the encoding of the idea of "property" corrupts and obfuscates feedback. Hence, property-based systems are unable to re-orient themselves effectively. Such systems are essentially unstable like a three-dimensional twirly top oscillating until finally it fails-over; they are not self-stabilizing like a regenerative gyroscope.

Empirically, there is no such thing as ownership, there is only access, and in the real world access is of an incrementally temporal nature (i.e., it involves time; Δt). Essentially, in the existent real world there is no such thing as property, there is only access; yet, individuals can socially agree (or be forced into accepting) a property-based model. The very idea of 'property' can subjectively filter perception and encode itself into a society's socio-economic system, but that doesn't mean the concept accurately reflects the 'access' that is occurring.

The notion of 'property' as self-owned or self-ownership and all that ownership entails, such as private property, is obsolete under the structure of an access-based system. The more factual idea of 'access' makes private ownership obsolete.

In an access-system an accessed item can be returned at any time for re-processing through the community's system. In a property-system an item of property is transferred and exchanged; hence, the idea of systematic resource re-processing (e.g., cradle-to-cradle design) is difficult if not impossible to effectively organize due to the transfer of responsibility through property exchange.

Ownership establishes a boundary to the most efficient coordination and re-processing of resources within a life system. If an organism, which has a supra-system perspective, can no longer allocate resources systematically because its intra-systems have ownership over interdependent resources, then the organism will no longer function optimally or remain in a state of dynamic and healthy equilibrium with its environment. Instead, a system of competing interests has been established and the life system enters into a state of decay. **Optimal decisions** in an access-based model are decisions about the allocation and occupation of interdependent resources that are coordinated to serve the homoeostatic functioning of the organism and the continued persistence (or purpose) of its existence.

Access to items when they are needed releases individuals from the property-based requirements associated with individual ownership of items. This may not appear to be a "big deal", but when accounting for all of the factors that ownership entails, it becomes highly relevant to a community's economic model. In a property-based (and free-market) model, ownership of an item transfers responsibility for that item from the producer to the owner. Under regulated market conditions the producers may still have ownership over the items they produce even after their commercial economic "sale" (or exchange/gift) to consumers (e.g., copyright and the U.S. Digital Millennium Copyright Act). Under hypothetical non-governmental free-market conditions, the consumer (or new owner) becomes solely responsible for the items storage, safety, transport, maintenance and recycling/disposal, among other functions associated with "responsible ownership" – someone "taking care" of their belongings (with degrees of incentive). In contrast, under an access model, the community (including human activity & machine activity) optimizes the fulfillment (or coordination) of these responsibilities, not any single individual or social group (class, nationality, or race). An access system is a system of and for mutual benefit. A property system benefits those with property and those with access to property (including, inheritance and gifting).

In practice, ownership acts as an external restriction on a resource, good or service. The concept of ownership exists in part due to the social and technical limitations of a society to provide flexible access to needed goods and services in any other way.

Someone who is owned is by definition not free. If someone's labor is owned in the marketplace, then that someone is by degree not free. It is an intellectual dodge or cheat to claim that the market is a place of freedom when there is ownership, and in particular, ownership of labor. It is quite clear that if someone can labor for "you", then they can labor for themselves in a community, without having to change bodies or change minds or make any fundamental change to who and what they are and how they operate in the world. They can go and do for themselves and for their community without ownership.

Ownership is not a real limitation of technical feasibility, it is a deliberately introduced constraint, which compromises capability and subordinates it to some other concern. In many cases that primary concern is "profit". In the digital economy it becomes the "piracy of intellectual property". Sometimes it even involves a deliberate breaking of the hardware -- broken (i.e., functions disabled by the "landlorded" business) and purposefully placed behind an "ownership" wall.

Ownership structurally de-incentivizes accountability for socio-ecological viability as it is inherently a structure that generates opposition (i.e., competition). To be remain viable in a system (e.g., the earth's bioshpere) we must accurately sense our environment. When we come together in villages, towns, and cities, we must accurately sense our environment at not only the individual level, but at the socially networked level also. In other words, we must be precise in our decisions so that our structures and behaviors align with regenerative sustainability as the population scales. If we scale without retaining a fulfilling alignment, then we risk our viability.

Ownership isn't a 'first principle'. You own something so that you have exclusive and unlimited 'access' to it; thus, access underlies ownership, and this is what an access-based system seeks to optimise, shared access (not the divisionary construct of ownership).

Further, any claim of ownership within a system, particularly a biological system, will cause the entire system to become unstable. If system entities begin "laying claim" to resources (as those substances that allow for its continued existence), then the system will eventually cease functioning in a stable manner from competition over resources that would otherwise be allocated and occupied in a systematically and strategically coordinated manner for the system's purposeful survival. And therein, the authority of the day will determine how rightful things are, how liable its participants are, and how much force to apply to modifications to the concept of "property ownership".

Also, individual ownership is inefficient within a community. Ownership, more than anything, is the personal burden of transport, maintenance and storage, and of disposal. In an access-based community needs are fulfilled cooperatively and through strategically efficient design, leading to a minimization of repetition, duplication, stagnation, deterioration, the non-use of a useful thing, ecological pollution, and waste & decay.

Ownership is [in part] characterized by the concepts of **liability**, **rights**, and **force** (and **trade**, as the processing element). Ownership involves the right of a claim, a greater claim than someone else [often through a "public" or higher authority]. Life becomes a spectator sport, a box. Ownership involves personal liability between players in the game of ownership. Ownership requires force to prevent someone else from claiming ownership. Force is a characteristic of ownership, and not necessarily a characteristic of the concept of 'access'. A property-based model is by its characteristics a force-based model; force is required in defense of property [from that which is referred in a property-based paradigm to as "theft of property"].

> *"The notion of "rights" is inseparable from the history of "property" or privatisation of nature, resources, processes, knowledge, and so on, for appropriation, consumption and control by the powerful, who can take possession of objects by force, excluding others."*
> *- Farhad Mazhar (Mazhar, 2007)*

In the German language, there is a saying, "Property comes with duties attached to it (e.g., something owed in return; responsibilities; tax; upkeep)." Except ... in a free-market it doesn't, and in a regulated market the duties are backed up with force (and threat of violence) by the State.

Any ownership over resources, individually or socially (as in "public property" managed by government), will eventually lead to the establishment of authoritarian force-mechanism constructs -- a paradigm wherein force is claimed to achieve right and proper[ty] action (as in property rights). Behind all *liability* and *property rights* there exists force. Therein, power fills in all the crevices where power is given over to another to apply through coercion or contract[ed negotiation].

Commercial researchers, for example, are highly likely to race to take credit for research-led therapy that increases survival, but not so equally attentive to the possibility of harm or the retraction of statements that were once accepted when later analysis shows harm or fraud. Commercial researchers are often not so attentive to retractions due in part to the issue of liability. In competition, liability is seen as a potential weapon (a variable in market gaming strategy).

For the past three hundred years or so, industrialised societies (or at least the class of tangible property owners within them) have become increasingly preoccupied with property, its privatisation and its protection - in the form of the accumulation of capital and financial control. The historic debate about property ownership has been framed as being between enclosure and commons as between "private property" and "public property" (governed by the State). Therein, the ideology of personal (and now corporate and governmental) greed has become the unquestioned driver of "the economy", with its assumption that humans are motivated only by the prospect of infinite acquisition, and that progress results solely from increased production (or productiveness) and consequent, infinite economic growth. Such an ideology is quite out of alignment with the reality of fulfillment and *how a common habitat area might be organized into accessibly coordinated service systems that fulfill a community of individuals.*

It might be interesting to learn how 'property-based' terminology is being and has been redefined over the centuries to include ever more of that which exists in the real world, and one might start with Roman Property Law. There are at least 5 general categories of "public property" that have been redefined as private property: Res nullius; Res communes; Res publicae; Res universitatis; and Res divini juris. A property-based system incentivizes "property owners" to further spreads their market demand more deeply into that which naturally exists in common.

Many of the social and economic concepts in modern parlance are terms of a property built world. Under an access model an individual could neither be said to "steal" nor "sell" nor "pirate" items that no one owns. In other words, the concepts of "stealing" and "selling" have no meaning in an access-based system. Personal property is sacrosanct in highly materialized/materialistic commercial cultures. Even in their work environment, with equipment allocated / issued by an employer, people can have a strong identification of something being theirs, which might be epitomized in the common office statement, "can I borrow your stapler". We must be careful of the language that we use because it shapes social and economic problems.

> *"I'd be a bum in the street with a tin cup if the markets were efficient."*
> *- Warren Buffett*

3.9 Access responsibility

> **NOTE:** *If we don't interface with things responsibly then we don't have quality things.*

An access-based model requires a shift in an individual's perception of responsibility from the idea of responsibility as described within a property-based system. The responsibility, the will and the intention, to "take care of" and to maintain systems, goods and services, is different between the two models. In the access-based system, "you care for things you use, but do not personally own". Generally, under a property based model, the statement is, "you care for the things you own (or don't care because it doesn't really matter as you won those things), and it is a sign of virtue to care for the things of others when they are in your possession"; and the incentive to care for the things of another comes in the form of punishment if they are not cared for. In other words, the later part of the statement generally carries a force mechanism caveat (or qualification), "If you damage someone else's belongings, temporally under your possession, then you must repair or replace that item under threat of your own property or freedom."

If society is not composed of property and no one owns a "thing", then the question quickly arises, who takes care of society's things? In an access-based system this question initially becomes one of individuals' values and their orientation toward themselves and the community as a whole -- we take care and we design systematically efficient and integrated services that take care -- we respect ourselves, we respect others, and we design systematically integrated services that are respectful. Technically speaking, in brief, systems can be designed with greater maintenance efficiency and operational integration so that less energy and effort is required to maintain society's things. Yet, to sufficiently answer this question in full the whole of the Community design must be detailed and understood in full from the social and decision systems to the learning and architectural systems. The community detailed herein is both intentional and integrated; and hence, to understand how things operate in full the whole of the design must be observed and taken into account. Wherein, in community, access occurs with a basic sense of social responsibility (per the Social System design). A society designed to facilitate our fulfillment as one, so why should we not take care of society in return? Community requires individual participants with a commonly directed value orientation.

> **QUESTION:** *The idea of 'ownership' has a double meaning. It refers to that which "you" own and that which (or whom) owns "you".*

3.10 'Wealth' as use and access

When the idea of 'wealth' is defined as **use** and **access** rather than as possession, then we could cut down on our delusions. If we seek to fulfill our non-material needs with material purchases, then, "we can never have enough". Our needs for family, friends, community, and a purposeful life get put off while we work hard to pay off the debt from purchasing all those things that were supposed to make us happier in the achievement of ever greater reward. The less time we have for meeting our real needs, the more needy we feel, and the vicious cycle continues. A monetary (or consumer) definition of "wealth" makes our hunting and gathering ancestors the poorest people on Earth. Maybe poverty shouldn't be defined by the market or by the State, but by access to real world [heritage] resources and services, and ultimately, our sense of an integrated, flowing, and fulfilling life experience. Maybe, 'wealth' is affluence in the naturally serviced fulfillment of our needs. Perhaps 'wealth' is how much of our time we can say we control, the ability to self-direct the fulfillment of our needs and our access, the participation in something we truly consider to have meaning and importance.

The term 'wealth' could in fact mean **accessibility**;

accessibility to the highest quality known and available good or service at the time it is known about and desired. Am I wealthy enough that I have access to what I need and want in the most timely and efficient manner? Isn't this really what 'wealth' means - having access to things and participatively contributing to service processes. Herein, there is no property/commodification/ commercialization process, what there is is access[ible design].

> **INSIGHT:** *The competitive market system creates an environment where "success" is the building of enormous financial wealth for one's isolationary and infinite commercial wants at the cost of true wealth for everyone.*

3.11 Zero-sum

This equitable access-based model does not maintain the qualities of either "sacrifice" or "zero-sum" (as in "the zero-sum game"). If one individual or group has access to a resource, it does not have to follow that another individual or group has less access to that resource -- coordinated sharing can effectively organize access. In other words, an economic system that follows an egalitarian sharing model (like in a family unit) is less likely to establish an environment wherein one individual's access to a resource restricts another individual's access to the same resource; they recognize the danger in establishing a pie of their resources and fighting over them wherein one entity's gain is another entity's loss. The finite sum of the pie represents a zero-sum position in competition. It is important for a community that values efficiency to understand that a zero-sum perspective hinders the emergence of a higher state of efficiency, that of a cooperative and synergistically fulfilling organization.

Herein, a basic distinction is made between "zero-sum" games and "non-zero-sum" (or, "positive sum") games. In zero-sum games such as competitive wrestling, the fortunes of the players are inversely related. One win minus one loss equals zero. In non-zero-sum games, one player's gain does not negate the possibility of another player's gain -- it represents the potential for cooperation wherein the gains can be additive, synergistic. We call this 'cooperation' or 'symbiosis', and 'mutuality' when the interests overlap entirely. In a positive sum game, when life becomes better for any of us, then life becomes better for all of us.

Nation states are currently playing a zero-sum game with the Earth, our common heritage, and it is obvious that they are bruising the prize for which they compete. An objective look at what is happening on the Earth today makes it clear that we need to cooperate to preserve the habitability of the Earth for our strategic survival and for all its many living species.

There is always the possibility for developing an awareness that sees the Earth as a single organism and recognizes that an organism at war or competition with itself is doomed. We are here on this planet together. Though mankind lives on a big spaceship we call Earth, the more our population grows and the more our technological capabilities impact our environmental conditions, the smaller the Earth effectively becomes -- and if viewed as a zero-sum game, the pie that entities compete over becomes effectively smaller, and hence, competition is likely to become more fierce. In a situation of limited resources, allowing the whims or personal vested interests of anyone to determine resource allocation would not only be dangerous, it would be suicidal. And, the danger of anyone owning those resources exclusive to themselves with the profit motive as an incentivizing factor should by now be obvious. The establishment and perpetuation of such a power structure will be everyone's downfall. If "you" were on a spaceship would "you" let anyone own all of its oxygen, or establish a system where ownership of any of the oxygen was possible, or even desirable? The oxygen would logically be considered the commons of everyone on-board, for it is part the interconnected system that maintains the life of those aboard. How about water? Ownership incentivizes monopolization [in part] by reinforcing the fear of not (or never) having enough.

If great care is not taken in the use of limited resources, then nobody will have access to them as differential advantage degrades a community's responsibility toward resource regeneration and a "tragedy of the commons" exacerbates conditions of scarcity. Answers about the commons lie in that which is common; they lie in the persistence of a "common sense" relationship among one another in a community and the community's relationship with the commonly regenerative ecological system that maintain its existence.

Optimized systems rely on organized and shared access to resources. Technology and automation are useful, but they are just the current "best" suggestion for accomplishing an engineered purpose; they are a means to an end. If (for some initially anonymous reason) the technology fails, a community will still need mechanisms for accessing those resources. Equitable strategic access to needed resources is the objective purpose, not that which is used to accomplish that task.

> **INSIGHT:** *There is no such thing as "competition on the honor system", particularly when individuals are fighting for their lives in a socio-economic system that pits individual against individual.*

3.12 Access is trust

> **NOTE:** *Potentially, concealment is a form of aggression when it denies the informed construction of a systems-level economic decision space.*

Where is the "social dilemma" when a community's life support needs are met and the remaining resources are equitably, efficiently, and sustainably put toward everyone's personal and social development, toward recreational wants, and toward the emergent restructuring of systematic resilience for a higher potential of common fulfillment? The "social dilemma" rests in our intelligence to design structural resilience into our fulfillment systems so that they persistently orient in the direction of our intended purpose.

In order to maintain a common decisioning system the community does not encode the divisionary and exclusionary concepts of property, ownership and [market] price. Instead, the Community finds any form of ownership of common heritage immoral [and likely to generate an artificial state of scarcity and competition among the community]. Our common heritage is the vested interest of everyone, particularly future generations, and cannot be owned by anyone. It must be accessed "equally". In the negative, it could be said that it is "collectively unowned".

In order for every user to have 100% trust in a system, the system must exist in a state of transparency for every user. **Transparency** refers to everyone knowing what everyone else knows about the system and changes made to it. Herein, the economic system exists to respond to its users, and thus, it is important to point out that transparency of the system actually refers to the system itself and may or may not be a characteristic of the functions the system performs on behalf of individual users. In other words, the operation of the system is transparent, but you have the ability to maintain the confidentiality of your personal information by encryption, for example. The system upon which your encrypted data is built is transparent, not your encrypted data. This is privacy-by open and peer design.

The economic model must draw from a "collectively" developed repository of data. The model must not be bureaucratic in that its complexities become circular, difficult to understand and have an appearance of arbitrariness. The model must also not be too simple in that it ceases to reflect reality, is incapable of meeting social and recreational needs, or cannot be measured against the outcomes of a value system.

Humans are the beneficiaries and users of these systems, goods and services; they are not the systems themselves. In other words, humans do not derive their meaning in life from their systems; they find meaning elsewhere -- and that sense of "self-initiation" and "self-empowerment" further reinforces trust in the system. The economic system is a conceptual and physical scaffolding for humans to use as they apply resources toward their needs in pursuit of their ultimate purpose.

> **INSIGHT:** *Always remember death as the passage from this physical world, which is inevitable for you. The idea of possessing anything is an illusion. Nothing in this physical reality can be owned. We arrive in and depart from this life with nothing but our consciousness. For the first time you may clearly see that the entire concept of ownership, and hence property, is a grand fantasy. How much of your life have you wasted on the lifeless objects around you. The possessions you work so hard to obtain eventually become meaningless and fade from view before eventually fading to dust. In truth, what is living if living is the collection of non-living objects.*

3.13 Collectivist access

"Collectivist access-based" models exist in stark contrast to the design of the access-based model described herein. In collectivist societies individuals sacrifices themselves to the collective [human] management of society by a ruling authority. Some claimed "access-based" models solely involve the governing of and management of human behavior. George Orwell's novel "1984" is an excellent example of such a society. Individual access is managed by the collective authority of "the Party" governmental identity collective centered around "Big Brother".

The smallest minority in a collectivist world is the individual. Yet, when equal access exists (i.e., distributive justice), then differential advantage and its behavioral and psychological consequences need not exist. A socio-economic organization that forces individuals to slave themselves out to pay for the necessities of life is not an intelligent organization for structuring society. Resilience does not come from the enslaving of oneself to another to feed oneself. Are we slaving ourselves and our time to pay for our things at undesired expense?

The business of profit is "their" business. The fulfillment of needs is our [social] community's concern. What is the real relationship between business and individuals because their certainly is one, one of profit. Yet, in truth, we are not each other's competitors (i.e., enemies). For it saddens me to see how much we distrust our neighbours and yet we easily trust commercial brands and suited figures. Community regeneratively creates healthy bonds, not "trusted brands"; in community there is no such attachment (i.e., no attachment to commerce, business entities, and commercialized public relations (or "brands")).

When a community's total information system is available to everyone then there is unlikely to be "grandstanding" - for what "you" know, I can know too.

> **INSIGHT:** *The cycle of our fulfillment must go back to the land, and it is broken by the idea that there can exist the ownership of land. Further, the ownership of invention (e.g., patents) and of discovery (e.g., eponym) turns individuals into little demi-gods. And the moment they try to enclose or control it they defile the source that they accessed it through (or., "gave it to them"). People who are tyrannical with their own identity tend to be tyrannical with others.*

3.14 Access service interactions

A sense of family and intimacy arises among those who share things. When people live with their families, do they bring weapons to the table to fend off fellow family members? Do they pay armed guards to protect their possessions in their bedroom, just in case someone leaves the table early and tries to steal the other's possessions? No, healthy families and communities do not do these things. If humanity viewed all other people as family members, then, in all likelihood, no one would need to be well armed to fend off anyone else. Everything would be shared. And that's what this is about; sharing, not hoarding as we do now in a monetary-based system.

In a family it's instinctive to look out for one another and be concerned with the needs of each other. In a healthy familial situation, you don't need to be told to trust your own "flesh and blood", as it were. How large is your family?

An access-based orientation is most easily recognizable by looking at the serviceable [access] interactions between members of a family living within a single cooperative home. Within such an environment there exist 3 primary forms of access. **Systems access** (a.k.a., InterSystem Team Access) refers to those [infrastructural] systems that maintain the biological and technological continuation of the family, including but not limited to energy production and distribution, water recycling and purification, waste disposal, food production (i.e., a garden), material architecture and environmental exposure protection, and a wide-variety of other systems that maintain the basic structural operation of the family-home system. **Commons access** (a.k.a., community access) includes object-resources and services that are accessible to everyone such as televisions, furniture, cookware, books, common sporting equipment, utility items, etc. Family- and 'systems access' items are shared between the members of the family. And, there exist *personal items* (**personal access**) including bedrooms (or the family home in the case of the family itself), hygiene products, and other personal objects / personal equipment (e.g., personal computing devices). These three forms of access are possible between members of a small family or among individuals in a vast community. The belief that everyone needs to personally own one of everything is a tragically unsustainable and relatively new idea perpetrated by market[ing] entities seeking to capitalize on human fears of insufficiency [in access to their economic needs] for profit.

> **NOTE:** *When the idea of [self-]sufficiency is introduced into the conceptual equation, then there cannot just exist sufficiency for one (i.e., one individual or one group); for sufficiency to exist in a society there must exist sufficiency [in access] for all.*

3.15 Logistical resource access

Under this access-based model, the conceptual space that the term 'resource' holds is further characterized by the terms **coordination, allocation**, and **occupation**. These terms are most easily understood by looking at organisms in an ecosystem: within an ecosystem organisms coordinate the allocation of resources and their systems occupy them. In logistical terminology this characterization is often known as "coordinated resource allocation and usage (or occupation)". Herein, "occupied" resources are "in use". "Allocation" simply refers to the "re-location" of a resource

As a tool, the process of "logistics" solves for the optimization of coordination and the most efficient utilization of resources. All [enterprise] logistical systems maintain a global resource inventory. Through "logistical operations", resources are allocated out in a coordinated manner to services that have been designed by individuals in the community.

Herein, the resources which have become integrated into goods and services are still common heritage, even though they are in use and otherwise "occupied" by systems and computationally designated by a design protocol.

Herein, it is important to state two things: First, that the Community also maintains an environment where 'personal access' is respected; yet, resource allocation and occupation is still seen as temporal by individuals accessing resources on a personal basis. And second, there is a difference between a system that is set in and designed to transcend a fascist world and a system that prescribes a fascist world.

A more materially equal society is a more fulfilled society. Research by The Equality Trust (*External Research*, 2020). We have the potential to optimize the coordination of our fulfillment so that we all become equally fulfilled, and we can do this [in part] through cooperative design.

> **NOTE:** *An access-based system requires coordination, and coordination necessitates planning -- logistics involves planning. Planning is necessary for sustainable resource availability, and hence, strategic access -- strategic design facilitates strategic access.*

3.15.1 Service inventories and catalogues

One of the most common forms of service access in community is an 'inventory'. An 'inventory' is a detailed list of every item potentially accessible in a system. In any economy there are three primary types of inventory: a resource inventory (per every system); a service inventory (per localized system); and a goods inventory (per localized system). An inventory is essentially a set of accounted for and usefully categorized logistical data referencing [material] objects.

Herein, lists of goods and services available in the system are represented to the user through a digital video interface and a backend logistical, inventory catalogue. And, for every inventory there exist a single transparent "ledger" of all access - there exists transparency in access. A catalogue is just another name for a "library" of which there are both digital forms (e.g., a library of films on a video sharing platform) and physical forms (i.e., a physical book library and "checkout/return facilities").

And, there are "sharing centers" (also known as "check-out/check-in" centers) where individuals can checkout and then return items on a temporal basis. Most checkout centers are placed in a fixed spatially structured position in the city-community. There are even inventory catalogues and scheduling for physical spaces. In other words, there exist "room" spaces that can be "checked-out" for temporary use.

Space is generally designed so that it can be used for multiple purposes. Sometimes the efficient use of space is about making the space multifunctional. In other words, sometimes efficient use of space is [in part] about designing space so that when it is not in use for a specific function it can be used for another functional purpose.

Herein, sustainable living refers [in part] to living with the minimal amount of space to provide the maximum amount of access to your needs, wants and preferences. This is done through design.

Land space usage is designed in parallel through the decisioning system. In an integrated self-sustaining, abundance generating city system there must be great consideration given to land [design] usage and access. Each integrated city system in the community has a finite amount of land dedicated to its system before nature is returned to until a new networked city is located.

In community, the problem isn't the amount of physical space needed for a set of integrated city systems, the problem is the intelligent and strategically planned organization and design of the city / set of cities, and self-education, of course.

QUESTION & RESPONSE:
Why would I return the book if there wasn't a fine (i.e., a punishment)? Because I want others to be able to read it as well, of course. It's called 'social conscience'. Where there is social conscience there is also to be found a structure facilitates it, and a critically accepted value orientation initiates toward that behavior. There are people on this planet who have not been mentally conditioned into the 'reward/punishment' mentality – who still hold on to their intrinsically oriented selves, or who have de-conditioned themselves and found their intrinsic self, once again. We can all re-orient whenever we choose. We can restore ourselves to a state of common fulfillment. Those in community think about what is good for a community and they can see how their actions affect the whole.

3.15.2 Time and service integration

Early 21st century society has been liberated from the drudgery of "wash work" to go stock the shelves at the big box store that must be driven to. Though our understanding of ourselves advances, the integration of our technical service infrastructure has advanced little. Are washing machines and other technologically consumable products really labor saving devices -- are these products designed, delivered, and acquired as "consumables", or are they part of a larger, integrated and freely accessible technological service infrastructure?

In early 21st century society, governments and industry are trying to force and pressure the technical integration of electronic systems. And therein arise the problems of privacy invasion, surveillance, and ultimately tyranny. It is important to recognize that one is committing the fallacy of equivalence when they premise their discussion of or argument against an access society on the socio-economic architecture and material infrastructure of a different, notably property-based system. The resulting architectural design of a access-resource founded system is an integrated habitat-city living environment; it is a different environment entirely, both conceptually and materially [to modern day cities, suburbs, or the lifestyle in general]. Principally, it requires thinking about the planning of cities (i.e., "city planning") from an entirely different perspective - both one's own perspective as well as the perspective of everyone desiring access.

3.16 Coordinated access through a digital ledger blockchain and "proof-of-work"

The concept of a 'blockchain' ledger allows for a communications infrastructure that is coordinated and operated cooperatively by the informed agreement of the whole of a globally networked community. The innovation of Bitcoin is not the peer-to-peer technology itself; it is the fact that the underlying protocol solves for the problem of transparent, auditable, irreversible, cryptographically signed [message] transactions. At a basic and fundamental level Bitcoin is a permanent and transparent journal, a distributed 'ledger'. Broadly speaking, Bitcoin is a mathematically sound and secure way for networked agents (and "nodes") to agree on something. The protocol behind Bitcoin is not [just] a currency -- the block chain concept extends further than that of currency. Currency just happens to be one of the implementations that organically emerged from the protocol's design under a global market-based economic system. Note that in its present incarnation, Bitcoin provides both a global currency and a distributed ledger. And, the same technology that makes Bitcion essentially fraud proof could be applied to community decisioning (or "governance", if someone wishes to call it that). Simply, a blockchain is distributed crytograogically secure ledger of information. The system enables resilience of an information network such that if one computer tries to corrupt it, then the remainder network can recover and/or remain secure, open and distributed; it is a way of creating and preserving accurate information in digital form.

A 'blockchain' is a transparently shared public ledger (database) of all information transactions that have ever been executed on the network and based on a set protocol. It is constantly growing as 'completed' blocks are added to it with a new set of recordings. The blocks are added to the blockchain in a linear, chronological order. Each node (computer connected to the network using a client that performs the task of validating and relaying transactions) gets a copy of the blockchain, which gets downloaded automatically upon joining the network. The blockchain has complete information about the addresses and the content those addresses hold from the genesis block to the most recently completed block.

The most significant real world problem that Bitcoin solves (or, purports to solve) is known by several names including: the Byzantine general's problem; the Byzantine fault tolerance problem; the decentralized consensus problem; and, the timestamping problem (actually, Bitcoin solves for multiple problems). It solves [sufficiently] for this problem with the idea of the "blockchain" (i.e., the iterative creation of a verifiable global ledger produced through 'network consensus'). The algorithm that creates the blockchain is the first purported [digital] solution to this problem.

The Bitcoin ledger sheet is an example of an integrated-distributed protocol for facilitating socio-economic access sharing, and it is an example of a process that such a system might run. The Bitcoin ledger is an identification of every transaction [in 'block chain'] that has ever taken place on the Bitcoin network throughout the history of its existence. It is transferred in full to every node of the network. Bitcoin itself is an example of a distributed network and the design of its protocols maintains its integration (and integrity) ... given what is known. It operates as a distributed model for trust.

The Byzantine general problem is a thought experiment meant to illustrate the pitfalls and design challenges of attempting to coordinate an action by communicating over an unreliable link.

The Byzantine general's problem presents a scenario with two armies. The two armies, each led by a general [of equal rank], are preparing to attack a fortified city. The armies are encamped near the city, each on its own hill. A valley separates the two hills, and the only way for the two generals to communicate is by sending messengers through the valley. Unfortunately, the valley is occupied by the city's defenders and there's a chance that any given messenger sent through the valley will be captured. While the two generals have agreed that they will attack, they haven't agreed upon a time for attack. It is required that the two generals have their armies attack the city at the same time in order to succeed, else the lone attacker army will die trying. They must thus communicate with each other to decide on a time to attack and to agree to attack at that time, and each general must know that the other general knows that they have agreed to the attack plan. Because acknowledgement of message receipt can be lost as easily as the original message, a potentially infinite series of messages are required to come to consensus. The thought experiment involves considering how they might go about coming to agreement.

The blockchain is a process that solves for the verification of a decisive agreement [to attack] at the same time. In other words, it creates a scalable mutuality-based decision network. Bitcoin is essentially a decentralized and distributed consensus system that is backing up a state transition system (as "*go" [for attack]* / "*no go" [for attack]*) -- the consensus system tells everyone in the network: 1) what transactions happened; 2) in what order; and 3) the state transition system will tell you if a [trans]action is valid. In other words, the events of all tasks are digitally recorded chronologically, their validity is checked, and the record can't be feasibly changed. Said in another way, the blockchain is a verifiable history of when events happen and whether those events are valid based upon a transparent and commonly agreed on protocol. Herein, there is no concept of an internal state. A transaction is either complete or it is not complete, available or unavailable. The architecture doesn't allow for a multi-state action. Now, just imagine the potential for fulfillment if there could exist a history of all economic events [in the community] and their validity toward mutually fulfilling access.

Bitcoin, is intended to give Byzantine fault tolerance. Fault tolerance - If you have 1/3rd or fewer faulty nodes then you can have linearness (or "correctness").

The protocol achieves this capability [in part] by hashing every block wherein each block contains a hash of the previous block. When a block hash is broadcast, nodes are capable of recognizing it as the [in-]correct one through their own validation ability. Therein, confirmed transaction use a canonical timestamp (agreed by the blockchain); whereas, unconfirmed transaction have an estimate, but similarly unconfirmed timestamp. Also, nodes are identified by an address so that they can be authenticated and we know who the message came from. Note that any message on the network is a 'transaction'.

At the present time the Bitcoin network is based on a "proof-of-work" principle that is captured in a distributed database known as a "blockchain". The concept of "proof-of-work" is what makes Bitcoin unique, technologically speaking, for its time. The blockchain enables a network of distributed nodes to achieve agreement (or "consensus at scale") on the common state of the network (Read: on a common information model).

Presently, each node in the Bitcoin network proves (or more accurately, "shows likelihood") that it has participated in resolving the distributed [network] blockchain through a system called "proof-of-work" which involves thermodynamic effort. Proof-of-work is like solving a very difficult problem and then proving that you have solved it. It is very easy to verify and much harder to solve. In the community, however, tamper-evident logs [of connected peers] are part of the substitution for the original Bitcoin protocol involving the thermodynamic mechanism known as "proof-of-work". In community, there is no coin ownership, and hence, no necessity to mine and validate coin ownership. The block[chain] can be created with no significant effort, versus the Satoshi (Nakamora) whitepaper approach which uses thermodynamic mining. The thermodynamic effort of mining bitcoins is fundamentally an unsustainable activity. A tamper evident log provides a way to ensure the nodes [in the community network] are aligned with one another. Such logs can be created through 'timeline entanglement'. (Maniatis, 2002) There are means of powering the distributed consensus engine known as the blockchain that are internal to the network and do not require significant outside resources (e.g., thermodynamic effort), particularly when mining is abolished entirely; in community, there is no incentive for winning and there is only commonly desired fulfillment.

A tamper evident log [of connected peers] is a permanent record and no one can go back and change it. It is "penned only". It is recorded. Essentially, peers verify that each is doing things right by the protocol. Every peer runs the same code base. The tamper-evident logs contain the name of each operation the peer performed as well as the inputs and outputs of that operation. Thus, any peer can remotely attest the correctness of another peer by replaying its log. Each entry on the log is a description of some [trans]action - a state that an agent has which gets logged; then the inputs that the agent received that causes the action gets logged; the operation name then gets logged; and then the actions that resulted from the operation get logged too.

It is important to recognize that Bitcoin is open source; anyone can examine the code and it is constantly being audited by what is known as 'network consensus'. The entire Bitcoin network achieves this 'consensus' on the state of the network and transactions in the network every ten minutes. There is a common decisioning protocol in the network, and there is a refresh "heartbeat" to the network. This means that Bitcoin relies on network consensus rather than central authorities for verifying itself and transactions (and in its own case, minting new currency). Regulation/control is built right into the technology itself.

Note, the blockchain itself can't be changed without everyone in the network deciding to change it; and that, is true community consensus.

The public ledger itself is completely transparent. There is no "shadow" element to it. Hence, Bitcoin is not anonymous, it is pseudonymous. It is possible to send and receive messages (e.g., bitcoins) without giving any personally identifying information. However, achieving reasonable anonymity with Bitcoin can be quite complicated and perfect anonymity may be impossible. The pseudonymous nature of Bitcoin means that sending and receiving bitcoins is like writing under a pseudonym. If an author's pseudonym is ever linked to their identity, everything they ever wrote under that pseudonym will now be linked to them. In Bitcoin, your pseudonym is the address to which you receive bitcoin. Every transaction involving that address is stored forever in the blockchain. If your address is ever linked to your identity, every transaction will be linked to you. This functional element of Bitcoin means that cryptographic[ally secure] accountability becomes possible.

The blockchain is a middleman neutralizer (i.e., it renders the "middleman" obsolete). Structurally, it is person-independent by design.

Having one ledger (inventory of events or log) is fundamental to the system herein (and also, to every digital currency in existence). It would be a disaster to have several blockchains (of transactions or and multiple models of the operation of the community). Yet, this doesn't mean the community's [socio-economic] network is controlled by a centralized force. No one "owns" or "centralizes" these [open source] protocols. No one owns HTML, for instance.

Cryptocurrencies are currencies whose operation depend upon cryptographic primitives and a common understanding of how the software [technology] works. This facilitates trust in the technology and in the network.

Nearly every kind of application that benefits from the ability to tell when a certain message was sent is improved through the blockchain technology. It is a protocol that becomes a platform on top of which any feature [toward cooperation (cooperative access)] can be built. In community, it is here that we build-in our values (into service applications and operational processes/ protocols) within the [economic] decisioning system. Such technology allows us to create a cryptographically equitable distribution and service application system. Herein, we can feature an economic system designed for distributed access and for our mutual fulfillment. It is a medium in which we may freely create applications and tools that extend our potential [information technology] capacities in mutually fulfilling ways.

In a community-type society, cooperation is substituted for adversity when deciding the correct chain for the nodes to support.

Herein, our information [trans]actions can be timestamped forever. Even digital documents can be put onto the blockchain, where they are timestamped and remain. Someone can add their effort to the blockchain so that it is timestamped and accounted for, forever. It is this concept, not Bitcoin, that makes cooperative decisioning possible at scale in a technically digital community. The protocol effectively creates a distributed timestamping system [as a technology] that can be used for a lot more than just currency. It can be used for modeling the distribution of resource allocation and occupation; it can be used for effortful coordination; and it can be used as an accountability structure.

The following are several uses of the blockchain technology:

- Logistical coordination and resource allocation.
- When someone becomes a part of a decentralized interdisciplinary systems team, then there are a set of technical rules and activity tasks associated with the selected role and the resources available to that individual. Individuals with a set of resources

mediated by a set of rules = an [systems team] organization. And herein, these technical rules are "enforced" by accountability on the block chain.

- Decentralized threshold triggering through [trans] action validation.
- First to file systems such as a reputation system to build team registration and registration in general. Bitcoin as an application can be described as a cryptographic first-to-file system (i.e., the order of transactions are critical).

3.16.1 Blockchain and the global information access network transfer protocol

Behind the globally coordinated access system is a "blockchain", which becomes a protocol that everyone can use to virtually redesign the community in parallel (i.e., 'distributed integration', which is a strategy that the Bitcoin protocol follows). Logistics has now been solved for all resources and tasks in the community [network] without referring to a central authority. The Bitcoin protocol (Nakamora, 2008) solves for this in the form of a [digital currency and] distributed ledger, which enables a distributed network of computers to agree on a state of reality - a list of accepted [trans]actions. All [trans]actions in the network can be verified by the network instead of a central authority (i.e., every node self-integrates).

[Among self-integrating (and self-sufficient) nodes in network] there is trust in the structure of the system without having to absolutely trust one another and without having to trust some central authority. It equalizes trust at a fundamental, technological level. Hence, no gate keepers to the exchange of money in the case of Bitcoin, and access/resources in the case of an RBE.

Bitcoin is a decentralized consensus platform, a neutral and lateral network. Within the network there is no central control by an authority. Decentralized networks have the potential of being highly equitable and are significantly different than the centralized systems ubiquitous in early 21st century society. At a technical level, distributed networks are more "robust" because there is no single point of failure; which also means that there is no central "authority". Due to its design there is a slim to none chance of corruption or errors. Of course, to those who seek authoritarian control and consolidation of power and monopolization it is a "weak" system for it cannot be controlled and directed by an authority. Its mathematical design makes it nearly impossible for a central authority or institution to take over the system. It doesn't require trust from any of the individual parties involved in the network as the [trans]actions are verified by the combined computational power of the network. In other words, the trust is in the system and not in any one individual or group of individuals. Further, an agent can't actually cheat (or, it is nearly impossible to cheat) the system because the system makes such behavior explicit in real time.

Importantly, currency is only one utilization of this type of prototypical strategic solution. Other states of reality can be agreed upon too, such as "who" has the best design for a given functional object as well as which inventory location (i.e., "who") has said quantity and quality of a given natural material. In other words, this type of protocol doesn't just solve the problem of currency, it solves the problem of anything that requires trust (Anatonopoulos, 2014). We can now, technically, do without a centralized organization (and when there is the necessity or desire for some form of centrality, now we can maintain absolute accountability and build the centrality transparently).

The integration of this type of strategic protocol enables problem solving at scale in a massively distributed social environment; it enables the solving of problems that could previously not be solved; it technically enables the trusted verification of information [in an information system]. The Internet is the first major example of massive distribution in our lifetime, and it is part of the "first wave" of a sweeping change. The internet allowed us to take distributed control over information, communication, truth, fact and opinion, and completely decentralize those functions, by creating a medium by which individuals might [more thought responsively] exchange information without having to rely on a central party. In the coming second wave we will see the decentralization of control over material objects. The very idea of employment in a market will "de-materialize" when we can recreate digital material reality in material form in an efficient localized manner. This might sound, "far out there", but we are only talking about such things as 3D printing, extruding, lasers, and robotics [of which there are both primary and maintenance systems]. Exponential reality integration moves us exponentially more quickly toward a highly thought responsive environment. Wherein, we must ask ourselves, in what way are we orienting our thought structures toward a higher state of fulfillment; for when they are manifested more rapidly and we have a greater creative ability, then thought structures that create suffering will create "that" a lot faster.

This 'global access protocol' is essentially a designed transport-network calculation based upon a variable number of micro-calculation factors. It is a "block chained" protocol that contains categorized information about resources in the [global resource management] network.

It also means that a centralized authority no longer has to be the origin and definition of truth at a technical level and on a cultural basis. The Internet allowed individuals to derive their own "truth" without reference to authority. Once you create a system that allows for decentralized organization that system will inherently scale better. And, it will deliver more value to each of the participants in that network than any centralized system can. Over time, it will start generating what is called a "network effect" where, as more participants join the network, it multiplies the value of the network rapidly and virally. Each new participant makes the network more valuable. Centralized systems have a difficult time scaling at a rapid rate (i.e., "fast"). The economic theme for the last 25 years has been decentralization, and now money, which is just information, is becoming decentralized.

There is no need for a State, and possibly, there never was. There is no need for the financial market, and possibly, there never was. To put it lightly, we just haven't been designing our increasingly technological environments with structures that scale with efficiency. More truthfully, early 21st century society has been re-structuring itself with millennium old beliefs. We can now see this technologically.

Bitcoin and the technology underneath it (i.e., the blockchain) creates a global network that allows you to transmit an information resource as well as decision-oriented information from endpoint-to-endpoint, from "A" to "B", without any intermediaries within a trusted structure. In market lingo it is a "peer-to-peer value network" where "value" can be transmitted between endpoints without an intermediary. If you use it to transmit bitcoin, then it enables a currency. You could also transmit stocks, bonds, share certificates, tokens, or inventory items; you could use it to verify resources; to verify accountable work activity; to allocate resources; to verify modifications to a design or feedback records in a habitat; to facilitate the arrival at a go/no go transport decision through decentralized threshold triggering; and you could use it to share the most up-to-date optimized design specifications for our intentionally modified environment, our emerging material habitat. It essentially removes "personhood" from the system (i.e., it is a initial version of a "person-independent" decentralized transaction-transtask system) -- and those transactions can be anything we want them to be.

Today, the internet is both a platform for content and for computation. A person-independent transaction protocol can transfer content on top of the internet and behave in the interests of the community users using it, which may be other autonomous systems or us as individuals. In community, the technology is used as a system for processing decisions, such as how to allocate resources, in a completely autonomous manner. It is the foundation of a system that cannot be corrupted, co-opted, or subverted to serve "the interests in charge"; because, there is no one in charge, it operates by a logically referential mathematical algorithm. An algorithm is a formulaic structure of mapped relationships (i.e., it requires the use of math, which may be visualized into structure).

This protocol is basically a consensual and openly designed algorithm for producing that which we agree and "trust" is the optimal next iteration of something (e.g., the real world information model and the habitat systems of our community). With this tool we can share the designs of our socially optimal solutions (or SOS).

The global access system uses a trusted coordination protocol to maintain technical neutrality in the Community's information space. Within this technical space anyone can transmit from address A to address B, and the system doesn't care who accesses either address, what content was passed, what geographic location the transaction occurred in, or even how much "value" was in the transaction. Herein, we recognize that a protocol may be traced to its origination as a strategy. A strategy becomes a design protocol, which is encoded as a transport protocol in a network, and the type of protocol we see with Bitcoin structures trust into the system for our mutual fulfillment making the system immune to politics. A design requirement of the original strategy is the technical encoding of an access system for resource transactions.

Transparency is structurally incentivized by the basic network transfer protocol (i.e., the economic system) for the community's information space. And herein, we can audit each other for accountability. Wherein, 'openness' makes compatibility more likely among community. Community shares the "wealth", it is a population of self-directed individuals "investing" in everyone's future.

There are two kinds of validation tasks in Bitcoin: transaction validation and fork validation. These are closely related, since validating transactions is at least a subcomponent of fork validation.

4 A resource-based model

CLARIFICATION: *The decision system is based on accountable resources.*

The [economic] decision system described herein may be characterized as an resource-based model, because it accounts for resources. In an economic sense, it is a Resource-Based Economy (RBE; long name is Natural Law/Resource-Based Economy, NLRBE), which is a holistic socio-economic system designed and engineered to maintain the fulfillment of individual material service needs through the sustainable and abundant access to services and other productive technologies from a set of common heritage resources via the structural integration of services by means of a habitat service system (which effectively becomes an "integrated city system").

An resource-based economy is an *emergently engineered* socio-economic system, holistically and strategically planned in a participatory-voluntary manner to meet the needs of all individuals in the community. It is a system that relies on collecting evidence, testing ideas, and then putting technical understandings into practical action without the need for price, exchange, barter, or currency (of any kind). It is a systems-based model that accounts for and coordinates needs, resources, and services in the community in complete transparency and with formalized efficiency. It is a system in which resources are held as the common heritage of all the community's (or earth's) inhabitants. A resource-based economy is both an emergent economic design as well as a systematically 'logistical' system. 'Logistics' refers to the logical flow of resources in time-related positioning between their point of origin and their point of use (as "consumption" or "cradle-cycling") in order to meet an "issued" demand requirement. In this sense an RBE is not a 'monetary economy', but a 'logistical economy'. Herein, the term 'natural law' is intended to reference the actual operation of real life versus assumed economic rules and cultural memes.

In brief, an RBE is an emergently engineered comprehensive, integrated and holistic socio-economic system based [in part] on the availability of (and access to) resources for re-structuring the effective design and efficient distribution of natures services through systems-oriented calculation toward human- and ecologically-oriented fulfillment without price or currency, resulting in a network of integrated city systems. Cities in an NL/RBE are integrated city systems (i.e., an example of sustainability in a city-wide design). These integrated city systems are also sometimes known as total city systems. Most of the technologically advanced city systems in an RBE are circular in shape. An integrated circular city system is often divided into different radial belts relative to functional necessity (i.e., relative to their service of need). Generally, these city systems are updatable and flexibly customizable to the needs, wants, and preferences of their inhabitants. Between cities, nature is allowed to return to its natural state (although, it is still caretaken).

An RBE is a transparent, formalized planning tool for resource integration, synchronization, and coordination for human fulfillment. An RBE integrates the direction of human fulfillment with the availability of resources and synchronously known to be technically possible, through global coordination.

An NLRBE seeks the emergence of a structure that will best be able (i.e., be "responsible") to maximize well-being through empirical measures. Fundamentally, it is called a "resource-based economy" because resources are recognized as a common basis for survival, fulfillment, and well-being. Our Earth system is our fundamental life referent. Any philosophy or encoded system that does not heed this referent is unworkable for human fulfillment. It could be said that an RBE represents a "culture of friendship, community, and collaboration" where we take care of each other and the nature around us.

A natural-law resource-based economy (NL/RBE) is an adaptive socioeconomic system actively derived from direct physical reference to the "governing" technical regulations of nature as they are emergently known. Essentially, there are verifiable regularities in nature and we should understand those regularities, and base decisions off of those known regularities, together on a social basis for the fulfillment of everyone.

Note: If fulfillment is the purpose, then "governing" seems like a fairly imprecise term if it implies anything other than an 'open systems hierarchy'. Herein, science is useful in the discovery of models that by some degree of probability reflect these technical regularities. In science, the term "governing" does not imply 'hierarchy', but instead, 'boundary'. Hence, an NLRBE is nothing less than the use of the discoveries of the boundaries of our universe synthesized into technologies which are applied toward socio-economic decisions that facilitate in structuring our fulfillment.

The "natural law" train-of-thought is simply the acknowledgement of the natural world in an economic system that accounts for resources, and its inclusion maintains an alignment of our way of life and methods of economy with the "governing" known "laws" with which we are bound. An ongoing failure of early 21st century society is to subdue or feed out these "natural law" awareness's (our natural ability to synthesize information from experience and coherently integrate our experience). Note here that an adaptive (a.k.a. 'relational') information systems can synthesize information from its available information (i.e., from a processing space within its own awareness).

The information processing capability of said economic structure is based on an adaptive calculation process for arriving at economic decisions [in part] through information about the availability of resources in an ecological system. Its system's structure may be described in contrast to a 'market-based economy' that uses 'price' to make economic decisions. In an RBE, the Earth system becomes a recognized sustainer of life.

An NLRBE is an economic system with the following characteristics:

1. It is a system based on the actual, logical operation of the real-life world.
2. It is a system based on resource surveying, resource management, and logistical systems design.
3. It is a system that applies science and participatively formalizes information technology systems.
4. It facilitates the restoration and preservation of the environment and human well-being.
5. Its sole purpose is to work for the betterment and fulfillment of all human beings in consideration of a generational ecology.
6. It involves [at least] inquiry into the transparent availability of common resources and verifiable knowledge.
7. It is global, in its final form.

The organizational structure of an RBE maintains the following structural characteristics as emergent properties of the total system:

1. **Formal structure:** a commonly formalized description; blueprint; design specification.
2. **Extant structure:** the one actually operating; the current state.
3. **Requisite structure:** the natural one; the one best known suited to fulfill needs.

The RBE is a holistically-engineered system designed to fulfill a purpose. Although an RBE maintains a physical infrastructure, it also exists continuously at the scale of a calculating information system engineered for the purpose of material service fulfillment. The system is designed to ensure that people have access to what they need when they need it with a high quality of living (the highest quality known and available at the time). An RBE seeks to maintain the highest possible quality-of-life for everyone in the community given the state of knowledge and resources available, which may fluctuate and evolve, and also lead to the emergent modification of the RBE system itself. In its functional operation an RBE becomes a global, community-wide, resource and information access system for the fulfillment of individual needs in an shared and coordinated manner.

The population of an RBE doesn't "own" anything, but has access to everything. Herein, 'resources' are considered the heritage of all the inhabitants of the community, not just a select few. It is not a "society" where the few control and distribute the resources.

To be classified as a resource-based economy an

AN ECONOMY AS A NETWORK

An economy is the comprehensive interaction of lots of individuals (or "actors") interacting among networks of interaction. A network is an interconnected system interacting for mutual assistance [the basic unit of which is a 'resource']. Out of all of those individual interactions emerges a set of patterns and behaviors. In other words, the economy is a complex and distributed system (in reality) which may have several dominant attributes causing it to express particular patterns and behaviors among its observed network. Through questioning we come to identify and clarify. To identify an economy's access structure one might first seek to uncover its incentive structure. Someone might ask: What is the 'economic value' (or "wealth") in the economy? Is it, what I have in my bank account?; Is it, what the GDP statistics say? What is the measure we might use when we think about wealth and the direction we orient ourselves toward the whole network of lots of individual interactions? Here, we take pause, to ask, "What are human needs?" What are the real solutions to human problems in a 'trophospheric ecology' and what are 'empty signifiers' of well-being?

> *Is 'wealth' the accumulation of solutions to problems that involve our entire human society? Is growth, then, the rate at which those solutions are being created and made accessible?*

A wealthy society has solved lots of problems, while structuring an environment that fulfills our beings. Because these economic network systems are complex and adaptive, their natural inclination is to concentrate both advantages and disadvantages; they are multiplicative. The question of our fulfillment then becomes, "Is 'access' to resources being concentrated in the hands of the few, or is an abundance of access being used by us to explore our higher potentials." In every complex economic network there are self-reinforcing feedbacks throughout the system. Conversely, and for example, growing wealth concentration is inherent to capitalism[1] and "poverty" is a consequence of its behavior.

What is progress; is it anything that pushes money around an economic system? The view of progress as monetary circulation leads to the stereotypical business ethic: If you can make money doing something you should make money doing something. The business of business is not to solve societies problems, which is dangerous to the continued circulation of money which maintains business.

The change in perspective offered by the view of a distributed network architecture can lead a much clearer conversation about priorities, structures, and decisions.

1. Piketty, T. (2015). *The economics of inequality*. Belknap Press.

economic system must have all of the following seven characteristics:

1. *Technological unification of Earth via the 'systems approach'.* In other words, an RBE represents the technological and organizational unification of understanding through the systems approach. In solving problems the systems approach follows a process of open inquiry (or open enquiry) toward the tracing of root identities and variables (i.e., root causes). The systems approach necessitates the scientific and critical approaches, which allow for the intentional discovery and identification of a common existent reality (i.e., the real world). Herein, science is the unfolding of discovery in a discoverable universe. And, critical thinking references the intentional and directed will of consciousness toward higher states of information entropy and higher states of potential in reality. An intentional community studies nature with intention; we create meaningful and purposeful systems to more fully develop our potential selves
2. An *emergent* and *systematically engineered* design based upon *commonly verifiable, scientific information*. An RBE is a emergent system; it is continuously being adapted, updated and revised based upon humanity's most current and verifiable systematically scientific understandings and engineered technological capabilities (i.e it's not a static or established culture).
3. *The continuous application of the scientific method* to more accurately inform the total information system.
4. *Access instead of property*.
5. *No currency, no money, and no market system* for the transfer, transformation, production or distribution of common heritage resources, goods and services.
6. *Automation of undesired/unsafe labor and technical processes*. A system designed to minimize and eliminate repetitive and unnecessary work.
7. Self-contained *localization* and *integration* of service systems into a total community (or "city") system infrastructure using systems-based *logistics* for the fulfillment of all human need, want, and preference. The type of logistical service integration described here is also sometimes known as: an integrated city system; an integrated habitat service system; and an integrated [global] access system. Herein, an 'integrated service system' refers to the total environment that provides access abundance to all individuals in the community with the highest standard of living known and possible for everyone given the resources and information available.

One of the intended purpose of an RBE, as a participatively designed system, is to identify the root causes of socially corrosive behaviors while iterating its own design; this produces a capacitive potential for reducing the continued likelihood said behaviors. One way to do this is to give all individuals in the community access to life supporting and life enriching goods and services without a price tag, without a need to commit to labor, and without the existence of coercive institutionalized forms of violence like the State. Law is a response to social insufficiency in a society and it is indicative of authoritarian power structures. The victims of socio-economic problems are often made into "criminals" through "legislation".

An RBE appears as, or may be observed by:

- The application of science and technology for the benefit of human co-existence.
- Socio-economic decisions that involve everyone benefiting without some benefiting at the expense of others.
- An environment in which all goods and services are available to everyone without the use of money, barter, liability, credit, debt or any other form of servitude or coercive force.

The type of thinking done in an RBE might be referred to as '*design thinking*' (Buckminster Fuller), '*systems thinking*', or '*holistic thinking and design*'. It is a whole systems design approach that defines the problem by observing the whole system such that "root cause" information becomes available [while recognizing the importance of symbiosis and mutuality between organisms in a habitat]. Hence, it would be something of a misnomer to refer to this decision system as "human-centered", even though it is designed principally to fulfill human needs.

An RBE could be more simplistically broken down into three general components:

1. A collaborative information system with design and demand interfaces.
2. A resource coordination (or logistical management) system that accounts for demand, value, measure, and feedback.
3. Informed and formalized macro-calculation [inquiry] for structuring a decision space and arriving at optimally oriented design decisions [in a probability space].

The essential conceptual components of a resource-based economy were designed (in part) and made known globally through the work of Jacque Fresco and Roxanne Meadows at The Venus Project in Venus, Florida, USA. And, it is with thanks to The Zeitgeist Movement and its founder, Peter Joseph, that a resource-based economic systems model (a whole Earth systems model) has reached the level of comprehension and global support it presently has.

In some respects Buckminster's "World Game" was the progenitor of the RBE as a thought-out conceptual model. In 1961, Fuller developed what he referred to as an educational simulation in an effort to facilitate the creation of solutions to "overpopulation and the uneven distribution of global resources". It was a game with the supposed intention of communicating knowledge about how to manage resources and meet the needs of the total population holistically; how you bring all of humanity up to the haves ensuring there are no have nots. That was his game. Yet, from where did he get the idea for the game? It was a version of a war game. While in the military he realized that the military didn't have the restrictions inherent in the market. He noticed a relationship between the "market" and 'efficiency' in the fulfilled well-being of everyone on the Earth system. He noticed that when something needed to be done by a "professional military", the military did it, and they did it quickly and efficiently because they could do it that way. Granted, there is still a lot of inefficiency in every military; but midway through the 20th century western military powers were considered by many to be "engines" of efficiency. The atomic bomb is a result of said efficiency.

Engineer R. Buckminster Fuller thought of the idea of running a global [calculated] simulation to "make the world work for 100% of humanity in the shortest possible time through spontaneous cooperation without ecological damage or disadvantage to anyone". The simulation is a rational thought exercise, a relational logic puzzle that uses what is known concerning scientific causality/probability [as opposed to the "wheeling and dealing" market competition]. It says that a society can do better than a superstitious faith in some invisible hand, or figure, or entity of the market that knows all and sees all. Fuller's logic is based around the Earth and a natural rule set, the known laws (or technical principles) of science. It is based on seeking to understand nature and working within our understandings of nature.

> **NOTE:** *A resource-based economy steps beyond the limits of '-isms'.*

4.1 Economic stability

> **INSIGHT:** *True economic stability is human stability and ecological regeneration, based on life capital as opposed to industrial and financial capital.*

An RBE is a stable-state economy in that it does not have a growth directive. It is designed to account for the necessity of remaining within the boundaries set by the carrying capacity of a particular environment, while also accounting for those variables that impact carrying capacity (e.g., technology). Zero growth is not a crisis. Some economic models require infinite growth, scarcity, and repetitive labor & consumption. The RBE model's directive, if it were said to have one, is to support [the growth of] consciousness in its evolution beyond the artificial boundaries that separate people; essentially, this is its unifying imperative. Essentially, an RBE seeks to maintain a "stable" economic environment - an environment where individual's needs are sufficiently fulfilled such that they are developing toward their highest potentials.

Stable economic environments must maintain at least the following three conceptual considerations:

1. **Resource accounting** - An RBE organizes and accounts for the existence of identifiable resources. Truly effective 'economic resource allocation' cannot occur unless the economic system has a clear and transparent understanding of what resources are available and their qualities. The allocation of resources in a system will become

THE DOUBLE-COINCIDENCE OF WANTS "PROBLEM"

Most professional economists believe that before there was money in its modern form people used barter, but it was very difficult for them because they had to fulfill a so-called 'double-coincidence of wants', which claims:

> *"I have to have exactly what you want and you have to have exactly what I want. For us to make a trade the two thing have to be of roughly equal value so that we walk away from this one trade even (as if we don't have any ongoing relationship as members of the same community). And every time we do any sort of business with each other or provide for each other's needs we have to completely close the deal and walk away with no ongoing relationship or responsibilities to each other whatsoever."*[1]

This is something that Adam Smith described in his work, "the Wealth of Nations". Curiously enough, however, when explorers and colonists and various researchers travelled the world and found so-called primitive societies (or tribal/indigenous peoples) they never found anyone operating the way Adam Smith said that primitive man was supposed to handle his economic business. And yet, 200 years of dis-confirmation doesn't seem to have thrown any sort of cold water on this notion, for it is still found in economic textbooks. To a large extent, the economics profession, like any "profession", is intent upon self-validating its own core premises and projecting them onto the world.

1. *Coincidence of want*. Wikipedia. Accessed: January 7, 2020. [wikipedia.org]

sub-optimal if the system has any lack of awareness of the availability of resources.

2. **Dynamic equilibrium** - An RBE scientifically responds and adapts to changes in its environment through the mechanism of feedback. Dynamic equilibrium is the steady dynamic-state of a system wherein forward reaction and backward reaction occur at the same rate. Multiple dynamic equilibrium adjustments and regulation mechanisms make homeostasis possible. An RBE tracks the rates of change and of regeneration of common resources. The use of Earthly resources requires a 'balanced load' economy involving dynamic equilibrium. The term 'balanced load' is used to identify the establishment of a state of equilibrium between all material and non-material (e.g., power) flows during the materialization and transportation processes of goods. The goal of a 'balanced load' is to find the ideal balance for the load (material and/or non-material), making it possible to utilize all available resources with the greatest degree of efficiency. Additionally, a balanced load also is designed to allow the greatest degree of safety for those working with or near the load itself. In concern to the economy as a whole, the production of goods and services must balance with the resources nature is capable of providing (i.e., natural services). It is unwise to exhaust resources just to maintain "labor" and an inherently unstable economic system. If dynamic equilibrium is not maintained within a system then the system is said to be 'unstable'. Biological systems all have negative (or corrective) feedback mechanisms whose purpose is to maintain the system in a state of dynamic equilibrium within an environment. For example, in a human's neurophysiological system the process of environmental adaptation is known as neuroplasticity.
3. **Strategically designed for desired access** - In an RBE service systems are designed and engineered to meet the [serviceable] access requirements of individuals; they account for 'access'. Herein, **Strategic design** is a means of efficiently meeting the spectrum of human needs on a finite planet in a sustainable way [over time] and generating 'access abundance' through greater efficiency. Strategic design requires the strategic optimization of resource allocation toward the preservation of the common fulfillment of needs. Strategic designs allow for the maximization of efficiency. Strategic designs recognize time as a factor. If "you" have no strategy, then "you" have no strategic plan. Without a strategic plan, system-wide organization lacks an intentional focus. Fundamentally, strategies exist to address needs and deficiencies.

These are mechanisms that sustain the state of need fulfillment in a systems-based community. These mechanistic strategies are programmatically applied to the emergent design of the RBE systems architecture. Wherein, they are *encoded* into the iterative design of the habitat service system through the *formalized* mechanistic structuring of decisions.

The exclusion of these three conceptual considerations from inclusion in an economic model would be considered 'negligent' from the perspective of a society that follows the systems approach.

Engineered systems are designed to achieve a functional purpose. When a programmatically designed (or engineered) system is in operation, then decisions are 'formulated' (i.e., they are arrived at via an information formula). When decision systems are optimally informed, then their 'selected decisions' are optimally align-able.

> **INSIGHT:** *Why apply protocols and algorithms? Because there are too many things happening all at once in a socio-technical society for one person to pay attention to all of them.*

4.2 The global coordinated access system

> **NOTE:** *In an RBE, concepts such as, "investment" and "marketing" would cease to exist because selling would cease to exist. Instead of "marketing", systems would be in place to 'inform' the society of what is available and what is occurring (i.e., transpiring and happening) so that each individual may more intentionally participate in ensuring continued access to the services and systems that structure their environment.*

The Global Coordinated Access System is the top level system in the RBE architecture. The objective of this top-level system is that of strategic access, which refers to the idea of meeting the material service needs of a population, whatever they need, when they need it. In other words, we have access to what we need, when we need it with an accompanying high-quality lifestyle. The global access system redefines "wealth" as 'strategic access'. The global access system is decomposed into macroeconomics at the systems dynamics scale, and microeconomics at the scale of local dynamics.

The purpose of the Global Access System's design is to provide access abundance and resiliency in the fulfillment of the economic needs of individuals in a community. It is an autonomous distributed structure, to which a set of value-oriented information processing strategies are applied through the formal encoding of a mutually developed set of economic protocols; hence, there is no need for an administrative class of "governors", for "government". Protocols (or standards) are a type of "convention" that everyone can follow to use a service.

An RBE is principally composed into an access system that creates a fluid means of sharing useful resources, goods and services, which may not be needed at all times by a single individual amongst a community of connected individuals.

In a sense, an RBE could be described as a set of scientific-engineering principles that form a technological platform for "running" [systems] protocols (i.e., information transformers) within the digital and material information space that schedules the prioritized coordination of common resources in a material habitat.

A global access system allows availability to everyone on an equal basis.

> **NOTE:** *Everything in medicine is a checklist, everything in avionics is a checklist. We can classify, categorize and codify a process for coordinating our own fulfillment [aligned with nature].*

4.3 The structured behavior of an RBE

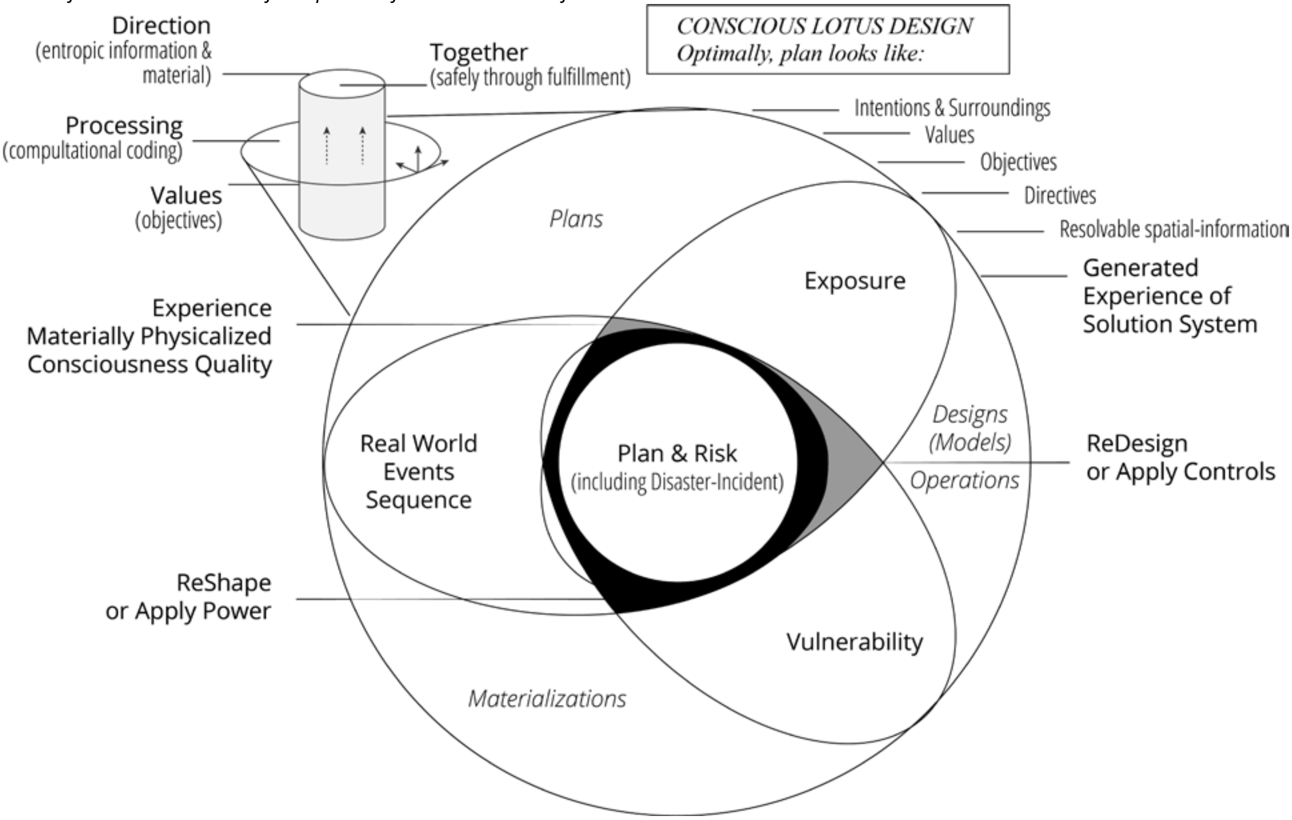
An RBE accounts for the empirical "life-ground", the natural environmental services from which everything we develop and construct is derived, and which every human being shares as a need regardless of their philosophy or ideology. In an RBE, resources are provided by a common natural[ly serviced] environment.

An RBE design is itself a recognition of the imperative of linking the environmental impact of the usage of resources with the economic decision process itself – systems processes maintain this feedback characteristic. This occurs at a voluntary social level wherein individuals maintain a global community commons, a place where people can access goods and services from a 'common resource pool' without the market.

Under a resource-based economic model all of the community's resources belong to the community in-common and are held as the 'common heritage' of all of the inhabitants. The term 'common heritage' refers to the coordination of resources to prevent exploitation [by any individual or group], and it is closely associated with the term 'environmental caretaking' (or stewardship). It is essentially the opposite of the market rationale that everything is for sale, and nothing is sacred.

A garden well-tended by people capable of tending it moves toward a lower entropy system. Caretaking (or stewardship) is a process of influencing one's environment toward lower entropy, and hence, greater fulfillment.

Figure 15. *A project coordinate where information is shared and resolved in order to sustain the continuous existence of an iterative societal system where all human individuals are mutually fulfilled. Together, humans may plan their informational and objective systems in order to generate greater states of well-being, fulfillment, and that which is desired. Life is reshaped through information and objective interaction. Life requires information and objective interaction.*



A resource-based economy is designed not to reward or reinforce exploitive behaviors. In a market-based system, people are marketed and socially conditioned to have desires that are probabilistically going to be socially frustrated. When the market-conditioned desires are not realized, then the probable likelihood is that of a socially frustrated psychology carrying the sense of dislocation, isolation, and alienation.

We belong to a single planet, which functions as a single, symbiotic system. An RBE is characterized by the concepts of questioning, bridging, and holism. When problems arise, the system is designed to seek systematic knowledge of the problem while bridging the gap toward a holistic solution.

4.4 True costs in an RBE

The RBE model accounts for what are known as the ‘true costs’ (i.e., “true cost economics”) of its own system on the natural and social environments, including its resource costs (e.g., resource regeneration), social costs (e.g., behavioral changes), and environmental costs (e.g., environmental damage) in an effort to understand what is possible and optimal within a given environment. A true cost economic system accounts for the true cost of economic services on all habitat systems. And, it makes explicit the economic services available to the community. The idea of “success” within such a system is defined by what someone contributes to humankind’s development and how they are themselves developing as a human being, rather than the acquisition and accumulation of artificial wealth, property and power.

A resource-based economy is a ‘true cost’ economics system because it [at least] accounts for the cost of negative externalities (i.e., in the market these are known as “non-transactional interactions”) and de-prioritizes designs, and goods and services that cause damage to the habitat environment. It is important to mention that the current global monetary market economic system does not (and cannot) account for externalities. And hence, it is a disconnected model - a model disconnected from the lifeground from which all needs are sustained - it is an erroneous and ambiguous model that leads to the further confusion of those beings who have adopted it as their “truth” (or “religion”).

An “externality” is something which is out of sight, and out of sight out of mind, something external. Any system which prefers market operation over sustainable operation of life systems on the planet will fail to sustain human fulfillment. All systems will fail if they don’t understand their environmental consequences, as well as the requirements of their environment (including, the fact that the system cannot be separated from its environment).

Any economic model that conceals the true costs of its actions is neither a viable nor desirable (nor even sustainable) economic model. How can an economic model that does not account for resources in its decision process even be called an economic model? Resources allow for the existence of goods and services. If resources are not accounted for in their totality, then an accurate measurement of goods and services as outputs of the economic system is not possible.

A true economy is characterized by gradual increases in efficiency as information within the community becomes more coherent. A true economy is scientifically correct, and therefore, not informed by opinion or bias. A true economy is based on what is known of the real world. A true economy involves contribution by a social group of individuals. A true economy does not compete with itself because it sees itself as a system.

The scientific discovery of scientific principles is the best common method known for verifying and predicting our common physical reality. The scientific method is a body of techniques for investigating natural phenomenon, acquiring new knowledge and the self-correction of previously ascertained knowledge. Our understandings of ourselves, our environments, and our ability to design fulfilling structures is advanced through science - a community is advanced [in part] through science. If applied openly, science can lead to the maximization of the quality-of-life and -living of everyone in a community, while preserving and caretaking the habitat.

Observably, the scarcity of resources, goods, and services has a detrimental effect on the behavior of humans. A true economic calculation as defined earlier conceptually formulates how abundance on Earth for all human needs is possible today.

We can produce goods in a regenerative manner on our own, without business or industry. We can build sustainable structures to meet our own needs, without governments and utility companies. We can grow good food to feed ourselves. We can develop productive service technologies. Our motive is not profit, but the benefit of ourselves and the community we have chosen to associate with. Daniel Pink, the author of several modern discursive sociological works states, “profit-driven approaches relegate purpose to a nice accessory if you want it, so long as it does not get in the way of the important stuff”.

In the commercial world, asking “why we do what we do” can result in answers of “because it is cool technology”, “because we will get more money”, or “to support the business objectives”. Therein, a purposeful understanding of why some thoughts and behaviors might lead to greater and lesser states of fulfillment represent potential commercial competition to profit. The outputs of commercial enterprises are achieved by carrots and sticks that are proportionate in magnitude to the risk of the endeavour. In commerce, questions about meaning (i.e., why questions) beyond these three pointed answers as to why we do what we do are likely to be met with silence, sneers, or puzzled looks. And often, a continuance of such questions are met with the termination of one’s career.

Here, it is important to remember some of the ways by which resources are squandered in early 21st century society. The following scenario is a frequent occurrence in early 21st century society, particularly in governmental and corporate environments. If there is a budget and "you" are a department that gets a portion of that budget among competing departments whom also receive a portion, then it is in "your" [departments] best interests to use all allocated funds (regardless of their actual need) every cycle so that you maintain the upper budgeted allowance. For, there is a risk that if you do not use your upper budget allowance this cycle, then next cycle that allowance might be lowered, which might also perceptually reflect a lower social status among the competing budgeted departments (when social status has a relationship to financial status). In the intelligence industry this type of scenario directly concerns the notion of "mission creep". A team will keep "creeping" its mission (i.e., mission objectives) forward to maintain or expand its own budgeted financial allowance.

4.5 Moneyless fulfillment in an RBE

> **INSIGHT:** *People don't really want money, they want access to things that money can provide under a certain socio-economic context.*

A resource-based economic system functions without money; it is a moneyless economy. It is the economic equivalent of the evolution of self-understanding, of computation, and of engineering and automation, which are applied to the benefit of all of humankind. The RBE system is designed to maintain access abundance to economic services without the use of a medium of exchange, gift, barter, or currency.

If there is no scarcity, then there is no reason for a medium of exchange. Resource scarcity is transparent in an RBE, and hence when 'critical resource scarcity' (vs. manufactured) exists, then the family (or community) adapts, which some systems allow for and others inhibit through the systematic generation of adaptive or maladaptive processes and behaviors. Scarcity is a principle generative condition of a monetary market-based economic system, and therein commercial entities (i.e., people) have to compete (or fight) for money, hence differential advantage, hence gaming strategy, hence dishonesty, hence corruption, hence the modern world around us.

By removing the monetary system from the manner in which human needs are fulfilled, the mechanism of differential advantage is removed and "integrity" becomes the understanding that the integrity of social and environmental systems is directly related to your own personal integrity. In an RBE it is in everyone's best interests to preserve a system that is designed to maximize the fulfillment of everyone's needs; hence, there is no clash of motives like there is in the market system where people [more often than not] pursue their own detached, conflicting, and narrow self-interests (vs. rationally thought-out self-interest). In this sense, an RBE does not maintain and reinforce mechanisms that corrupt individuals (i.e., "corrupting mechanisms") that are ever present in a monetary system. Instead, it is a structure that is responsively adaptive to its users and its environment.

In an RBE there is no need for money, labor, or gift as a means of exchange. Principally, 'money' (i.e., the monetary system) is an essentially corrupting force; one that generates its own reality in the minds of those who believe in it. It is a remarkably dynamic strain of corruption, generating con-artistry and predation behaviors at all levels. Also, rather than focusing on economic labor as a means of exchange, labor is sought elimination to entirely through automation of service processes [where desired].

From a behavioral perspective, the need for cyclical monetary earnings to maintain one's standard-of-living

THE OPERATION OF PRICE, IN BRIEF:
The following is a cursory example of how price works in the modern electronic market: Someone walks into a modern grocery store in the market and buys 3 bananas for a dollar. This data is communicated to the [enterprise] transaction process system of the grocery store, which updates its inventory system to reflect "-3 bananas" (minus 3 bananas). This information is then communicated to a larger web of interconnectedness that is the claimed market system to which is add the information "-3 bananas". Entities in the market then looks at banana consumption purchases throughout the rest of the economy, wherein the rate at which they are purchased is weighed against the price at which they are purchased, and the market essentially [is said to] self-regulate itself by updating how many bananas should continually be produced to correspond to the identifiable market and price consumption levels.

In an natural law/resource-based economy, this [calculation] process would work in almost exactly the same way. Someone enters a distribution [sharing / checkout] center (or places a demand into the information system) and takes what they need [without payment]. That demand / access is tracked (and becomes a data point, rather than price being the data point). An information system calculates demand-access in real-time and adjusts the running, qualified production of how many bananas to produce to meet the real, trending and estimated demand.

In truth, many people in early 21st century society due to the layers of confusion therein, would have a hard time imagining the smoothness of a transparent economic-decisioning information system. Yet, a community can make very strong calculated predictions of requisite 'variety' (cybernetics term) if it has sufficient data. Wherein, the system simply adapts to increased demand and other environmental signals.

is dangerous to well-being; it incentivizes behaviors with harmful (i.e., harm inducing) social costs.

The entire field of modern economics presumes the necessity and existence of money - everything an "economist" states presumes its axiomatic presence. The entire field of modern "economics" is like a fish in water that doesn't realize there is a different atmosphere above or that there is such a thing as "land", which it bumps into on occasion, but doesn't quite understand (e.g., the commons and open source).

The market propaganda is that if someone doesn't like a particular business or industry, then s/he should vote with their currency (i.e., spend their money elsewhere) - if you don't like a company, then you should just not use them. Unfortunately, such behavior is not an actual solution to real social problems. It is not a solution because [in part] the market system re-enforces pressures to purchase from the worst manufacturers, because they are the most cost efficient and make the most affordable goods [for most people]. In the market, caring is a convenience; it is a luxury to care about the quality of the food you buy or the quality of the goods you purchase. Mostly, those who care to purchase otherwise can afford to care. Yet fundamentally, everyone is in deficiency in this model.

In a monetary society it is not irrelevant to note that the modes of communication we use are tightly coupled with the modes of production that finance them. An untwisting of words can be useful.

When life needs become a commodity, then everyone suffers. An RBE is designed to service life needs and not manufactured, commercially oriented wants. When "you" travel do "you" have to pay in order to sleep somewhere comfortable? This type of a commercial transaction represents the subtle commoditization of a life need (a restorative sleep environment). The commoditization of life needs are aberrant and harmful, yet culturally normalized in early 21st century society.

An RBE removes the monetary profit incentive from natural-logical economic processes. The profit incentive at a societal scale inhibits progress, stifles efficiency, promotes violence and exploitation, while it surreptitiously engineers scarcity out of the very structure of its system. In other words, the structure of its system generates these systematic characteristics. Essentially, these are some of the behavioral characteristics of an economic system that maintains the encoded conceptual value known as "profit". Early 21st century society extracts profit in the form of *property* and *price* at the expense of all human needs. Fundamentally, everything good that is happening now, in early 21st century society, could happen more efficiently and more effectively without money.

In a monetary market there exist "market entities" who employ a whole host of strategies in competition with other market entities. The use of propaganda is one common strategy. Entities employ strategies to maintain market share, maintain profit, maintain liquidity, maintain customers, maintain their establishments and institutions, maintain their product line, maintain their valuable employees, maintain revenue, maintain service, maintain growth, maintain leverage, and maintain competitive advantage (i.e., economic power), to name just a few. Some of their strategies are known as "business strategy". Business strategies often (if not always) work in opposition to the design of resource-based, sustainability strategies for optimal fulfillment. Hence, if someone were to participate in a business strategy, in general, it could also be said that they are not participating in a sustainable systems strategy. Whereas 'business' is a process of competition, the design of a sustainable system involves a recognition and integration of networks of cooperation. A business strategy is not a solution orientation that accounts for the largest known system and all available information. Business strategies exist within market economies and are not a part of resource-based systems economy which does not, in fact, have "externalities". Business strategies are competition-based, and often, infinite-growth oriented. A resource-based economy applies cooperative, systems-based strategies [with an intentional recognition and design of the systems overall purpose].

Infinite growth is infinitely absurd. For purposes of sustainability, it doesn't matter what kind of technology arrives if the [consumer-ist] mindset doesn't change. The major motivation in early 21st century society is and only can be concerned with "how do I get money to meet my needs and the needs of my family?" Money is a principal motivator for the majority of human behavior on the planet right now. By and large the thing that constrains the human society is the truthful statement, "I have to survive by making money."

We will not have abundance while we continue to use the means that generates our own enslavement, while we continue to use "money".

Truly solving problems in a monetary system ebbs the flow of money. If "you" were to actually solve a problem, then the flow of money would dry up. And hence, for those whose satisfaction and survival is based upon the flow of money, and even for those who have the "best of intentions regardless of money", if money is a re-occurring part of the "solution", then it is not a real [world] solution.

Rather than having money it would be useful to have tools - things that make other things. And in a community, once "you" make anything "you" become part of a network of other makers.

INSIGHT: *Money harms society by generating a state of wealth disparity in the population.*

4.5.1 Structural goals and artificial scarcity

NOTE: *An RBE isn't "against" trade or gifts or exchange; instead, it simply makes these things irrelevant to individuals survival and fulfillment in society.*

All economic systems have structural goals, which may not be readily apparent.

- The market capitalism structural goal is growth and maintaining rates of consumption high enough to keep people employed at any given time; employment requires a culture of real or perceived inefficiency and that essentially means the preservation of artificial scarcity in one form or another.
- The natural law resource based economy's goal is to optimize technical efficiency and create the highest level of abundance possibly within the bounds of Earthly habitat sustainability, seeking to meet human needs directly.

Resource scarcity has a perceptual dimension to it. In a family situation, when something becomes scarce, the family "works its way around" the scarcity either by focusing their sharing more precisely or developing an alternative resource to the actually scarce resource. In this sense, there is never really a scarcity problem, there is a resource problem, which may involve a coordination, production and distribution problem.

Scarcity greatly depends on perception. Generally, elemental resources for the sufficient fulfillment of all human needs are all abundant, but the productive mechanism of society is what makes them scarce. There is a fundamental difference in the perception and usage of resources between cooperative creation (i.e., co-creation) and competitive production.

> **NOTE:** *The concept of "free" is different from that of "selective". In 2013, in Scandinavia, the local universities are touted as "free" [though they are still paid for by the public], and people are still selected to go [to universities of different calibres].*

4.6 Irreducible scarcity in an RBE

> **NOTE:** *In a community-type society, the economy is understood to be part of the ecology, and the decision process reflect this recognition.*

Irreducible scarcity may still exist in an RBE as an appreciative challenge to be overcome for the betterment of everyone. The temporary irreducible scarcity of what is essentially a functional resource represents an opportunity for creative innovation. An RBE accounts for the application of resources, technology, and intrinsically motivated individuals to eliminate all forms of superficial scarcity. Scarcity presents an opportunity for the growth and coalescence of information within the community to form new processes and technologies to overcome scarcity, and evolve our means of preservation and of fulfillment. If irreducible scarcity causes conflict, then there is [at least] a need whose requirements (pseudo or real) are not being met.

ATTACKING THE COMPUTATIONAL DECISION PLATFORM

A hostile takeover of the computation of the economic decision network is highly unlikely, and if such an attack were followed through with it is unlikely that it would be effective. If it is done, then all of the incentives within the community are against it. If anything, such an attack would lead to more publicity and strengthening of the open algorithm. Keep in mind that through network consensus the blockchain can change -- the technology can change and be updated if the participants in the network agree. Like any technology it can become more resilient over time; the system's design will evolve responsively and dynamically to change and adapt to external stimuli. An attack strengthens the system (like the human immune system; your exposure to pathogens makes your body more able to resist those infections in the future). Similarly, attacks against the network force the network to adapt, which then makes it resilient to those attacks.

If someone tried to maliciously alter the community's information model, then they would achieve two things. First, they would violate the trust of the network by doing this; wherein, they would be seen as an agent seeking to concentrate power in their hands or for some other reason inhibit need fulfillment in the community. So, it is not in anyone's interest to do it because they wouldn't get the reward of the aim, which is the power (in the case of Bitcoin it is tokens on a network which lose value exponentially if they become too centralized). Among community, when we see a centralization of power in one unit (i.e., significant non-reconciliance), then we are likely to move toward (i.e., redesign toward) de-centralization of that unit [of power]. This is why the system must be open; it must be open so that a movement toward decentralization is always a potential. Among community, when power begins to concentrate, then individuals are prone (i.e., incentivized) to disperse and decentralize it [when they aren't inhibited from doing so]. In the worst case, if someone where trying to do this, they would get blocked (or "excluded") from the open modification of the network because it would be in the best interests of everyone else to keep them off the network. Fundamentally, to accomplish a successful attack someone would have to do it without anyone noticing, which is very difficult when all transactional changes are open and everyone can see them, and the protocol itself is open.

Hence, open source is necessary in the founding of the first community of this kind; to think it isn't [necessary] is to be both uninformed and to advocate something potentially dangerous.

As long as a society studies what is being "bought" and uses that information to inform its economic system, as opposed to what is being measurably 'fulfilled', then such a society is always going to come up with the wrong conclusions. In the real world the proper study of economics is the design of real world fulfillment, not market consumption. In a market-based society it doesn't matter how the market is measured, such as a society is measuring the wrong thing. What matters in this world is the fulfillment of needs and of our aspirations to grow, develop and become everything that is latent and potential in each of us. The fulfillment of human beings is most clearly seen in how they relate to each other, and particularly, their children. As we separate ourselves further from our true nature there is a great sadness that calls a return to our humanity [not to purchases, consumption and isolate]. Is this not the greatest longing and freedom we can have, to be in community with each other.

The RBE is a coherent, integrated total systems approach for understanding what resources are available and how a real resource shortage (not subjectively perceptual scarcity) are overcome.

> **NOTE:** *If the work is uninteresting, but must be done, the question is, are you doing your work with the intention of not having to do the same work/task again at some point in the future? Even the brain and mind automates processes; why should society not automate technical processes?*

4.7 Availability in an RBE

> **INSIGHT:** *It is not our economic resources that are scarce, but intelligently applied passion for the betterment of oneself and everyone else.*

The RBE exists for the expressed purpose of producing an abundance of access (i.e., "access abundance") to needed and wanted goods and services. If individuals have free access to the goods and services that they need and want, then the concepts of "trade" and "property" are unlikely to exist in their social system or be encoded into their economic system. Hence, a resource-based economy is a truly voluntary system. In other words, individuals are not bound by trade or property for movement in the system. A community that designs its own economic system might seek to create a voluntary environment that brings out the best of human behavior.

When educational, creative, and explorative resources are available to all without a price tag, there would be no limit to the evolution of human potential. An RBE necessitates a fully open learning system for a truly open society. When a society is unburdened by chronic survival concerns, then people would have time for individual intrinsic learning and exploration. Education, if available to everyone without a price tag, could become a never-ending process, a lifelong intrinsic learning process. RBE communities would be living learning centers (e.g., like "universities"). Most people would participate in activities and pursuits that they enjoy and that make them more highly developed and fulfilled human beings.

4.8 Technology in an RBE

> **INSIGHT:** *Eventually all of our doable work will be doable by automated robotic machines. How, then, do we wish to live [as a species]? We must ask, to what extent are automation technologies improving our humanity and our fulfillment, and to what extent are they disrupting our humanity and our fulfillment? How do we integrate them into our social purpose so they are helping us in our desired state of fulfillment, individually and as a society? How do we use them as tools in order that we might flourish as human beings?*

The RBE model is deeply informed by the understanding that a socio-economic system must remain in alignment with a community's technological capabilities to maintain the social stability of the community. If technology exists to free humans from banal or dangerous labor, then the socio-economic system must evolve (change for the better) and adapt to this new technological way of meeting needs. If automation technology exists to free humans from repetitive labor, then again, the system must adapt. If adaptation is not preserved then community destabilization is more likely. Of course, not all technologies are novel enough to cause a socio-economic adaptation. But, when those technologies that evolve the social environment begin to infect the economy, then to remain stable, the economy must evolve alongside. Mechanization is more productive and efficient than human labor, which means it is socially irresponsible to not mechanize and enjoy the fruits of abundance and ease and satisfaction it can create.

All technological decisions in a community are also social decisions as they [in part] involve common heritage resources. In a sense, fulfillment-oriented the technologies are an extension of a fulfillment-oriented social structure.

In an RBE, the actual Earth [eco]system becomes the basis for decisions in the economy. Instead of "affordance through monetary transaction" there is "affordance through regenerative Earth capacity". An RBE is a movement from a "labor for income" system to an access [abundance] system without "differential advantage" or having to submit to the opportune (or incentivized) dominance of another for one's own need satisfaction. The systems approach is a process by which we can come to more greatly know ourselves and organize for our fulfillment in harmony with naturally designed servicing technologies.

When technology is systematically applied it conserves energy, reduces waste, and provides a more efficient and effective economic system, as well as conveying a larger decision space. Eventually, technology itself will have advanced to such a degree that the technological landscape mandates a systems-wide resource-based economic model.

The introduction of automation machines into the methods of production decreases the effort expenditure of the individual in the production of goods and services. Engineered automation leads to more effective and efficient technical need fulfillment. Herein, non-human productive service resources are maximized and human time becomes free for the meaningful.

What is the purpose of technology if not to produce abundance for all the worlds' people? This very day we have the technological know-how and resources to produce abundance for all the world's people. Why aren't we doing so? How do we actually relate to one another if we don't realize that each of us has an innate drive toward a higher potential for ourselves and others, that each of us has common needs and common inter-relationships? Can an economic system influence how we relate to one another?

By applying the tool of a resource-based access system that maximizes the [systematically] functional use of every good, along with intelligent resource management, and near complete automation of primary services and goods manufacturing, then a community has the potential of creating a society of economic efficiency and useful abundance. This results in something which has never before occurred in human history; it generates an economy where goods and services are available in such abundance, and with such little need for human labour, that there would literally be no reason for money, barter, trade, or debt of any kind. A fully functional RBE may be said to "come into existence" at approximately the time that fulfillment becomes a sufficiently automated process that there is no potential re-initialization of the idea of the "market".

When efficiency is valued, automation is sought, and the concept of material exchange between humans no longer holds any relevance. We seek that which is mutual. Instead of exchanging goods and services for their survival, we openly share information for our betterment. Humankind is presently in the process of closing the chapter on the time in history when humans produced and distributed every good and service. Machines are increasingly replacing human effort, which isn't to say that in an RBE society that individuals wont still be highly creative and artistic with their hands and bodies. In an exchange-based system an exchange is necessary to maintain the flow of goods and services. In an RBE, intention and purpose are necessary to maintain the fulfillment of needs with goods and services. When machines perform all the banal and duplicitous work, then the exchange of resource for survival no longer need occur between humans. And, to remain in balance with their technology humankind must adjust its socio-economic environment accordingly.

It is relevant to point out here that humankind's current state of technological development is such that some of its technological systems are themselves being designed, constructed and maintained by other technological systems, which is somewhat less commonly known as "automated automation" (indicating that the operations replacement layer is automated also).

Because all technology can be used for "dual purposes" (as betterment or weaponization), it would be wise to establish a socio-economic system that reconnects the economy, society, and technology with the natural world so that technology is not used as a weapon in competition among one another, but with the intended fulfillment of everyone. There is a large experiential difference. Anything can be weaponized and turned to harmful purposes, including the wish to keep children healthy by vaccination with mercury, or to prevent tooth decay by putting a fluoride by-products in the water. If someone else controls what may or may not, should or should not, must or must not go into your body, then you are a slave. And that is the essence of the slave State. Somebody else controls what happens to your body. If only you have 'personal access' to your own body, then you have to take responsibility for it.

Those who do not understand technology, who do not comprehend the basic conceptual designs of technical systems do not generally appear to have an appreciation for the capabilities of humankind and its current state of technological development. If someone does not understand even the basic operation of something, then how can that individual truly appreciate its operation or conceive of lateral operations? This very year, we are a technically capable species - we have been to the moon and back, and we are autonomously driving around on Mars at this very moment. Our scientists, mathematicians, and engineered began creating vast architectural structures decades ago. Consider for a moment the advanced mathematics and physical understandings that it takes to accomplish the sustainment of the modern technological infrastructure around each of us. At this very moment, here on Earth, we have mathematicians, scientists, and engineers who could solve our greatest social, and fundamentally, technical problems as rapidly as the next updated release of your smart phone. As a society, would it not be prudent to use these skilled individuals to solve our socially-oriented world problems? Only under a predatory-based system [economic parasitism] would we stifle our own social progress.

The monetary system wastes limitless amounts of resources in the replication and duplication of products that are not necessary, and it is a place where some goods and services become contrived to us. We are coming to know more about what we need, and why and how we come to like things.

Exponential knowledge acquisition and technical development leads to the transcending of material scarcity and engagement with a more thought responsive environment. At this very moment humankind is in the process of such a transition. Technology allows for new possibilities, the eventual consequence of which is a highly thought responsive and customizable environment. In all honesty, if technologies continue to advance, even at a fraction of the rate they are now, services are going to look increasingly less like jobs and more like thought responsive science fiction. It is hard to offer your labor in an economy that is full of automated machines. Take the software application Photoshop for example, any 2D image you can dream of you can re-create, re-copy, and re-print in digital form. Similarly, 3D software and 3D material rendering technologies (e.g., 3D printing) allows for the physical creation of nearly any structural-architectural object imaginable (within material limits, of course).

Real things don't vary by opinion. "You" can think (or believe) that iron is stronger per measurable attribute by comparison with another metal as much as you want; but, if you can't prove your opinions through testing, prototyping, and experimental controlling, then they are irrelevant to the selection of an optimal material for a projected service. This is just basic engineering. Many people in early 21st century society do not have a complete and functional understanding of what 'systems-oriented engineering' actually is, remember that.

Here, technology as a functional extension of our cognitions allows for the simultaneous processing of (or 'multiprocessing') of information. Atoms are bits of information. Structures built by humankind are also information. In a sense, technology represents information about how to make environmental responses or processes run more efficiently and require less energy, like enzymes do in our body or platinum does in catalytic converters.

> **INSIGHT:** *Technology ought to evolve our humanity; if our technology were to surpass our humanity, then humankind would be at risk.*

4.9 The scientific method in an RBE

The RBE's decision architecture involves a scientifically derived process that unfolds objectively toward a higher potential of human fulfillment through contribution and an information and spatial support structure. The RBE model uses the scientific method for quantifying the impact of its own technologies and actions on its environment [through 'scientific feedback mechanisms']. Would it be wrong for a community to agree that a product or activity that causes harm to the environment or any human being, either in a direct or indirect manner, should be de-prioritized in accordance with its potential for harm? Herein, an RBE achieves equitable systematic prioritization of resources through community-wide access to accurate information and voluntary participation. With feedback we can come to know what conceptual and material structures have the potential to cause harm, and we can remove these structures from our life-space.

Applying the scientific method to partially solve for socio-economic problems is only logical. Science is unique in that its methods demand not only that the ideas proposed be tested and replicated, but everything science discovers is also inherently falsifiable. Science never attaches to anything, and it evolves constantly. Everything that science currently suggests is accurate must also maintain the attribute of possibly being proven wrong, eventually. An RBE applies the scientific method to the fulfillment of individuals in a community. This is in fact already being done to a relative extent today. System's engineers do this world-wide by designing systems that bring relatively clean water, electricity, transportation, and communications to people's homes and community centers. They have been able to accomplish what they have accomplished because of the scientific method and a systems understanding of the architecture of the material environment.

The very purpose of science is to allow us to explain our own conditions. Hence, to some high degree our social organizations must be based on the very natural systems that "govern" us ... if anything could be said to "govern us". Humanity is regulated by nature whether some human individuals like it or not (or have a preference for it being so). The RBE creates an economic information context where humanity can begin to "grow up" in its recognition of the larger information system within which it verifiably exists.

The advance of technology due to the progress of our sciences is not for us to fear, it is for us to consciously embrace and design love and compassion into, what could be more compassionate than technology that frees us from the wheel of fear and self-limitation, allowing us to spend our lives pursuing our passions and chasing curiosity? The RBE is not some imagined subservience to a machine collective; it's actually in all respects turning machines and AI into technical fulfillment facilitators for living beings.

An RBE is not an ideology. It is an engineered system designed for a purpose. It appears as nothing more than an organized set of proven life supporting understandings, interrelationships and material infrastructure that inform the arrival at decisions that optimize human and environmental sustainability within a context of need fulfillment. It is the application of scientific and technical ingenuity toward the creation of an abundant resource environment. To claim that an engineered resource-based economy is an ideology is a fallacy of equivocation - an engineered system is not an ideology. An engineered system can encode an ideology, but it is not identifiable as an ideology. Ideologies are systems of unverified ideas (i.e., not science) and ideals (agendas and opinions) that form the basis of belief in a social or economic organization, including political theory and policy. Such ideologies are equivalent to belief systems and they end in the suffix "-ism", such as republicanism, rightism, leftism, communism, socialism, capitalism, corporatism, marxism, marketism, etc. Every "-ism" becomes co-opted over time, hindering technological integration at every scale.

Nature isn't always compatible with our wants on an individual basis -- nature doesn't care about us as individuals; instead, nature appears to have an interest in the perpetuation of life, in general. Therein, if we understand how nature works and we work with those understandings, then we can enjoy a more optimal way of living than any of our ancestors.

> **INSIGHT:** *We must be open to challenge and thoughtful critiques of our system if we are to further the thoughtful development of our system.*

4.10 Utopia and the RBE

> **QUESTION:** *How much do we really gain in our societies by maintaining systems that in their design limit human reconnection, re-correction, or error-correction with the source from which we have all come in common.*

An RBE is not the design for a utopia (Greek: not [u] + a place [topia], not-a-place). Each design iteration for the engineered processes that compose the present operational state of the RBE is simply the best design known of up until the present (i.e., when the design is being developed). If someone admits that an engineered system is capable of being updated when new information becomes available and also that humanity is capable of encoding the idea of error-corrective feedback into its socio-economic systems, then all talk of an RBE being a conceptual place that cannot exist becomes erroneous and disingenuous. From a conceptual systems perspective, such a place is logically capable of existing. In fact, an RBE is designed to follow the community's emergent understanding of systems dynamics, so it is in fact the "best" system the community knows of or has developed to date. Early 21st century society has a "big" (potentially catastrophic) issue with error correction. It has [at least] set itself up with a whole host of applied technologies and systems with no accounting for their biological risks and behavioral affects (to its socio-psychology, to its health, and to its habitat). Early 21st century society is not a healthy system in a state of dynamic equilibrium with a functional mechanism for error-corrective feedback. Without error-corrective feedback intentional state change in a common environment is not only unlikely, but a potential scenario of conflict.

An RBE is not the "establishment of a system", but rather the iterative emergence (i.e., "appearance") of a systems-system, originating from those who compose its community, and not from any "rulers" or "administrators". In a resource-based economic system there are no political rules, no power elite. Politics tends to either maintain and keep things the same, or it becomes the toy of some smaller financial elite. Politics is not a system of progress. The difference between politics and an RBE is the difference between "policy" and 'self-evident', which is 'experiential information'. It is the difference in the demands of power versus the appreciation of sharing.

To keep something the same is to state that there is no forward motion in a direction (e.g., entropic) or toward a purpose (e.g., fulfillment). An RBE is an emergent system. It is not a top down system or an established system, but a centrally distributed system (a systems-system) based on a shift in mindset of the population: that individuals can direct and orient their lives toward higher states of potential fulfillment.

Life in an RBE community does not become "less challenging" than life in early 21st century society. Instead, there is an experiential shift in the nature of stress and challenge, which become known as controlled hormetics. The challenge is no longer one of stressful and fearful survival, but one of opportunity for growth and expansion. "Work", as in the laborious expenditure of energy for currency is not itself fulfilling. Its not intrinsically meaningful. It doesn't make people happy; access makes people happy. But "work", as in accomplishing an important goal, learning something, designing, building, growing, achieving, doing something that is in line with your values, is fulfilling, meaningful, and brings happiness. A community does not need a "superclass" that forces the challenge of daily survival on each of its chess pieces.

An RBE is a system that emerges from [individual] participation in a commonly fulfilling [form of] organization. There are no rulers. The system emerges based on the shift in understanding of the common individual over time through access to more accurate information and more fulfilling organization.

4.11 Power and an RBE

An RBE is a non-discriminatory, person independent (i.e., apolitical) system; it is not designed to create socially organized power structures, classes or hierarchies, that may curb its most efficient operation. It is a system without "factions" in decisioning (i.e., without politics). It is a form of organization which does not structurally reinforce the establishment of competing institutions. It is a system that doesn't give people who want to harm others a massive platform to do so. Instead, it is a participative system designed to accomplish economic fulfillment efficiently and without an administrative class of leaders, governors, or enforcers - it uses a set of participatively developed and formally understood [transparent] transport protocols [for decisioning]. In short, it is a system designed for non-hierarchical adaptive responses to individual needs and issues in common. Herein, one person is not choosing for another person. Instead, a decisioning method is designed and applied in common by all persons. It is a bias-agnostic system; a system to keep the community's communication clear and coherent - a value clarified space.

The tracking of information in a competitive environment (as in, predator vs. prey) is not equivalent to the shared transparency of trackable information in a cooperative social environment. Those who conduct the tracking (i.e., surveillance) in a competitive environment have a greater ability to manipulate and socially engineer due to the [incentivized] concealment and obfuscation of collected information. In a competitive [information] environment there is likely to exist a higher echelon (or "PRISM") of people who can use information in competitive warfare to remain in power.

In a resource-based economy, the integrity of the system partially lies in the openness of the total information system, which requires that individuals remain (or re-become) self-directed learners. Hence, it is "centralized" only to the extent that the community accounts for information from the whole of the real world. In an open information system there will always be information available to counter possible acts of destabilization. The odds of someone committing horrific acts against other human beings while living in a system of fulfillment would likely be extremely low. In an RBE there is no coercive force, there is only freedom in the effective and efficient fulfillment of needs. Such a society is set up so that there is no reason why anyone would want to act in a socially destructive manner (i.e., it is not a structurally incentivized behavior). Humans do not engage in violence and destruction without reason. Without a reason to harm society there is extremely little chance that anyone would do so. An RBE is essentially the emergence of a society of individuals who care for one another, applied that intention to into the encoding of their economic decisioning to form a "community". An RBE is not a system that creates leviathans out of other human beings for the express purpose of keeping a population "in check", with the consequence of generating extreme violence.

An RBE is participatively designed and built by a group of individuals to prevent the accumulation of power in the hands of a small group. Conversely, traditional [financial] economic systems are built to encourage it; precisely the situation the modern world finds itself in now. In truth, we need to be wary of any *imposed* order or government or institution or approach or understanding or thinking. Every imposed principle must be critically examined prior to conscious integration into our information system. An RBE is a collaborative and participative system; it is not an imposed system, but it is informed by the "imposed" technical regulations of nature as they are presently known.

In an RBE, literally, every system is under the access-control or "governance" of the entire population in a distributed and participatively open-source manner. Note that something with the characteristic of "open source" is by its very nature distributed in form. When effectively designed for this functional purpose it prevents one person or group from taking control [of the whole distributed network of control]. The system is literally designed to be as resistant to absolute minority control as much as possible, and individuals are incentivized to maintain distributed [access] control.

Herein, an RBE could be contrasted with a leadership-based "command and control" or "need to know" governance structure in which individuals are not aware of what the forces above them are doing - such a structure is divisionary, and is not equivalent to distributed-access control (or, "later systems-power").

An 'openly distributed access-control system' is sometimes confusingly labelled as "governance". The application of the term "governance" is something of a misname here, for the word is most closely associated, in an etymological manner, with the following three concepts: authority; administration of rule; and socially controlling power. These three conceptual characteristics do not accurately describe the characterized makeup or behavioral characteristics of the Community's emergent socio-economic access system. When taken in their basic normative they are contradictory value conditions to those identified in the Community's social system. If there are socio-economic [access] rules, then those rules are universal and applied to everyone equally (i.e., distributed access). No entity can be given permission to break the rules, such as the "State". For instance, the State has the ability to force payment of tax on a relationship; this is something "you" as a "citizen" do not have the legally protected ability to do. If people still choose to call an RBE a form of "government" or "a governance system", then they must qualify their meaning of the term in order to be clearly understood. The RBE model is not equivalent to the form of government seen by States or the governance structure seen in businesses and club[bed] organizations. The definition of government and governance used in modern parlance must be unequivocally differentiated from the "governance" structure in an RBE. In early 21st century society, although the term "government" may not be openly defined as such, government is in fact "a monopoly over the use of force and coercion within a given geographic area [administered by (land) owners]".

Government may also be defined in terms of "regulation", which the market always (or, has to) have. In an RBE, the "regulation" is technically and formally defined to align with a particular direction (sustainable fulfillment) and value orientation (efficiency). The "regulation" in an RBE is not coercive, it is our best understanding of our technical reality and our ability to integrate that understanding into our technical[ly serviced] habitat [production systems].

All 'systems' are regulated through the controlling of processes. Adaptive systems observe the output of a controlled process and then adjust the process as required (or 'intended'). This is called a [control] feedback loop. There is another kind of control loop known as a feedforward loop wherein input variations are monitored, and then, the process is adjusted to compensate. System management involves regulating the input and process for the desired output. In living systems, "governance" structures and processes "evolve" to control the functioning of the system within its environment for its desired purpose(s), its survival and its fulfillment.

It should really be noted here that "governance" is sometimes mistaken for "guiding". It should not be so mistaken, "governance" is never about "guiding"; it is about 'controlling'. Any definition of governance that includes the word "guide" in place the word 'control' is using manipulative language. "Governance" is in fact the state of being governed, and "social governing" is the state of social control by an external social "governor". In some sense we might ask, "Do we want a participative, open control system based upon nature, or do we want a hierarchical social governing system?"

To redefine "governance" as "guidance" is a bit of a dangerous thing because it masks the socially governing power structure (or, belief in authority) behind the idea. For example, some alternative governance advocates define governance as "a sequence of activities carried out within a structure to achieve some set goal". A systems thinker would likely not refer to this conceptual idea as "governance" because of the varied social concepts already associated with the label "governance". Instead, a systems thinker would more likely refer to this idea as that of "systems control processes", which can be visualized for clearer communication. A recommendation engine, for instance, is a guidance system; it recommends access, whereas, a control system controls access. The question is, how do we want our access controlled; and, how do we process feedback? Do we want it distirbutively controlled and laterally powered (i.e., powered by individuals), or do we want it socially controlled and hierarchically powered? Do we want feedback from nature, or do we want feedback from the State and powerful for profit entities in the Market?

> **QUESTION:** *Why should we spend hundreds if not thousands of hours deciding together what to do? Why not organize a system that gives the maximum amount of time to the individual to decide what s/he wants to do (i.e., greater freedom of choice)?*

4.12 Planned obsolescence

> **NOTE:** *In a more technologically advanced market economy 'planned obsolescence' is replaced with 'rent seeking' in order to maintain the cyclical consumption cycle.*

In a competitive structure for resource acquisition and engineering (apparently worthy of the title "economy") there is something known as 'planned obsolescence' (i.e., built-in obsolescence). 'Planned obsolescence' is the deliberate planning of goods and services so that they are made to break down [sooner] to ensure their resale for the company in question. Similarly, 'intrinsic obsolescence' is when a good is made with inferior materials and inefficient production processes to cut corners on cost. Effectively, planned and intrinsic obsolescence are the conscious withdrawal/withholding of technical efficiency to generate repeat purchase, and they are common practices in the market.

'Planned obsolescence' is a value orientation: it is a value orientation away from comprehensive efficiency for the benefit of all and toward the planning of inefficiency for profit, exclusionary benefit, and to maintain the market cycle of 'cyclical consumption'. Businesses to varying degrees deliberately design and engineer products to wear out and malfunction [within a planned amount of time] in an effort to: repeat / maintain the continuity of sales, or maintain a cycle of continuous servicing (which becomes 'rent seeking'). Essentially, goods that could otherwise knowingly have a longer, safer, and more functionally useful lifespan are being given shorter lifespans (or lifespans that interrupt usage on a cycle) to maintain the money cycle (i.e., to continue commerce).

Planned obsolescence is an incentive in the market because its behavior facilitates cost efficiency for the owner: it is a form of self-maximization for profit. In the battle of competition everyone is looking for cost efficiency, and no one can make the "best" because everyone has to save money in some respect. Hence, there is "undercutting", one-upmanship, and competitive advantage as systemic practices in the market. In a sense, everything is obsolete the moment it is produced in a competitive market.

In the Community, we plan the lifespan of our goods and services, but we plan it for our functional fulfillment in an emergent manner. We realize that functional fulfillment is temporal, spatial, and iterative. In community, the lifespan of "products" are not planned for in terms of the deliberate continuation of an abstract [monetary] cycle.

Market philosophers sometimes argue that planned obsolescence is actually a good thing because they claim it drives "innovation" through the incentive to design increasingly powerful, efficient, and up-to-date products through the regular influx of money. In other words, they believe that planned obsolescence is making technology significantly better through continued profit.

However, to assume we [as society] need to keep money circulating in order drive technological progress is like saying running is good for your cardiovascular health, even if you are being chased by a lion who is going to eat you if you stop. Do you justify the lion chasing you as "good" just because it is forcing you to exercise? The lion symbolizes an inherently detriment force driving what is perceived of, in a truncated manner, as productive. The same logic applies to market economists who think that since "more poor people have cell phones, TVs and microwaves than they did years ago" it justifies the existence of the market system as a productive or even egalitarian force. And, it is conveniently ignored or not understood that the Market system (or more specifically the exploitation/scarcity/competition that underscores it) perpetuates poverty and class imbalance.

In fact, we could sit around all day making up things about progress and productivity within the confines of narrow, truncated frames of reference. "I hear cancer reduces your appetite! ... cancer must be great for losing those extra pounds. Wouldn't it be nice to have a free meal, free little room and a workout facility?... let's go to a prison and relax. I heard that the green revolution is going to be led by hybrid electric cars! I'm going to go out and buy 10 hybrid cars to support the cause! And perhaps the most amazing of all, coming back to your point, is the idea that buying things and pushing money around and incentivizing more industrial activity ("innovation") - even if it is unnecessarily wasting the earth's finite resources at the same time, speeding up ecological collapse - is actually a good thing.

As already stated, 'planned obsolescence' is the deliberate withholding of technical efficiency to generate repeat purchases. The by-product is, of course, more money to be applied to more possible products. But that is circular in its reasoning in the context of "innovation" as it assumes there is no other option available than to encourage waste. Does this also mean that "innovation" is about finding better ways to create better planned obsolescence? It is certainly something to consider.

5 A participatory-based model

A.k.a., A contribution-based model.

CLARIFICATION: *The decision system is based on contribution [to user access].*

This economic model is a participatory model in that it involves multiple levels of volitional, voluntary and otherwise non-coercive, participation. There is participation throughout the models application, and without participating there would be no potential application of the model. In other words, the models application essentially relies on participation, because there is no coercion. It must be restated that all participation in the decision system is of a voluntary (and volitional) nature, and every individual in the community has the opportunity to participate. The economic model is designed based upon mutually beneficial and voluntary interrelationships (or "associations"). This design maintains an environment where we are more likely to work toward fulfilling our needs in common rather than seeking to get our own needs met at the expense of others. In a community-type society, there is autonomy of participation. Participation is both particupation in demand identification and participation in contribution. Here, representation means a lack of direct choice. When "you" are being "represented", and therefore, do not have a direct choice, then don't expect quality.

It is relevant to note that there is a spectrum of possible states of participation in any societal environment, and these extend from volitional to voluntary to conditioned and eventually to coerced and forced. Some socio-economic systems force participation (e.g., governmental systems), and others do not. Some systems extrinsically condition participation (e.g., the market system), and others facilitate and guide intrinsic motivation. The restoration of intrinsic motivation as well as self-esteem facilitates socially intelligent decisioning (i.e., self-interest at the social level), which is likely to diminish the re-structured expression of the socially corrosive behaviors associated with that which is labelled as "secondary psychopathy" (or "sociopathy"). A useful economic system will allow for the emergence of voluntary participation with transparent systems. Only through voluntary association does there exist the capacity to contribute to globally effective action, where everyone has the opportunity to contribute to the community's knowledge base, its information systems, and its technical infrastructure.

An economic model is only as accurate as the community's conceptual framework and its empirical alignment with natural phenomena. When everyone has the potential to participate in the evolution of the community's total framework, then participation in the decisioning process takes on a whole new social meaning. Herein, everyone has the opportunity to contribute to the design and development of the models and systems that compose the community as well as the information infrastructure that informs all economic solutions. Equal participation means that everyone has an equal opportunity to participate in the economy. Participation is open to everyone. A community is a system of interaction where everyone decides through coordination and cooperation.

A participative sharing (i.e., participative-access) society minimizes its risks [to its needs] through efficiency in its relationships. A participative form of social arrangement was common with hunter-gatherer societies. And, humans have lived as hunter-gatherers in participative sharing arrangements for over 90% of their existence on Earth.

A functional community decisioning system is not governed by politicians or businesses, nor driven by popular opinion or exclusive agendas, but at its core it is upheld by the equal participation of individuals through an objective common process applied to human and environmental concern (or caretaking). All information applied to the decision system is openly shared and verified, which is exactly what other cooperatively social organisms do - they communicate for their own benefit.

When all "disciplines" are linked, then all interests can contribute. Contribution makes one feel more a part of the community. When all interests can contribute, then the interests of all are connecting and colliding.

In a participatory model the individuals in the community are both the "end users" as well as the "providers". The economic relationships between the two are transparently known and feedback is continuously present. The users have a vested interest, and are naturally connected "stakeholders" in the *design & manufacturing effort, characteristics and qualities, and conditions* of all items produced for and by the community. And, when users have the ability to participate in the design of those items and services that they use, then the efficiency by which users' needs are met becomes optimal[ly void of force, fear, and confusion].

When information is said to be "democratized" in this manner (i.e., equally available to all), then it becomes distributed to all and all can participate. With that said, the concepts of 'transparency' and of 'openness' are probably more accurate than the term "democratized", though.

Essentially, the contribution of effort and the contribution of multiple streams of information "run" the community. And, in the community anyone can contribute to this reservoir of possible experience. Everyone can contribute to the sustainment and the evolvement of our species in a habitat. But, we must first start openly communicating and caretaking.

A truly participatory-based model removes any penalty for not contributing and replaces the idea of penalty (or punishment) with a conceptual design that involves a freely contributory structural organization where we do what we do because we want to contribute to society and to ourselves in meaningful ways, and this fulfills ourselves and our community. A community is a socio-economic arrangement that facilitates free contribution.

A true participatory planning system requires the "democratization" of all knowledge and understanding so that it is transparently available to everyone and may be informed by anyone. Herein, all real problems are technical and all solutions are solvable by inputting all known relevant data, organized by causal reasoning and pattern recognition, and evaluated and tested by the scientific method, which is applied toward the engineering of new and more fulfilling structures. We, then, begin to realize that social involvement falls mostly in the realm of human need and our orientation toward our environment. If "democracy" is about finding consensus with values, then values are not orientationally aligned (i.e., "equal"). In the real world some values are more aligned with fulfillment, and hence, sustainable, and others have an increasingly diminishing relationship to the natural environment, and are therefore more likely to be unsustainable.

Values can be assessed and qualified: consider the affect they have on the process of human survival. As a basic example, if someone were to value profit at any cost, which leads to behaviors that pollute a local environment causing others to become sick, then that person's value is inherently unsustainable and causes suffering. The real revolution is the shifting of human values toward one of a higher potential [construction] of fulfillment. In community, we arrive at decisions via a formalized process that synthesizes solutions from scientific evidence using a referential [information] system that can calculate technical solutions to "issued" inputs.

Mass influence and propaganda are used by authorities to steer the masses in an entirely irrational way. The demands of human opinion will always be second to natural law if the common goal [of our species] is to survive. We can design a system where reality can be evaluated objectively.

Herein, we might find that if resources and economic outputs are not distributed in a manner that facilitates everyone's access, then the majority will be unable to participate in the system in any meaningful way.

In a truly participation-based system the condition of what is relevant is externalized (or "outsourced") to the community as a whole by asking the question, "what are your needs?" This type of inquiry should not be equated with the classic market mechanism wherein whomever pays the most [currency] gets their wants satisfied higher on the "priority list", which essentially maintains the formation (i.e., operational structure) of a power/class hierarchy. A truly participatory decision system is one of voluntary involvement and transparent participation. It is not a system of consultants feeding authorities information through decks of strategy and biased "research".

It is important to note here that the Community is not an entity of force or coercion, for there exists no such mechanism in the Community as a system. Some socio-economic systems maintain a mechanism that forces participation (e.g., competition in a market acts as such a mechanism).

When we share, our wants are neither "infinite" nor "perverted" [by advertising or marketing sciences]. What is the use of "marketing" if not the creation of demand and need for something "you" are going to sell [with the structural incentive for profit]. A community is a system that actually fosters self- and personal-development instead of mundane replication, conformity, and stagnation. To say that "human wants are infinite" is to de-contextualize human need from human desire and from nature, in general. A community involves the cooperation and social sharing of participation versus any form of market [object] exchange.

A lot of the "desires" that we have that are claimed to be "difficult to quantify" come from artificial sources of conditioning. There are actual priorities when it comes to surviving and flourishing. Advertising is brainwashing. Advertising, publicizing, marketing, and otherwise "commercializing" inherently involves the engineering of desire and of behavior. It is a targeted psychological attack on someone to give them a desire for "your" product. There has been a multi-generational trend of condition the social populace toward consumerism, through advertising and propaganda (or "public relations"). And, we protect ourselves from this type of conditioning through a set of thinking tools including systems thinking, critical thinking, and analytical thinking. These structurally useful ways of thinking may become encoded into our 'critical factor' to allow us to pattern-resonate with a higher fulfillment more frequently.

One of the primary purposes of the advertising and marketing industry is the engineering of demand. The contrived engineering of demand is such a significant issue [for individuals enculturated into a society that accepts it as normal] that it is discussed in the Social System, the Decision System, and also, the Lifestyle System. Through these readings one might come to an understanding that wants would be a little less chaotic among community.

The research done by the economist Manfred Max-Neef, and many others, refute the claim that individuals have unlimited wants. Those who believe that human wants are infinite make the claim that it is human nature to want an endless number of things in any given moment, yet have a limited amount of resources to achieve those wants. Max-Neef states that this claim was made hundreds of years ago when humankind's understanding of human behavior was more primitive. Research into the nature of the human condition has discovered that a spectrum of human needs are an inherent part of human development.

Fundamentally, there is a difference between human needs and inculcated [cultural and market] expectations. Herein, the development of 'intuition' involves the realization that there exists a difference between needs, wants and preferences. A very simple example of this might be the following scenario: A waiter comes to table and asks a child, "What do you want?" The parent at the table then asks the child, "What do you want?" Notice that the child is not being asked, "What does your body need?" Early 21st century society designs experiences (and products) for profit, not for fulfillment [at a structurally fundamental level]. There are, in fact, artificially concocted wants -- wants that you only want because someone else wanted you to want them. It is important to recognize that the only reason some goods and services exist at all in early 21st century society is because they can monetized.

Only a truly participatory model will allow an observation of the emergent behavior of the whole system, without being controlled by either a single heroic "leader" or even a subsection of the collective group. 'Emergent behavior' refers to the collective phenomena or set of behaviors in complex systems that do not exist in their individual parts, but upon their relationships to one another. Thus, emergent behavior cannot be observed or predicted by examination of a system's individual parts. It can only be understood through the parts and their relationships. 'Emergent' behavior is also known as 'emergence', a unit of which is an 'emergent property', which exists in reference to "the whole is greater [in meaning] than the sum of the parts."

In a real world socio-economic model individuals would not have to ask permission (e.g., apply for licenses) to behave in normal ways like they do in a property-based system, where individuals must constantly ask, "May I do this?" Instead, this community system is open for anyone to create and innovate and share and explore if they want to, by themselves or with others. Property is one mechanism of coordination, but it is not the only one. A common access-/resource-based system is an alternative.

If the community is an information system, then the 'habitat service systems' are information platforms developed for the organized fulfillment of our needs, and within which we create and learn and participate.

Economic activity within a community's decision space is founded upon 'intrinsic motivation' rather than the extrinsic motivators of the modern economic system. Intrinsic motivation refers to being involved in an activity or project because "you" want to be involved, which requires a particular form of environmental orientation involving the value dynamics of autonomy, mastery and purpose. 'Autonomy' refers to the ability to choose what you are working on, where, when, how, and with whom. 'Mastery' refers to doing tasks that are challenging, but not far beyond your abilities, leading you to constant improvement, which is a rewarding factor in itself. 'Purpose' refers to doing "your" work for what "you" perceive as a good reason – perhaps the desire to achieve something in particular. If "you" are someone who is doing "your" current job purely for money and would probably quit if you won the lottery, then you are not intrinsically motivated. Intrinsic motivation is a far more worthwhile than money. In a figurative way, it is the structured essence of our will-power. It lasts longer than extrinsic motivation (which self-degrades over time); it is self-renewable; and, it allows for far deeper explorative creativity.

In a horizontal socio-economic system without the integrated application of the scientific method to social concern there is still the risky uncertainty of individual's personalities replacing verifiable evidence to the contrary.

> **QUESTION:** *Are we creating together or are we just participating in someone else's creation?*

5.1 Individual and social benefit

> **INSIGHT:** *Participation enables further participation; contribution enables further contribution. Therein, what are we responsible for if not for ourselves and the society that we are continuously creating through our participation?*

Individually we may benefit [from specific pharmaceutical medicine], while socially we are losing sight, of sense and of health. There are things that may benefit some of us in the short-term, while causing harm to all of us in the long-term. The individual as well as the social must be observed and accounted for, in social decisioning, over time; herein, we desire to know the total system and we plan strategically.

This decisioning model represents a collaborative social approach toward arriving at decisions to identified problems in our fulfillment. Among community we seek a collaborative social approach to arriving at decisions to identified problems in fulfillment.

5.2 Corruption

> **NOTE:** *Violence and aggression are not acceptable in coordinating the movement and transformation of resources into services and goods in this world (if human well-being is a goal).*

In a community-type society, there is no reward for corruption, because the interdisciplinary teams do not get paid and have no status tied to their economic (access) position in society; hence, there is little to no incentive to behave corruptly. The reward of contribution/participation is, in fact, the benefits of the effectiveness and efficiency of fulfillment in the society as a whole. And, individuals therein contribute because it is in their best interests to do so. As such, self-interest becomes integrated with social interest; they become one. In order to help yourself, you must help society explicitly. And the survival of the community is based upon this concept.

These teams are not fixed, but constantly revolving based on who wants to participate, who can contribute in any given field. Arbitrary voting is replaced by the logical review of given empirical concepts and measures based on scientific discoveries and systems engineering. Participation is open to everyone, all material issues are recognized as technical. The degree to which a person contributes is based on their education and ability to create and problem solve, as well as their own interest to contribute. This is why emergent and self-directed education is critical.

Power is often maintained through ignorance. Herein, intelligence will no longer be a threat to the establishment because there is no power establishment. Under this environment it is highly likely that individuals will have a high propensity to become generalists, and not specialists. Specialization is a limitation. The current monetary system promotes specialization as a form of labor distribution for income. The lifestyle of a labor for income system is built in an colossally inefficient manner.

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TABLES

Table 13. Decision System Classification*: The three decisioning processes in early 21st century society and their relative equivalences in community. Note that the three processes do not align exactly [due to a different direction, orientation, and approach] between early 21st century society and community. It may also be relevant to note that "decision making" is a key concept in "human management". Fundamentally, among community, we want to fix problems, we don't just want to advance decisions along some bureaucratic path.*

Decisioning in Early 21st Century Society and in Community			
Decisioning category processing name *(In early 21st century society)*	**Associated description** *(In early 21st century society)*	**Name given to [subjective] processors** *(In early 21st century society)*	**Descriptors given to equivalent system-level processes** *(In a community-type society)*
Making *(the decider, the maker the owner, the leader)*	The individual(s) who make a decision	(State terminology) - Leader; politician; minister; statesman/woman (Market terminology) - Executive; manager; boss	The transparent, parallel, and collaboratively developed **decisioning system**
Administering *(the administrator, the employee, the enforcer)*	The individual(s) who carry out the decision	(State terminology) Bureaucrat; administrative official; assistant (Market terminology) Administrator; secretary; employee;	Interdisciplinary and collaborative systems teams and associated **operational processes**
Adjudicating *(the judge)*	When decisions have not been "properly made"	(State terminology) Judge (Market terminology) Owner or employer; legal professional (attorney/advocate)	Transparent **feedback** and **system redesign** via integration and planning; the **restorative justice** process

Table 14. Decision System Classification*: The four transactional frameworks.*

Four Transactional Frameworks		
	Market-Based	Non-Market
Decentralized	Price System (1)	Social Sharing; Strategic Distributed Access (3)
Centralized	Ownership "Capital" Hierarchy (2)	Governments; Protocols (4)

Table 15. Decision System Classification*: The Market Economy in comparison to a Resource-Based Economy.*

Market Economy	Resource-Based Economy (a living systems economy)
Consumption	Preservation
Obsolescence	Optimum Design
Property	Access
Infinite Growth	Steady State
Competition	Collaboration
Labor for Income	Mechanization
Scarcity/Imbalance	Abundance/Equality

TABLES

Calculation: Statistical Computation Service for a Community-Type Society

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Last Working Integration Point: *Project coordinator integration*

Keywords: statistical service, resource calculation, resource computation, economic computation, mathematical economics, computational economics, economic automization, economic planning, managerial economics, command economics, socialist economic calculation, socialist economic planning, command planning, input-output decision economics, enterprise input-output economics, input-output matrix economics, computational material planning, input-output planning, economic value chains, socio-economic accounting and calculation, environmental management, material flow accounting and planning, etc.

Abstract

This decision system contains an economic resource resolution matrix calculation service with a set formula that solve for the optimally planned configuration of those resources, given a set of categorical human needs and common heritage resources. A society may produce economic planned allocations of resources in order to optimally meet human needs and preferences. It is possible to use statistical calculation to compute feasible master plans for the optimization of human need. Plans identify and calculate for the inputs and outputs of habitat services.

Graphical Abstract

Image Not Yet Associated

1 Introduction

Objects become resources in a calculation [input-output] matrix upon which computations are executed to identify a optimal allocations of resources to services [in society]. Calculation for the production of access to services, and therein, objects are delivered through protocols that meet community objectives and other inquiries. It is within a habitat where physical objects are conceptualized of as resources for service[s in the habitat]. The calculation for access to habitat services involves:

1. Objects (materials).
2. Resources (demand).
3. Services (capacities).

Here, there are objects that have quantity (count), version (sub-type), and location. These object are categorized as resources and in two types of calculations:

1. **A calculation that controls production** [of habitat system] objects [to users] through protocols that conform production to stated [societal] objectives.
   A. Object[ive] production calculation [protocol, algorithm].
2. **A calculation that plans optimal allocation** of objects to services at specific locations given local and global demands.
   A. Service resource allocation calculation [protocol, algorithm].
3. A problem solving protocol to engineer solutions by means of a series of inquiry processes categorized by the core values of society (freedom, justice, efficiency, and solutions). Here, solutions are the result of a global inquiry protocol that accounts for resources and requirements, and that resolves requirements into optimally engineered solutions [for construction and operation], given what is known.
   A. **Solution inquiry protocols [algorithm].**
      1. Issue inquiry [identification of demands].
      2. Effectiveness inquiry [identification of demand fulfillment].
         i. Surveys are a feedback inquiry.
      3. Solution inquiry [standardized engineering of socio-technical systems].
         i. Solutions are an inquiry into production and allocation (product cycling).
      4. **Demanded object [quantity] (freedom value)**
         i. Production: Economic efficiency inquiry [object production efficiency, optimized production].
         ii. Allocation: Resource inquiry [resource allocation availability, optimized resource allocation].
         iii. Capacities: Environmental inquiry [ecological service capacity].
      5. **Preferred object sub-type [preference] (freedom value).**
         i. Preference inquiry [sub-type, customization].
   B. **Just object value (justice value).**
      1. Justice inquiry [restoration and distribution].
   C. **Effective object fulfillment (all three values).**
      1. Feedback inquiry [survey for improvement].

2 Mathematical economic planning and coordination

A.k.a., Algorithmic economics, objective economics, computational economics, mathematical economics, energy economics, mathematical economics, quantitative economics, Leontif production economics, resource calculation, energy economics, transaction table economics, business mathematics, resource flow calculation, input-output calculation, material flow analysis, material flow tables.

The questions central to economics (Read: macroeconomics) are:

1. What is needed as the outputs of an economics system?
2. What is required as the inputs of an economic system?
3. How is/will the economic system produce the outputs from inputs?
4. What configurations of the economic system are possible (or, optimal) to produce the outputs?

An economy (macroeconomy) can be divided into several main sectors. In a community-type society, the aggregation of all the sectors is called a habitat service system, and the escorts themselves are called habitat service systems (or, habitat service support systems). At the highest level, a habitat service system can be divided into three main sectors:

1. Life support service sector
2. Technology support service sector
3. Exploratory support service sector

Within any economy, each one of these sectors depends on all the other sectors. If the output of each one of the sectors is added, then it will show the overall output of the economy. Here, it is noticeable that a service (industry, sector, etc.) can be linearly represented as a combination of other services. Services can be categorized, prioritized, aggregated, and disaggregated.

Note here that high-level sectors have sub-sectors. An economy or habitat is divided into sectors (in the market, these are often called industries). Each terminal sector produces one service or product (object) defined previously as a demand (in engineering, these are called requirements). Some demand/requirements are intermediary, that is, in order to produce the final demand/requirement, the sector (itself) has a number of internal demands/requirements [for processes and objects] it must meet.

In terms of access, team access/demand is an intermediary production requirement, in order to meet final user, community and personal access, demands.

Input-output tables consider intermediary outputs and the production of a final output. This is useful to societal material planning because it allows the planning system and its users to observe how resources are distributed and used in the production process of a final user product/service. It allows for viewing and calculating flows of some quantifiable amount, which come into, and go out, of allocation [within service systems].

In this way, a producer can know varieties (categories) and quantities of products (goods), and make the necessary adjustments to improve the production system as a mutually interrelated whole.

In a market economic structure, there is the assumption of competition; whereas, in a habitat/

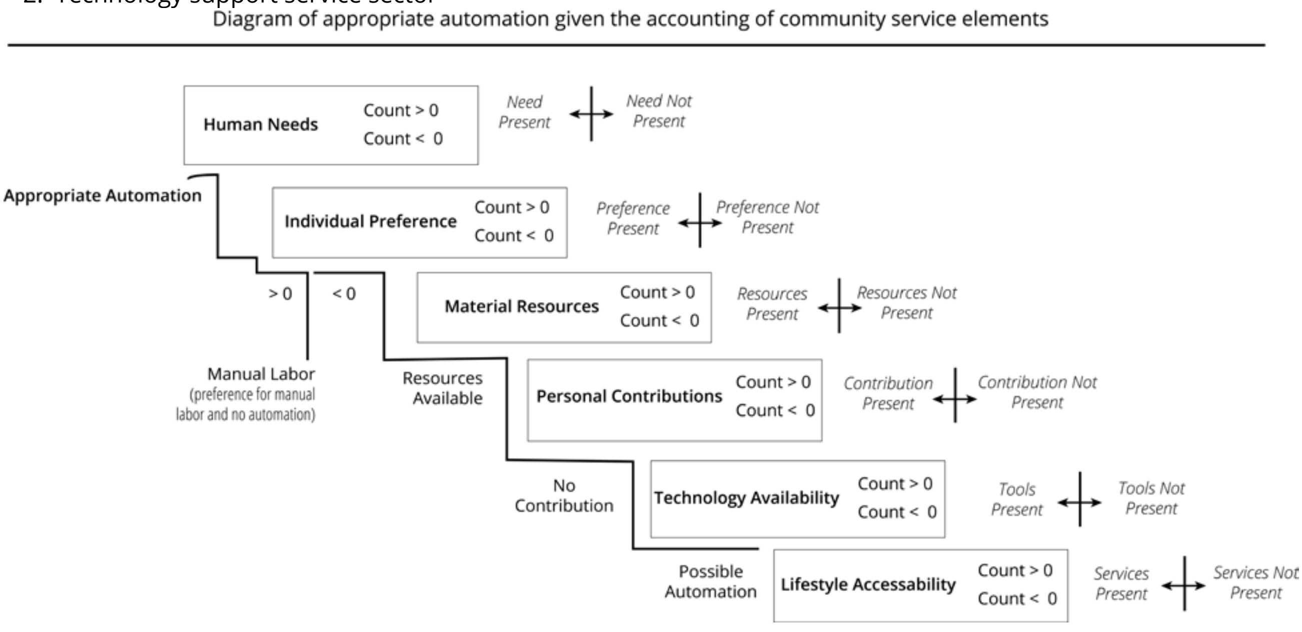


Figure 16. *Accountable habitat service elements for calculation of resource allocation and automation.*

community economic structure, there is the assumption of cooperation. Competition and cooperation represent two differently oriented social [system] value states. In a market-State, input and output may be expressed in monetary units. In a habitat, generally, input and output are expressed in natural (or natural derived) units.

If the production of a sector is consumed internally by the sector itself, it is called a closed model. Here, an economy (or society) is stable (Read: not going to fall apart) when the output is its input.

Each sector is, in part, a production (or, produced) system. With any production system, some of the production is used (consumed) by the production process (or, system) itself. This means that, in general, there is an interrelation within and between sectors (production systems). In other words, production systems have requirements for the production outputs of other productions systems, and maybe even from within their own production system itself. For example, the energy/power sector provides power to an agriculture/cultivation sector to operate its machinery, as well as providing power to some of its own systems. So, an output of power is an input of cultivation to produce an output of cultivation. Similarly, food may be a required input into the cultivation system to make more and/or new food. For instance, cultivated animals require food themselves, and a final item of food might require yeast, which is another food. Another complete example is the architecting sector, which provides buildings to the power sector, as well as providing buildings for producing other buildings and the clothing to be worn by humans (which may be worn within and without buildings). So, the architecting sector provides inputs into the power sector as well as proving inputs into its own sector in order to produce the end outputs needed/demanded by humans. Every sector requires some kind of input in order to produce its output. Through modeling it is possible to visualize and understand how these sectors relate to one another in a dynamic economy. Afterward, once what is is accounted for (e.g., in an input-output table), it is possible to run calculations (computational operations, math) on the data. In computation, logicals (logical data and operations) can be written in full (True or False), or abbreviated (T or F). The results of these calculation should be useful for decisioning in determining the next iteration of the economy.

All of this information about an economy can be conveniently visualized ("captured") inside of a matrix (Read: input-output matrix). In other words, it is possible to use a simple matrix equation (Read: input-output planning) to model, understand, and plan for an economy such as defined herein. Simply, a matrix can encapsulate all input and output information for a given economy and all of its different sectors (as long as units/objects and amounts/quantities can be accounted for). In real world economics, only that which can be measured (in either natural or natural derived units) in the real world can be accounted. For instance, volume, electricity, distance and weight can be accounted for in a real world economic system. In non-real world economics, abstractions also become accounted for; pure conceptions are reified. Money is an example of a non-real world economic unit [of account]. There is no such measurable object or process as money in the real world; there is only peoples' belief in money. Money, as an economic categorization, can even become a sector of an economic system itself (e.g., the financial sector).

Matrix equations can be applied to economics problems (Read: mathematical economics). Matrices applied to [object-ive] economics are quantitative matrices, primarily. Versus, qualitative matrices, such as, a probability-impact risk matrix. Leontief input-output analysis is a series of equations.

An input-output matrix consists of columns and rows. Generally, the columns correspond to the inputs of each sector, and the rows correspond to the outputs.

Another kind of matrix required for a complex economic model (really a sub-matrix of the sander input-output matrix) is a production matrix (a column matrix), which accounts for how much (how many units) each sector is producing. This matrix typically appears to the right of the standard input-output matrix. The two matrices can be multiplied together to create another column matrix to show the amount used (or, consumed). In some sense, it is the amount the economy uses (consumes), itself. There is a certain percentage of the economy that will be used/consumed by itself in order to supply final user demand. The products produced to be consumed for sustained and continued production are called intermediary products (or goods), and whatever is left over is the output to humans of the economy. Intermediary means the production of services to produce the final demanded service.

Hence, in this sense, an economic model is a model of production process interrelationships. Different types of society are likely to have different productions and different arrangements of interrelationships for those productions. The sectors chosen [to exist] as part of the economy form its economic input-output network. For humans, it is possible and desirable to select sectors based upon aggregated human need. Thus, each sector becomes an output to fulfill human need and a potential input to another sector to meet human need.

Note here that the production of outputs by sectors for themselves, and for other sectors prior to the production of the final human demanded output, are called intermediary outputs. Intermediary outputs are the outputs of a sector that are required for supporting its own sector, or any other sector, in the fulfillment of final human need. Here, it is reasonable to consider the danger a sector [of the economy] might pose if it is decoupled from human need or the real world.

2.1 What is required for a fundamental understanding of economic calculation?

A fundamental understanding of economic calculation requires, at least:

1. Understand systems thinking and methods.
2. Understand the basic elements and structure of input-output tables (IO tables).
3. Understand matrices (a.k.a., tables, spreadsheets, arrays), which are a presentation and calculation tool. A table (or, matrix) consists of the figures in a spreadsheet, arranged in a specified order, and from which charts (or, tables) undergo mathematical operations. Spreadsheets can show the relationships in an economy visually, interactively, and they can have the calculations done upon them.
4. Understand key aspects of linear algebra. Understand the use of linear algebra to create a system of linear equations from the IO table. Linear algebra codifies properties of matrices in the notion of linear maps. Matrix computation is the fundamental operation of economic calculation.
5. Understand how to setup a product system as a set of linear equations, and express these as linear algebra.
6. Understand balances in IO tables.
7. Understand how to calculate a coefficient matrix (a.k.a., Leontief inverse, technology matrix, resource flow matrix, energy matrix).
8. Understand how to conduct a variable analysis.

Within a community-type societal system, the above "economic" information is calculated in the context of a larger decision systems that resolves complex state solutions to re-configurations of the natural, real-world.

2.1.1 Habitat sectored service economics

A.k.a., The input-output approach for cities, habitat service system planning and operations with input-output modeling.

One important result of a study of interdependent economic systems is the ability to have a better understanding of the system components (e.g., economic sectors), and their interconnectedness with other societal system components. A measure of the interconnectedness of an economic sector(s) is essential to unified societal [economic] planning. Here, resources become interconnected into habitat service production platforms in order to output services and objects demanded for usage by humans for their fulfillment.

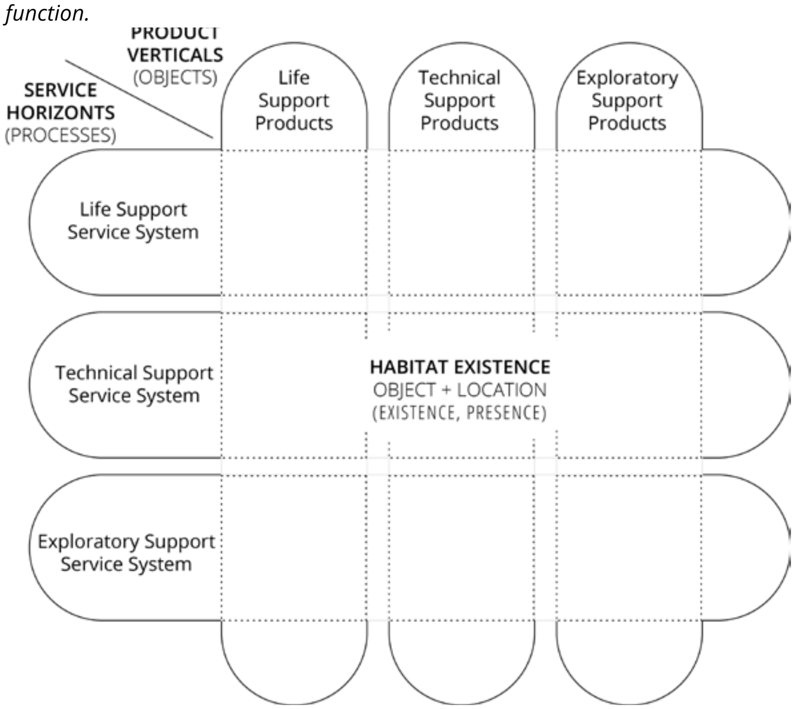
A habitat service economy may be formed through the accounting of *resources* and of *access* (as well as *systems* and *participation*):

1. The intermediary habitat service production platforms are composed of resources, and are accessed by InterSystem teams.
2. The final services and objects are composed of resources, and are accessed by community groups (common access) and individuals (personal access).

An economy acts as a service platform; it produces objects (and services). An economy makes things and provides services. In an economic system that is habitat based, a habitat service system provides services to humanity, some of which provide objects to humanity. Herein, the highest orders of service are often called "economic sectors". In a habitat service system, the highest-level economic sectors are: Life Support, Technology Support, and Exploratory support.

At an economic decision level of a habitat, the concept of a "sector" refers to a top-level habitat service support sub-system, a core habitat service platform for humanity. At the material level, where city systems exist (Read: the

Figure 17. *A matrix for economic calculation to be performed on actual (and, potential) material system. The habitat of objects and services is the user economy. Resources are occupied, flow, and cycle between a set of knowable habitat service systems that actually exist, and that may exist, given what is known, and hence, can be calculated for. Humans resources services, some services produces objects of use to humans. The service systems cycle objects in order to sustain their human requirements. Here, there is a matrix of potential function.*



materialized habitat service system) the term "sectors" is often used to refer to divisible portions of the whole city, and to differentiate various functional locations from the whole city platform.

If an economy is divided into sectors, it is possible to study the inter-sectoral resource flows and transactions between the sectors.

In order to create a output from one of the sectors, outputs from the other sectors may (or, may not) be required.

It is possible to plan the operation of a habitat, as it is equally possible to plan the operation of any industrial plant or sector using process evaluation, economic analysis, and linear programming to decidedly optimize material configurations. Fundamentally, the method of optimization applied by various industries, governments, and cities in the early 20th and early 21st century could be applied to the global economy as a whole (i.e., applied to the global habitat service system). Therein, the habitat service subsystems are the processing sectors of the economy. Physical input–output models can be used to aid in the synthesis (design) or operations of cities.

In a habitat service system, each habitat subsystem could be considered an input-output system. Accordingly, it is possible to analyze and plan the pattern of materials and energy flows amongst service systems, and between service systems and the final user. The proposed input-output model can be applied as an accounting and planning tool both to a single city (local habitat service system and to the global city network (global habitat service system). Input–output models can be used to represent supply chain networks in entire economic systems (i.e., in the global habitat service system also known as the cities network or community network of cities). At the city level, an input-output model is necessary to coordinate and control internal and external logistics flows. At both levels, input-output models are used to analyze and plan logistics flows and materialization processes.

A large majority of I–O matrices in the market are measured in terms of monetary units. However, in community, the data are provided in their "natural" (or physical) units.

Integrated city systems allows service systems co-located in the same city to benefit from localized energy, waste, and materials flows that can reduce resource usage and environmental damage. By adopting the input–output framework, the economy is translated into a physical flow of materials and energy for production, consumption, recycling, and waste disposal. The role of habitat symbiosis in integrated cities (and city networks) can be addressed through identifying the objectives (values) and demands of the users.

A habitat economic planning model deals with a supply chain composed of a network of materialization and informatics processes. This network can be fully described if all the interrelated processes as well as input and output flows are identified.

Requirements for a global habitat service system input-output model include, but are not limited to:

1. All habitat service systems are accounted for and modeled as process inputs.
   A. Transport is accounted for as any other habitat service system and is modeled as a primary input that includes distance covered.
   B. Human contribution amount is accounted for.
2. All processes are time referenced.
3. All resources are accounted for and modeled as primary inputs
4. All materialization processes are geo-referenced.
5. All materials are geo-referenced.
6. All land use is accounted and geo-referenced.
7. All land use change is accounted and geo-referenced.

A complete input-output system for a network of integrated city systems will required:

1. A human view of the inputs-outputs.
2. A service view of the inputs-outputs.
3. A resource view of the inputs-outputs.
4. A city view of the inputs-outputs. This view is for the cities network.

2.1.2 Real-world, socio-technical planning

Real world planning requires not one, but many separate natural units as part of its material balancing procedure. Material balances use natural unit, such as meter, meter squared, gram, etc., to plan products. Some forms of planning homogenize the diversity of natural units to a single unit, like money, labor time, or energy credits. The experience of the method of material balances verifies that there is no single natural unit of economic (a resource flow quantity) planning.

For any socio-technically planned economy, there are two primary types of economic requirements/effects that need to be balanced in units and amounts:

1. **1st order materially balanced effect of production** - more requirement of product x; hence, more product y (e.g., steal) is needed to produce product x, because product x output has changed to require more product y (steal) in its design, or there is more demand for product x, and hence, more requirement for product y (steel). Here, capacity refers to product demand being be balanced with (i.e., account for some amount of) the supply or availability of product y (steal).
   A. What demand does the solution meet?
   B. What is the resource composition of the final solution?
2. **2nd order materially balanced effect of production (effects on intermediary goods)** - more coal,

electricity, etc., is needed to produce the additional steal. Here, all inputs that go into the steal supply must be balanced with (i.e., account for some amount of) the demand for steal.

A. What does the solution depend upon?
B. What are the dependencies' resource composition?

A method or methods may be applied to solve for problems given these two requirements/effects.

Natural units must be accounted for in a real-world, human oriented economic decision system. Once natural units are present in the information set, then the input-output method may be applied to a signaled demand and all possible potential output options may be calculated.

2.1.3 Complexity

Algorithms can be measured in terms of their complexity. The complexity of an algorithm is measured in how the number of instructions used to compute it grows as the size of the problem grows (i.e., as the size of the input data grows). In other words, how long will the problem take to compute as a function of the growth in the size of the input data to the problem.

Complexity defines how long it takes the algorithm complete its task a function of the problem size. There are various complexity classes that grow increasingly harder. Classes include, but are not limited to (O = order):

1. Constant time algorithm - gives the same answer irrespective of the amount of data it is working on.
2. Linear algorithm (linear O N) - will take an amount of time proportional to the amount of data.
3. Log linear class (log linear On log N) - an algorithm takes an amount of time that is proportional to bot the number of data items there is and the logarithm of the number of items (e.g., best methods of sorting).
4. Polynomial algorithms (Polynomial ON2, ON3, etc.) - the time taken is a fixed power of the amount of data (e.g., it might grow as the square or the cube of the number of items).
5. Exponential algorithms (exponential OeN) - the running time grows as eN. Generally, because of their exponential runtime, exponential algorithms are unusable for anything but the smallest economic data sizes.

Indexing and sorting are log n types of problems. The complexity of looking up an item from a number is of order n, or On, with n number of items in it. Problems with log n steps are highly efficient problems for computers to calculate. This is significant, because just the sorting of already available data can turn an intractable (impossible) problem and tune it in to a tractable (possible) problem.

Economic planning requires more than the sorting of lists; it requires matrices of input-output tables. Input output tables can be measured (and computed) in natural units (or, in abstraction units, such as, money, urgency, or priority). Given an [economic] input-output table, it is possible to compute how much of each intermediary product is required to produce a given amount of each of the final [economic sector demand] products to be use (Read: the final output) . Further, it is possible to compute the required contribution ("labor") content of each final output. It is also possible to compute the priority and urgency of content of each final output. And therein, with coordinated scheduling and open source contribution, it is possible to share mutual access to common heritage resources.

2.1.4 A dynamic coordination system

These dynamic coordination systems have to optimize what is occurring right now, but also navigate the possible current alternatives occurrences and future probable predictable trajectories. The simulation and future planning of a societal economic system must compute and coordinate between multiple contingent options, dynamically, with the purpose of identifying which option is closer to reality, and then that direction/vision may be steered toward. By doing the calculation it is possible to identify options that may not have been obvious or possible in the first place. It is possible to not only consider production in terms of virtual scenarios, but it is possible to visualize society in terms of simulation and standardization. Being able to understand occurrences in a virtual space and then being able to commit to something actual provides additional room for safe maneuvering as a society. A society that optimizes for human flourishing may not know that there are even more optimal ways of flourishing until the calculations and integrations are complete; an adaptive society necessarily has a discovery (exploratory) process going on. Maybe even the things known as flourishing are not fully knowable ahead of time; that is, there is a continuous discovery process (inquiry process) that the society is going through, itself. A society must have some sort of way of generating new possibilities, continuously. In a community-type society, the exploration habitat service system houses several of subsystems primarily dedicated to discovery and possibility generation. A community-based decision system is designed to integrate both the present and the possible futures into one another to navigate a dynamic, real world environment where individuals with an intention of mutual fulfillment interconnect, optimally. It is a serious and complex endeavour to create an open society that can navigate its own possibility space. There is no exchange (trade) between economic agents in a community-type society, like among cooperative species in nature.

In a community-type society, all inputs and outputs for all production processes are known (i.e., are directly knowable). In a market-type economy, globally, inputs and outputs have to be inferred, because competition leads to concealment and a lack of attention to contribution, and thus, lack of data for those who are cooperating. Whereas economic calculation may only be an inferred result, economic under conditions of directly known data makes calculation a precise and possible tool for planning an economy.

3 Optimal allocation planning calculation

In economics, an input–output model (I-O or IO model) is a quantitative economic model that represents the interdependencies between different [macro] economic entities and their activities. The input–output (I–O) model views the economic system as a set of interconnected subsystems, which produce outputs (goods) and use resources in the process of production. Input-output models describe and analyse the logistics flows (a.k.a., streams) of spatial and environmental effects associated with production and other economic processes, including demand. Therein, the output from one economic entity becomes the input of another. In fact, economic and operational analysis, planning, and performance can be evaluated through IO tables. IO models are an essential material accounting approach and tool. Input-output analysis is a form of analysis based on the interdependencies between economic entities. Further, input–output (IO) models can be used to study the environmental, social and economics impacts of human activities in an interconnected world. (Rodrigues, 2016) Organizational structures can be represented as a system with interdependent components where the outputs of some components become inputs of another. The input-output model is a essential tool in economic decisioning.

The input-output method is defined in terms of flows [of materials and information]. Essentially, within an input-output table everything is a flow per time (e.g., year) of resource composition (e.g., product Y) into the production process of service (e.g., sector X). Such expressions are sometimes known as flow formalism. Cybernetics introduces the idea of using machines to run the calculations, and machine learning and neural networks are being proposed in the early 21st century as computational frameworks. Under cybernetic planning there are continuous fast calculations and iterations, where different levels of immediate planning and future predictions occur to control operations. Further, demand, usage, and contribution are the three axiomatic points of interaction that an economic (material) system has with its individual community of users.

Cybernetics is commonly considered a science concerned with the study of systems of any nature that are capable of receiving, storing and processing information so as to use it for control. (Kondratov, 1969) In other words, it is the science of effective organization. To be effective there must be information about and control over systems. (Beer, 1979) Hence, cybernetics appears to provide a sound framework for organizing information and control in the economic problem domain.

In some sense, cybernetics is the application of systems science using complex machines. Therein, there are at least two ways to view "variety [of access]". First, "variety [of access]" in the market, where goods and services are traded in competition and scarcity. And secondly, "variety [of access]" in the sense of how systems scientists (e.g., Stafford Beer, Norbert Weiner, etc.) in cybernetics define the term "variety [of access]". In the market, variety refers to choice, such as the variety of coffee that someone can buy, or the variety of services that can be found; in this case, it is a euphemism for competition. Cybernetic's has a different definition of variety [of access]. In cybernetics, variety refers to the number of possible states of the [material and/or informational] system. Variety is a loosely defined as the number of different states ("status") a system can be in. In a cybernetic sense, different system states produce different types (quantities and qualities) of access (to habitat services). For example, a standard traffic light (or stop light) has three normal states: red; yellow; and green states. It has four states if there is an additional state where there is no colors displayed (state = off"). This is the systems 'variety'. If a driver approaches an intersection with a traffic light and wants to proceed through the intersection safely, then the driver must distinguish (or otherwise, understand) each of the different states of the traffic light system; otherwise the driver will not have control of [a decision space in] the situation, and the likelihood of an accident increases. The number of different states (or 'behaviors') of a complex dynamic system can be extremely large (e.g., the global climate). Community has variety, both in the sense of states of the social and technical systems, as well as a preference [inquiry] in the decision system for particular states of the material environment. Cybernetics offers a systems-based conceptual frameworks for understanding and improving design processes, and thus, their outcomes.

Based on the principles of communication and control, cybernetics can inform design [decisions] on at least three levels:

1. Modeling interaction: human-human; human-machine; or machine-machine.
2. Modeling the larger service systems in which much interaction takes place.
3. Modeling the design process itself.

In a cybernetic economic network, data would be automatically collected, reviewed, evaluated and used to calculate dynamic action plans meant to solve human economic problems and change the societal system's environment. These action plans may be calculated through computing systems and visualized for human understanding into intelligible graphs, figures and other forms.

Herein, cybernetic decisioning implies the use of environmental feedback loops to adapt new actions to the input, integration, and valuing/re-orientation of the results of prior actions.

When the individuals among a societal population (i.e., persons within the collective) can relate performed actions to their consequences on the overall system condition, then they are able to 'learn', by means of action-impact-integration triad chains. During subsequent decisioning processes individuals may adapt by using this earlier integration of information to re-evaluate actions' utilities (priorities and processes/activities) differently than before. Herein, certain activities can increase current and future fulfillment, and certain actions can hinder current and future fulfillment, of some user's set requirement of the cybernetic system. Given the information available, individuals can come together to form a model and algorithm that identifies mutual and optimal paths for fulfillment, computationally.

Fundamentally, input-output (IO) models are tools for economic and operational accounting and planning. (Polenske, 2001). Input-output tables can be used to analyze and plan the structure and flow of an economy. Historically, the input-output modeling approach has been applied to analyze the economic structures of nations and region, in terms of flows between sectors and commercial entities by representing the economy as a system of matrices and linear equations. (Leontief, 1941) Such modeling allows for analyzing and planning the interdependences among all interdependent economic entities. By analysing the interdependencies among entities, it is further possible to evaluate the effect of technological and economic change on an economy, and in the case of community, a habitat.

The widespread use of this method can also be seen by the scale of the scientific literature on the topic. For example, searching for "input–output analysis" in Google Scholar in early 2020 yields over 101,000 documents (this result includes scientific articles, conference papers, books, chapters, and online gray literature). There have also been several individuals awarded nobel prizes for their work in this discipline, including Wassily W. Leontief, Leonid V. Kantorovich, Tjalling Charles Koopmans, and John Richard Nicholas Stone.

Logistics flows can be analyzed from at least the following two perspectives. Firstly, logistics flows can be analyzed from a spatial perspective where entities and processes are described referring to their location. Secondly, logistics flows can be analyzed from an operational perspective that describes all the processes (as a set) in a given geographic area. (Albino et al., 2007:35)

Industry uses the term "supply chain" to refer to a network of production processes, which transform inputs into outputs, and are located in a given area. A "supply chain" may be considered an input-output system wherein a set of tightly interconnected production processes convert materials into final products, which are then delivered to users who demanded them. In other words, a "supply chain" is a network of production processes, including transportation and energy, which transform inputs into outputs, and are located in a given area. (Albino et al., 2002) Note that in the market-State, the term, "supply chain", is an industrial manufacturing term that can have vertical and/or horizontal integration. However, in a community-type society, the supply chain is considered to be fully integrated and there is no competition or sales price between entities involved in the supply chain (as there is in commercial industry).

Input-output activities are essential in order to represent the relationships between production processes and to investigate the effects of possible development scenarios on the economic and environmental performance of the supply chains.

It is relevant to note here that in the market-State there are at least three supply chains for end products:

1. One supply chain that feeds commercial entities: the commercial market, including workplaces, stores, and direct to sale manufacturers and manufacturing for other commercial entities.
2. One supply chain that feeds residential individuals and families: Household supply chain that feeds individuals and families; including retail outlets, stores, restaurants, etc.
3. One supply chain that feeds each government.

Note that there is significantly complexity under market-State conditions in calculating, planning, and otherwise agreeing on inputs, processes, and outputs for society. Here, in general, each individual entity in the supply chain does its own calculation and planning for that which is relevant to its own existence and profit. In a unified societal system, planning is more feasible and significantly likely.

At a basic level, the conceptual framework of an input-output system requires at least four types of data input:

1. Processes: The services, which are processes that transform inputs into demanded outputs (a.k.a., sectors).
2. Inputs: The resource inputs required of each service to be transformed into demanded outputs (a.k.a., resource inputs).
3. Demanded outputs: The known demands of each service (a.k.a., final outputs).
4. By-product outputs: The known non-demands of each service that are a by-product of their processing resources into final outputs (a.k.a., wastes/emissions).

Take note that the usage of natural resources and the generation of wastes and emissions are negative externalities that are not included in the conventional accounting process for economic systems. In the market-State, these flows/streams emanate directly from, or terminate directly to, the natural environment rather than economic sectors within the system. Accounting for such flows plays an critical role in measuring the sustainability of a production process and identifying opportunities for improvement. (Tan et al., 2018:2) In community, these streams/flows are included and are not considered external to the model.

Input-outputs can be geographically referenced with GIS technology and temporally referenced with a schedule. The IO approach can be integrated with GIS technology that spatially references all the inputs and outputs accounted in the model. Spatial complexity, can be modelled through the integration of an I-O approach with a Geographic Information System (GIS), which enables the geographical reference of input-output data, then allowing the organization and processing of information both geographically and logically. (Malczewski, 2004) Inputs and outputs must be spatially (Read: geographically) referenced.

Albino et al., (2007) provide an input-output model of a local supply chain supported by GIS technology. Therein, transportation is modeled as a primary input for logistical services required by each production process to convey its output to its final destination. Therein, the transportation system includes all the tracks covered by transportation means to deliver products.

Scalability and general systems applicability are two useful features of input–output analysis. While the original idea of input–output analysis was for analyzing and planning economic systems, it has been extended to other applications, such as ecosystem food chain analysis, human organizational system analysis, and industrial plant analysis and planning. As a fundamental means of understanding systems dynamics, input–output analysis has proven its versatility not only through its application to the field of economics, but also through its application to various fields of sciences. (Tan, 2018:7)

3.1 Product coding

A.k.a., Product coding for enterprise resource planing, product codes, GTIN, UPC, EAN, ISBN, SKU.

Product coding is necessary for coherent economic calculation (and economic understanding in general). Product coding is necessary for categorical understanding of products, as well as, the coordination of production, usage, and materials cycling. When coding for products, there is hierarchical taxonomy that can be populated into a database.

Appropriate and accurate categorization is essential for planning a habitat service system, because it enables the mapping (categorized allocation) of products to the three habitat service support systems (life, technology, and exploratory), which therein, allows for appropriate prioritization of products and activities. Accurate categorization also ensures accurate tracking of resources, products, and their usages. Herein, imprecise categorization leads to imprecise models, and then, higher uncertainty that production will meet fulfillment requirements. Being able to categorize objects as similar or different, as well as identify differences, is an essential tool for the planning of an economic system. Herein, product coding is the process of assigning codes to products at different scales. In society, because technology and social development are dynamic, classification accuracy must be continuously assessed, and updated where necessary.

Product codes provide necessary information about products at four principal levels:

1. Categorization of a product type out of all possible product categorization types (e.g., global identification number).
2. Categorization of production run of product (product sub-type; e.g., model number).
3. Identification of each uniquely produced unit [of a product] (e.g., serial number).
4. Identification of location of a unit (e.g., coordinates, location name, etc.).
5. Identification of quantity of units at a location (e.g., count).
6. As well as other product metadata associations (e.g., usage, phase of lifecycle, composition of raw materials, composition of intermediary materials).

In community, the following basic product codes are used for the production and coordination of products:

1. **Global identification number** - an identifier that identifies a specific product or product category.
2. **Model number** - an identifier that identifies the sub-type of a specific product or product category.
3. **Serial number** - an identifier that identifies a unique, individual unit of a product.
4. **Stock keeping units (SKUs)** - an identifier that identifies a specific type or sub-type of product, as well as the quantity of the product, in a specific physical location.

Common coding identifiers for products in the market include the following:

> **NOTE:** *National statistics offices of many States collect, compile, and release "official" statistics. National economic statistics offices, often use unique codes that have been assigned to products and services.*

1. **Global Trade Identifier Number (GTIN)** - is a universal identifier for every possible product, it also generally identifies the manufacturer of the product. A GTIN is typically a 12-14 digit identifier (e.g., generally in the form of a barcode) visible on a product. In other words, it is an identifier that identifies a specific product and the manufacturer of that product. The number (or code) is unique to a product-type and it is universal to its categorization. Simply, a code carries identification information about a product. Internationally, a GTIN is called a different name (for example, UPC code in the US, EAN code in Europe). In the market-State, the code standard to be used depends on where the business is located. Note the usage of the word "trade" in the title of this product coding category.
   A. **Universal Product Codes (UPC) and European Article Number (EAN)** - are product tracking-manufacturing codes that are standardized for use (even in the market, and hence, universal to all market-State operating organizations). In the market, the UPS/EAN is a true universal product identifier. The UPC/EAN code is affixed to a product wherever it is acquired by a user (sold), remaining a constant throughout the product's shelf life. Note here that the EAN (European article number) serves the same purpose as the UPC and has thirteen digits. UPCs are 12 digits, numeric only. There is also Japanese Article Number for all products sold in Japan.
      1. In the market, UPCs must be purchased from business. These "authorities" ensure that two sets of numbers are not issued to more than one company for a product. Many UPC providers sell them online.
      2. The "authority" for creating and maintaining UPC standards for the market is GS1 [gs1.org] (formerly the Uniform Product Code Council).
   B. **International Standard Book Number (ISBN)** is a universal tracking-manufacturing code for all text-based materials (e.g., books, magazines, ebooks, and other published objects). The code carries information about the book registrant, title, edition, format, etc. In general, every book version and edition gets its unique ISBN. There are ISBNs with 10 and 13 digits. Those numbers that were registered before the end of December 2006 have 10 digits, while those that are released since 1 January 2007 till now contain 13 digits in length.
2. **Stock keeping units (SKUs)** - are used to account for the amount of a product (specific type of object) in inventory and units of the product that have been acquired by users (e.g, sold). SKUs are alphanumeric code. SKU numbers can be assigned to physical products, as well as intangible products, such as services (i.e., market billable activities), units of repair time, or market warranties. Simplistically, they are product (service) inventory codes. SKUs are used in warehouses and fulfillment centers. In the market, SKUs are unique to different companies. In community, SKUs are universal like the universal product code UPC, but each is tagged with a particular geographic position). Since an

SKU is unique to the company, the same product would have different SKUs if sold by different companies, but they would have the same UPC. SKUs are generally on the packaging a product comes in, rather than on the product themselves. SKUs are essential doing calculations on inventory, because it supplies inventory data. For example, a simple example SKU for an 18 quantity stock of red sandals might be: Sand-Red-18. Additionally, it is possible to assign different SKUs to the same product in order to track product batches by quality level, expiry dates (food industry), location (when managing multiple sites), or merchant information (if doing fulfillment as a service). Note that in the market, the term SKU is often used inconsistently, sometimes to mean UPC, the manufacturer part number, as well as the company's part number); these are all improper usages of the conception of an SKU.

A. **Amazon Standard Identification Numbers (ASINs)** - are assigned by Amazon Corporation to products it sells and used to manage and organize all products throughout Amazon. ASINs are 10-digit alphanumeric Amazon-specific SKU codes. On Amazon corporation's website, it is possible to find the ASIN of a product in the product's URL. ASINs are distinct from manufacturer model numbers and from SKU numbers used by other sellers in Amazon's supply chain.
B. **Fulfillment Network Stock Keeping Unit (FNSKU)** - is an Amazon Corporation generated identifier to identify the product that has been sent by the seller to their fulfillment centers. In other words, every unique item that is eligible for fulfillment by amazon (FBA) AND enters an Amazon warehouses should be assigned an FNSKU.

3. **Model numbers (a.k.a., manufacturer model numbers, and sometimes, product numbers, product codes)** - a model number is a code used to identify a group of items made in a production run, such as a particular type of blender, vacuum cleaner, a silicon processor, etc. Simply, serial numbers are issued to individual units within a production run. These may be numeric or alphanumeric. A model number identifies the product sub-type. Note that it is possible to use model numbers as part of the SKUs, but one additional option would be to set them up as [metadata] attributes so that users can use filters. Knowing a model number is essential when garnering services for a product's repair since replacement parts often correspond with a model number.
4. **Serial numbers (SNs)** - is a manufacturers assignment of a unique number to every single individual production of a product type. The serial number will only be for one single object. Serial numbers are unique to each unit. It is a sequential number that is assigned to a single item of a product. In the market, serial numbers are used to track ownership and warranty information of that item. In community, serial numbers are used to track the location, usage, and time elements of a product. Serial numbers are generally numeric only, but may be alphanumeric.

3.2 *The economic calculation technique*

Economic calculation is a simple three step technique:

1. Know about the input-output model and know about input-output mathematics.
2. Construct the input-output chart/matrix/table.
3. Populate the table with accurate data.
4. Use matrix calculation equations to derive [more] useful data.

Demand is a multi-layered conception:

1. Demand is what the user needs. What does the user need (what are the user's requirements)?
2. Demand is what capacity is present. What resources are available, or could be made available to complete the demand?
3. Demand is what production is present. What production (and how much) must occur to meet the given demand?
    - How should that production be configured to meet the demand?

3.2.1 The input-output model

A.k.a., The input-output method, the Leontif method, the input-output table method, the input-output graph method.

The source of modern mechanisms for planning (in this context) is what is termed the input-output model, which is detailed by Leontief (1986). The Leontief model is a model for the economics of a whole country or region. In the model there are *n* industries (economic sectors) producing *n* different products (service-objects) such that the input equals the output or, in other words, consumption equals production.

Input-output modeling is an economic calculation technique. In its simplest form, input-output modeling can be graphed on a table to show the relationship between a set of needs (axiomatic inputs) for a set of things to be produced (axiomatic outputs). The type of input-output table shown below is often called a technology matrix, and labeled something like, "Technology Matrix M":

Service-Object		A	B	C	...
Need	A	M_{11}	M_{12}	M_{13}	...
	B	M_{21}	M_{22}	M_{23}	...
	C	M_{31}	M_{32}	M_{33}	...
	...	...	...	...	$M_{...}$

Wherein,

Humans	Humans have *needs (input)* for *service-objects (output)*.
Items A, B, ... are interrelated	In a habitat service system these may be called economic sectors. These are the service sectors that transform resources into needed service-objects.
A	A need-product, for example, electricity.
B	A need-product, for example, water.
C	A need-product, for example, plant cultivation.
$M_{...}$	Coefficient of relationship between input and output.
Needs	Require identification of (i.e., of the need) and resources. Humans have "needs" as an input category.
Service-objects	Require design and resource compositions. Humans have "service-objects" as an output category.

Herein, Leontief distinguishes two models, which are really one model (the open model) with the closed model being a sub-element thereof:

1. **Open model** (a.k.a., open Leontief model, open input-output model)**:** some production consumed internally by industries, rest consumed by external bodies.
   - Problem: Find *production level* if external demand is given.
2. **Closed model** (a.k.a., closed Leontief model, closed input-output model)**:** entire production consumed by sectors (industries).
   - Problem: Find *value* (e.g., price, prioritization, urgency, sustainability, etc.) of each product.

It is important here to distinguish between (at least) lists and tables, though both, are in fact, matrices. A table is just a n•m or n•n, whereas a column matrix is a n•1 matrix.

This is a **list** (n•1 - row or column; this example has rows, each with a unique label):

#	Label 1
#	Label 2
#	Label 3

This is a **table** (n•m or n•n; rows and columns with unique labels; A1, B2, A2, ...):

	B1	B2	B3	...
A1	#	#	#	...
A2	#	#	#	...
A3	#	#	#	...
...	...	...	...	...

- Wherein,
  - B1 = #1 input; A1 = #1 output
  - B2 = #2 input; A2 = #2 output
  - B3 = #3 input; A3 = #3 output

And, **table array (**or just, **array)** is the combination of two or more tables, which has data and values linked and related to one another. An array is a "matrix-like" structure with more than two dimensions.

The input-output model is a technique to study the production structure of an economy considering the mutual interdependence of various sectors using graphic operations and logical algebraic techniques. Thus, the input-output model is:

1. A visual and mathematical tool.
2. A planning and forecasting tool for production (material cycling), given inputs and outputs.
3. A method of analyzing how one economic sector output is used as an input to another economic sector. Here, input implies object (or material) which is demanded (required) by an economic [production] sector for the purpose of production. Here, outputs are products and services to users, some of whom are also producers, as in, contributors). Note that in a market economic type system, there is one additional layer where the products and services do not go directly to the users, but are sold in a market, and then, used by users.

Input-output tables have several functions, including but not limited to:

1. A quantity accounting tool (quantities and their [al] location.
2. A statistical possibility calculation tool (an analysis tool).
3. A scheduling tool (a time planning tool).
4. A visual understanding tool.
5. An input-output analysis model supposes that an economy consists of sectors (e.g., habitat service systems, industries, etc.), and some of the output of each sector is distributed among the various sectors. Input-output tables shows the technical interdependence between service systems in a

given environment.

An input-output model (a.k.a., Leontief model) is an economic (resource-requirement-production-demand) model that relates:

1. The production of services and objects using resources.
2. To how they (services and objects) are produced.
3. To user demand/requirement.

Leontief's input-output analysis (Read: the economic input-output calculation method) describes and explains the level of output of each sector of a given economy in terms of its relationships to the corresponding levels of activities in all the other sectors.

Leontief uses a simple two way model that assumes agriculture and manufacturing as two sectors that are interdependent on each other for inputs, as well as a final demand and labour (service) costs. Leontief then expresses this model using value terms (by multiplying prices of factors and services). Subsequently, he then adds an extra row and column for pollution abatement costs. The final demand of the "pollution" is not, according to Leontief, a demand in itself, but a "tolerance limit" to what level of pollution can be borne by the final consumer.

Input-output models use quantitative matrices are concerned with technological problems (technical decisioning), whereas qualitative matrices are concerned more with social decisioning. A quantitative matrix is part of an empirical investigation [into how to best arrange and optimize an economy]. Both quantitative and qualitative methods can be combined together within a unified decision system. Wherein, demand analysis is usually done with qualitative matrices, and input-output matrices plan how to best produce for a given (set) demand of something.

3.2.2 Input-output tables

A.k.a., Input-output matrix, transaction tables.

Input-output tables allow for the building of statistical models for planning an economy. In terms of building a statistical model of a planned economy, it is possible to start from the structure of an input-output model.

The goal of an input-output matrix may be to plan for demand at the end of a time period. The problem of planning has been formally defined in Lahiri (1976). Per unit of time *t*, a set of demands *d* for certain goods (e.g., products, services) are to be satisfied for individual *i*. The planner's goal is to satisfy the demands of each individual. In machine learning terminology, the planning expression akin to a Markov Decision Process (MDP), with an agent (the planner) receiving information (the state) on the plan and a set of rewards related as to how closely the demand is met.

An I-O table shows the interrelationship between the total products and total inputs among different economic sectors.

A single input-output table records the amount of some unit of balanced account that moves through different habitat service systems (economic sectors), and forms of access, in an economy (where resources are transformed by into useful environments and objects, and then once again become resources). Effectively, this technique can be used to do a life-cycle assessment on all the services and objects produced, or probable to be produced, by an economy.

Individual columns in the IO matrix (Read: input-output planning matrix tool) represent how much of some thing (Read: material or product) it takes to produce a single unit of output. The columns in the coefficient matrix conceptually ask the question, How many units of each input (good) are required to produce a single output (good) of the type portrayed in this column? The dot product (a.k.a., scalar product; linear algebraic operation of the sum of the products of corresponding entries) of each row, along with the technical coefficients, represents usage ("consumption") of a specific good/ product.

3.2.3 Input-output planning

A.k.a., Input-output table analysis and planning, the input-output planning method, the input-output table method, economic production plan.

When planning using input-output tables, the planners first identify the final demand, and then determine the target of total input required to meet that demand (i.e., the order is reversed to material balance planning). Here, the production is determined by what the user needs (i.e., by the output target), instead of need being residual to what is produced (as in material balance planning). Of significant note, second order instances of changes in production to intermediary products require the input-output method.

A unified societal planning system has the information available (or, procedures to discover the information) to determine the total economic activity of material products and services and optimize user fulfillment.

Input-output tables can be composed in terms of physical natural units, as well as monetary, merit, priority, or labor-time, etc. The selected units concern the particulars of the situation being planned for.

In input-output planning, the plan itself is composed of tables, and an algorithm is selected and run that solves for the optimal flow (out of all potential flows) of resources (materials, etc.) to meet user demand, given that which is available. A unified society is likely to have a unified plan.

In a community-type society, demand is set by the users. In the market-State, demand is set the policymakers, capitalists, administrators, and bureaucrats. In a habitat service system, versus a market-economic system, there is more cooperation between that which is known as demand (i.e., needs, and preferences for service) and supply (i.e., contribution to that which is available under habitat service priority decisioning conditions). Under community-type societal conditions, humans supply demands as: 1) articulated in the form of issues, collected by surveys and issue interfaces, and 2) in the form of contribution to the development and operation of the habitat service system as a part of the InterSystem Team; essentially, forming a reciprocal open source society (versus, a market-State society, for example). It is under the conditions of community that price becomes unnecessary. It is under the conditions of community that authority becomes unnecessary.

Once a priority matrix for habitat operations is published by a decision system, then the computational economic model can simply read the priority values from that matrix. And, combine those priority values with natural[ly observable] units (or their derivatives). An alternative to a human habitat priority matrix and the usage of natural units is, to use "price".

3.2.4 Input-output analysis (mathematical economics)

A.k.a., Input-output calculation economics, resource economics, energy economics, resource allocation mathematics etc.

There are two basic "Leontief" input-output models for conducting economic mathematical analysis. In the closed model, all production by sectors is consumed by those sectors. In the open model, there is some form of outside demand for which the production system must account.

1. In **the closed model** there is no external demand, but there is a production vector and a sector matrix:
   A. An sector resource **nxn (n•n) Matrix* Z** (elementary row operation matrix) of technical coefficients. These technical coefficeints are useful for planning.
   B. A production **vector P** of production level (i.e., how much to produce for each product).

   **An nxn (n•n) matrix/table refers to a square matrix/table. The first useful form of habitat sectorization is life. Life is, of course, also composed of technology, which is sectored*

   The closed model can be described by the matrix equation:

   p = Zp

2. The **open "Leontief" input-output analysis method** is a homogenous system of equations that form a model, which comprises of:
   A. A demand **vector D** (or d).
   B. An sector resource **nxn (n•n) Matrix Z** (elementary row operation matrix) of technical coefficients. These technical coefficeints are useful for planning.
   C. A production **vector P** (or p) of production level (i.e., how much to produce for each product).

   The open model can be described by the matrix equation:

   p = Zp + d

3.2.5 Closed input-output analysis model

Consider an economy made up of *n* (some number of) economic production sectors (S) labeled:

$S_1 , S_2 , \dots , S_n$

In a certain time period, each sector produces an output of some product (service-object) which is completely utilized by itself or other sectors in a predetermined manner which remains constant during that time period. When simplifying, it is supposed that units are chosen so that each sector produces exactly one unit of its product in the given time period.

Let z_{ij} be the fraction of the total output of sector S_j used by sector S_i. Then each z_{ij} is a non-negative number:

$z_{ij} + z_{2j} + \dots + z_{nj} = 1$

The *exchange* or *input-output matrix* is an n•n matrix:

$$Z = \begin{bmatrix} z_{11} & z_{12} & \cdots & z_{1n} \\ z_{21} & z_{22} & \cdots & z_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ z_{n1} & z_{n2} & \cdots & z_{nn} \end{bmatrix}$$

$Z = [z_{ij}]$

For each sector S_j, let $p_j \geq 0$ denote the quantity of one unit of it output (i.e., the production vector is P):

$$P = \begin{pmatrix} p_1 \\ \vdots \\ p_n \end{pmatrix}$$

Sector S_i has an input of P_i and an output of:

$\sum^{n}_{j=1} z_{ij}p_j$

$$\sum_{j=1}^{n} z_{ij}p_j$$

For an economy to be workable, its sectors should not output more than is input:

$\sum^{n}_{j-1} z_{ij}p_j \leq p_i$

n			
∑	$z_{ij}p_j$	≤	p_i
j=1			

Suppose that P is a production vector that results in an equilibrium:

$p = \sum_i p_i \geq \sum_i \sum_j z_{ij}p_j = \sum_j \sum_i z_{ij}p_j = \sum_j p_j \sum_i z_{ij} = \sum_j p_j \cdot 1$

If,

$\sum_i p_i = \sum_i \sum_j z_{ij}p_j$

Then,

$p_i = \sum_j z_{ij}p_j$

Thus, production P is an equilibrium vector if and only if ZP = P.

Note on matrix denotation: The notation form of these equations is seen written in the literature in three ways:

1. **All Caps**

   P = ZP + D P = ZP

   - A capital variable is a complete matrix (not a list matrix).
   - A lower case variable is a vector.

2. **Caps and Lower case**

   p = Zp + d p = Zp

3. **Caps and lower cases with lines indicating vectors**

   $\overline{p} = Z\overline{p} + \bar{d}$ $\overline{p} = Z\overline{p}$

   - A capital variable is a complete matrix (not a list matrix).
   - A lower case variable with a straight line over is a vector. A vector is usually denoted by a lower case letter with a bar over it.
     - If the production variable was X, then the production vector variable would be $\bar{x}$, and if it were demand D, then it would be $\bar{d}$: $\overline{p} = Z\overline{p} + \bar{d}$
     - In some cases, matrices are designated as a capital case variable with a line over it $\bar{Z}$: $\overline{p} = \bar{Z}\overline{p} + \bar{d}$

Notes on matrices operations:

1. Placing a -1 exponent after the symbol for a vector or matrix represents the inverse.
2. Placing a letter "t" exponent or apostrophe (') after the symbol fro a vector or matrix represents the transpose (exchanging rows and columns).
3. A unique matrix, a square matrix with ones on the diagonal and zeros elsewhere, is known as the identity matrix and is a multidimensional "1".
4. An upside-down A (∀) means that the preceding statement applies "for all".
5. A comma (,) may be used delimit indices in the element of a matrix, as in $z_{i,j}$.
6. { } means "is in the set". The symbol ∈ indicates set membership and means "is an element of" so that the statement x∈A means that x is an element of the set A.

3.2.6 Open input-output analysis model

Consider an economy made up of *n* (some number of) economic production sectors (S; S_1 , S_2 , ... , S_n) and some external source of demand for some of the output of each sector. Interpret z_{ij} as the unit value of the output of sector S_i needed to produce one unit's value of output of sector S_j. Then each z_{ij} is non-negative:

$\sum_i z_{ij} \leq 1$

∑	z_{ij}	≤	1
i			

Let p_j be the number of units to be produced by sector S_j.

The production vector is $\overline{p}$ (P or p):

$$\overline{p} = \begin{pmatrix} p_1 \\ \vdots \\ p_n \end{pmatrix}$$

Then, the vector P - ZP = (I - Z)P has components which give the excess production of each sector. And, the user (or, external demand)for output of sector i has a unit value of d_i.

The demand vector is $\bar{d}$ (d or D):

$$\bar{d} = \begin{pmatrix} d_1 \\ \vdots \\ d_n \end{pmatrix}$$

One of the most useful aspects of model is the ability to identify what production is required given some demand. Given a demand vector D, is there a production vector P that meets that demand; that is, (I - A)P = D

3.2.7 The input-output analysis model in greater detail

The relation of dependence of different economic sectors and the product flux (a.k.a., material, resource, etc., flow) between them is expressed by a matrix. The input-output model is highly useful, because of its matrix-based operational flexibility and its absence of complexity to calculate, that make it easy to re-calculate the effects of changes therein. Together, this combination of data categories (i.e., the logic behind it) can be written in matrix equation (X = AX + Y). In an economic system the following listable (placed into rows) equation is satisfied (i.e., the matrix equation for this information is satisfied):

sector: P = matrix Z + D

production of something real: total output = internal consumption (nxn matrix) + external demand

total output = internal demand + final demand

Alternatively,

P = Z + D

Production level (P) = intermediate resource efforts (Z) + final demand (D)

Note that in the literature, there are a variety of different letters, capitalizations, and marks that are used to represent the axiomatic economic concepts, including the accompanying matrices, of production, demand, resource, technology processes, priority, material flow, etc.

1. The **demand vector** is a column of demands:

$$D = \begin{bmatrix} 4 \\ 12 \\ 16 \end{bmatrix} \begin{matrix} \textbf{Item 1 } (S_1) \\ \textbf{Item 2 } (S_2) \\ \textbf{Item 3 } (S_3) \end{matrix}$$

The demand vector list (d):

$$D = \begin{pmatrix} d_1 \\ \vdots \\ d_n \end{pmatrix}$$

- Wherein,
  - D - demands list, is simply a column listing the three demands by users for items 1, 2, and 3.

An item could be a service or product.

2. The **nxn sector matrix (technology matrix)** is composed of *n* economic sectors (S; "industries") denoted by:

   S1, S2, ..., Sn

   The flow (i.e., transfer, transformation, exchange) of products (i.e., resources) can be described by an input-output graph. A table is a type of graph known as a matrix. A base input-output table will always be a square matrix (a.k.a., nxn or n•n). An example matrix composed of [economic] sectors, and their single/standard unit interrelationships, Matrix Z (wherein, Z means the amounts of all the intermediary flows):

S = Sector
Z = Flows

⇩ INPUTS *(consuming sectors; j)*

⇩ OUTPUTS *(using sectors; i)*	S_1	S_2	S_3	...	S_n
S_1	Z_{11} - 0.1 # unit	Z_{12} - 0.3 # unit	Z_{13} - 0.4 # unit	...	Z_{1n} - n # unit
S_2	Z_{21} - 0.3 # unit	Z_{22} - 0.1 # unit	Z_{23} - 0.2 # unit	...	Z_{2n} - n # unit
S_3	Z_{31} - 0.2 # unit	Z_{32} - 0.1 # unit	Z_{33} - 0.3 # unit	...	Z_{3n} - n # unit
...	...	...	...	...	...
S_n	Z_{n1} - n # unit	Z_{n2} - n # unit	Z_{n3} - n # unit	...	Z_{nn} - n # unit

The internal production and consumption (intermediary requirements and resources) matrix Z (n•n):

$$Z = \begin{pmatrix} z_{11} & \cdots & z_{1n} \\ \vdots & & \vdots \\ z_{n1} & \cdots & z_{nn} \end{pmatrix}$$

Matrix Z:

$$Z = \begin{bmatrix} Z11 & Z12 & Z13 \\ Z21 & Z22 & Z23 \\ Z31 & Z32 & Z33 \end{bmatrix}$$

- Wherein,
  - Matrix Z - is the name of the sector flow matrix

or table (table Z).
- Z_{ij} - denotes the number of units produced by industry S_i necessary to produce one unit by industry S_j.
- The numbers (0.1, 0.3, etc.) under each Z cell is the example number of units required to be produced (or, produced) by industry S_i necessary to produce one unit by industry S_j.
  - # = the value itself; the amount to be (future) or being (present) produced.
  - unit = the label of the unit shared by the values. Units can be natural units or abstract units like price.

3. The **production vector** is a column of total production outputs.

The following is a simple three sector economy consisting of three sectored demands: food (x_1), clothing (x_2), and shelter (x_3):

$$P = \begin{bmatrix} p_1 \\ p_2 \\ p_3 \end{bmatrix}$$

The total production output vector (p):

$$P = \begin{bmatrix} p_1 \\ \dots \\ p_n \end{bmatrix}$$

4. The **matrix equation** becomes available because all data herein is essentially organized by matrices, the above system of linear equations is equivalent to the matrix equation (i.e., in matrix notation or matrix form):

$X = AX + B$

Note that the equation is often written in the literature using any number of different letters, for example:
$Ax + D = x$; $AX + B = X$; $AX + Y = X$, $Ax + f = X$; or $Ax + Y = x$; etc.

In this context, the equation is represented as:

$P = ZP + D$

$$Zp = \begin{bmatrix} z_{11} & z_{12} & z_{13} \\ z_{21} & z_{22} & z_{23} \\ z_{31} & z_{32} & z_{33} \end{bmatrix} \begin{bmatrix} p_1 \\ p_2 \\ p_3 \end{bmatrix}$$

- Wherein,
- P = production matrix (output vector, column matrix; total output of each sector).
  - $P = n \cdot 1$ vector of sector outputs.
  - $P = p_1, p_2, p_3$
- D = demand matrix (final demand vector, column matrix; total demand output for each sector).
  - $D = n \cdot 1$ vector of final demands.
- Z = input-output matrix (square matrix).
  - $Z = n \cdot n$ matrix of technical coefficients.
  - $Z = Z_{11}, Z_{12}, Z_{13} \dots Z_{33}$
  - In the literature, [Z] is typically called the Leontief technical coefficient matrix.

Together, the data may then be turned into a series of rows, with each row having a label associated with its production of a real-world service or object (that requires real-world resources and contribution), and is expected to be used by a user who is requesting the service or object:

Production of a real service or object	Total Output	=	Internal consumption	+	External demand
Life (S_1)	p_1	=	$p_1 + p_2 + p_3 \dots$	+	d_1
Technology (S_2)	p_2	=	$p_1 + p_2 + p_3 \dots$	+	d_2
Exploration (S_3)	p_3	=	$p_1 + p_2 + p_3 \dots$	+	d_3

- Wherein,
  - p_1, p_2, p_3 are the total output of S_1, S_2, S_3.

For example, this information can be represented in several ways:

	Input			Final demand
Output	P_1 Steel	P_2 Auto	P_3 Oil	
P_1 (steel)	z_{11}	z_{12}	z_{13}	d_1
P_2 (Auto)	z_{21}	z_{22}	z_{23}	d_2
P_3 (Oil)	z_{31}	z_{32}	z_{33}	d_3
Primary inputs	L_1	L_2	L_3	

The following is a more complete version of the rows, without the S designations, and with a more complete intermediary (internal amounts) matrix:

Total Production / Final Supply (p)	=	Internal amounts of production and consumption (intermediate uses, Zp)	+	Amounts of production going to final user (final uses, d)
p_1	=	$z_{11} + z_{12} + z_{13} + \dots + z_{1n}$	+	d_1
p_2	=	$z_{21} + z_{22} + z_{23} + \dots + z_{2n}$	+	d_2
p_3	=	$z_{31} + z_{32} + z_{33} + \dots + z_{3n}$	+	d_3
...	=	...	+	...

p_n	=	$Z_{n1} + Z_{n2} + Z_{n3} + \ldots + Z_{nn}$	+	d_n

- Wherein,
  - p_1 is the total production of sector 1.
    - $p_1 = Z_{11} + Z_{12} + Z_{13} \ldots Z_{1n} + d_1$
    - In other words, some of the production of sector 1 will go to sector 1: Z_{11}. Some of the production of sector 1 will go to sector 2: Z_{12}. Some of the production of sector 1 will go to sector 3: Z_{13}. This pattern continues until the full number of sectors is reached: X_{1n}. Plus the output that goes to actual user/people demand d (or, Y, D, etc.) for sector 1: d_1
- p_2 is the total production of sector 2.
  - $p_2 = Z_{21} + Z_{22} + Z_{23} \ldots Z_{2n} + d_2$
  - In other words, some of the production of sector 2 will go to sector 1: Z_{21}. Some of the production of sector 2 will go to sector 2: Z_{22}. Some of the production of sector 2 will go to sector 3: Z_{23}. This pattern continues until the full number of sectors is reached: X_{2n}. Plus the output that goes to actual user/people demand d (or, Y, D, etc.) for sector 2: d_2

The fully expressed coefficient transaction matrix for the equation X:

1. $Z_{11}p_1 + Z_{12}p_2 + Z_{13}p_3 + \ldots Z_{1n}p_n + d_1 = p_1$
2. $Z_{21}p_1 + Z_{22}p_2 + Z_{23}\, p_3 + \ldots Z_{2n}p_n + d_2 = p_2$
3. ...
4. $Z_{n1}p_1 + Z_{n2}p_2 + Z_{n3}p_3 + \ldots Z_{nn}p_n + d_n = p_n$

In actual table/matrix form:

Intermediate uses	+	Final uses	=	Final supply
$Z_{11}p_1 + Z_{12}p_2 + Z_{13}p_3 + \ldots Z_{1n}p_n$	+	$+ d_1$	=	X_1
$Z_{21}p_1 + Z_{22}p_2 + Z_{23}p_3 + \ldots Z_{2n}p_n$	+	$+ d_2$	=	X_2
...	+	...	=	...
$Z_{n1}p_1 + Z_{n2}p_2 + Z_{n3}p_3 + \ldots Z_{nn}p_n$	+	$+ d_n$	=	X_n

- Wherein,
  - Z_{ij} = Flow (or, transfer) from sector *i* to sector *j*
    - input of sector i to sector j (intermediate usage)
    - Where, both *i* and *j* are $_1$ through $_n$ (i.e., i,j = $_{1\ldots n}$ OR i,j = 1,2, ..., n
    - Z_{ij} - input of sector i to j, normalized with respect to the total output of sector j.
  - d_i = Final demand for [the products of] sector i.
  - p_i = Total output of sector i.
  - p_j - Total output of sector j.

Then, transaction (transformation or flow) coefficients of the IO matrix (Read: IO coefficients) can be defined:

- Z_{ij} = flow (transaction) coefficients.
- Z_{ij} = Input from sector *i* required to produce one standard unit of the product of sector *j.*

It is then possible to assume the following logical ["balance"] equations:

$$Z_{ij} = Z_{ij}p_j$$

$$Z_{ij} = Z_{ij} \cdot p_j$$

- Wherein,
  - $Z_{ij}p_j$ = the output of sector i (e.g., technology) can either be used as an intermediate input to sector j (e.g., life) or consumed as a final product (e.g., technology).
  - Z_{ij} = the total output of sector i is used either as intermediate demands (i.e., Z_{ij}) or as final demand (d_i)

The transaction coefficients form the expression:

$$Z_{ij} = P_{ij} / P_j$$

$$Z_{ij} = \frac{P_{ij}}{P_j}$$

- Wherein,
  - Z_{ij} = [Quantity of] Input from sector i required to produce one standard unit of the product of sector j.
  - Z_{ij} / p_j = Out of the total production of sector *i*, some quantity goes to sector *j*.

3.2.8 A simplified hunter-gatherer economic example

A simplified hunter-gatherer economy can be used as an example of mathematical economics. In this simplified example, the whole economy consists of three sectors (of demand/service:

1. Food 4 units demanded/needed
2. Clothing 12 units demanded/needed
3. Shelter 16 units demanded/needed

Each of these three sectored services/demands have to be "made" (or, worked toward) by the population. In order to make any 1 unit of any of the sectors, inputs from the other two sectors are required; hence:

1. **To make 1 unit of food requires:** 0.1 food; 0.3 clothing, and 0.2 shelter.
2. **To make 1 unit of clothing requires:** 0.3 food, 0.1 clothing, and 0.1 shelter.
3. **To make 1 unit of shelter requires:** 0.4 food, 0.2

clothing, and 0.3 shelter.

From this collection of data, it is possible to determine how much in-between (intermediary) stuff should be produced to satisfy the three final demands of food, clothing, and shelter. Two simple matrices can be constructed from the available model and its populated data, a requirements matrix and a demands matrix:

1. **Intermediary requirements matrix** (a.k.a., sector flow matrix, production matrix, technology matrix, ratio matrix, input-output coefficients) - "matrix A" tells the planner (=) how much food, clothing and shelter need to be produced, and it is the matrix notation for the three above requirements:

	Food	Clothing	Shelter	
Z =	0.1	0.3	0.4	**Food**
	0.3	0.1	0.2	**Clothing**
	0.2	0.1	0.3	**Shelter**

2. **Demands list** (d) - is a column listing the three demands by users for food, clothing, and shelter, in total:

d =	4	**Food**
	12	**Clothing**
	16	**Shelter**

3. **Total outputs list** (X) - is a column listing the total production of each of the three outputs.

p =	4	**Food**
	12	**Clothing**
	16	**Shelter**

3.2.9 Economic matrix operation to solve for the total demand

Matrix operations may be performed using this combination of data categories. To solve for the total demand, the following formula may be applied:

$d = p\,(I_3 + Z)$

demand = total output times (IdentityMatrix plus matrix Z)

- Wherein,
  - d = final demand
  - Z = intermediary requirements matrix (proportion values or ratios).
  - p = total output to be produced

3.2.10 Economic matrix operation to solve for the total output

To solve for the total output, the following formula may be applied (i.e., the same formula above may be alternatively written as):

$p = (I_3 - Z)^{-1}\, d$

total production output = (IdentityMatrix minus matrix Z) inverted, times demand

- Wherein,
  - p is how much in-between stuff should be produced to satisfy the three final demands of food, clothing, and shelter.
  - $(I_3 - Z)$ is computed first.

The economic [Leontif] intput-output analytical operation uses the following formula and the earlier requirements and demands matrix:

1. IdentityMatrix is a matrix with 1s down the diagonal and 0s everywhere else:
   I_3

$$I_3 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} - Z =$$

2. The requirements matrix (for food, clothing, and shelter) is subtracted from the identity matrix ($I_3 - Z$ is called the Leontief matrix):
   $I_3 - Z$

$$I_3 - Z = \begin{bmatrix} 0.9 & -0.3 & -0.4 \\ -0.3 & 0.9 & -0.2 \\ -0.2 & -0.1 & 0.7 \end{bmatrix}^{-1} =$$

3. The resulting matrix is inverted:
   $(I_3 - Z)^{-1}$

$$(I_3 - Z)^{-1} = \begin{bmatrix} 1.5641 & 0.647 & 1.0769 \\ 0.641 & 1.41 & 0.769 \\ 0.538 & 0.38 & 1.864 \end{bmatrix} \cdot d =$$

4. The resulting matrix is multiplied by the demand matrix:
   $(I_3 - Z)^{-1} \cdot d$

$$(I_3 - Z)^{-1} \cdot d = \begin{bmatrix} 31.1795 \\ 31.7949 \\ 36.3077 \end{bmatrix} = p$$

This system of matrices can be solved by the use of the inverse of Z, if Z is regular (i.e., $|Z| \neq 0$). Thus,

$p = Z^{-1} \cdot d$

The demand vector 'd' represents how much demand there is, hence, in long-form matrix notation:

$p_i = Z_{i1}p_1 + Z_{i2}p_2 + \ldots + Z_{in}p_n + d_i$

In short form matrix notation:

$p = Zp + d \rightarrow (I - Z)p = d$

And, in table notation as linear equations (i.e., each row in the table is a linear equation):

- *[Re]Sources = Intermediate Uses + Final Demand*
- For, three and 'n' more products: #1, #2, #3, #n

Sources	=
X_1-S_1+M_1	=
X_2-S_2+M_2	=
X_3-S_3+M_3	=
X_n-S_n+M_n	=

Intermediate uses	+	Final Uses
$Z_{11}X_1 + Z_{21}X_2 + Z_{31}X_3 + \ldots + Z_{1n}X_n$	+	$U_1 + I_1 + Ex_1$
$Z_{21}X_1 + Z_{22}X_2 + Z_{32}X_3 + \ldots + a_{2n}X_n$	+	$U_2 + I_2 + Ex_2$
$Z_{31}X_1 + Z_{23}X_2 + Z_{33}X_3 + \ldots + a_{3n}X_n$	+	$U_3 + I_3 + Ex_3$
$Z_{n1}X_1 + Z_{n2}X_2 + Z_{n3}X_3 + \ldots + a_{nn}X_n$	+	$U_n + I_n + Ex_n$

The letter variables used in the above input-output equations refer to:

- p_i - output of the i^{th} service system (planned target).
- S - change in resource stock.
- M - planned tasks/teams.
- Z_{ij} - requirement for input p_i per unit of output in the j^{th} service system. Technical co-efficients (Z_{ij}) are how much of input p_i is needed to produce one unit of output in the j^{th} service system. Technical co-efficients (Z_{ij}) are typically derived from the previous cycle's planning experience.
- U - User usage.
- I - Storage placement.
- Ex - Planned transport.

3.2.11 Economic matrix operation to solve for the allocation of a sector's output to a specific access type

To solve for the allocation of a sector's output to various access/allocation types (intermediate and final) translates to the following mathematical formulation:

$p_i = \sum^n_{j=1} Z_{ij} + d_i$

		n			
p_i	=	$\sum$	Z_{ij}	+	d_i
		j=1			

Substituting equation ($Z_{ij} = Z_{ij}p_j$) into ($p_i = \sum^n_{j=1} Z_{ij} + d_i$) creates the equation:

$p_i = \sum^n_{j=1} Z_{ij}p_j + d_i$

		n			
p_i	=	$\sum$	$Z_{ij}p_j$	+	d_i
		j=1			

Alternatively, input-output analysis can be used to solve for different questions and arrangements of relationship. For instance, the matrix equation (AX + Y = X or Zp + d = p) could be written as a relationship between the production and the input-output to that of demand (or, given production x, it is possible to find demand capacity):

$p - Zp = d$

$d = p - Zp$

- Wherein,
  - (p - Zp) = net production in the economy (i.e., the amount that is produced in total, both to meet demand and to keep production going).
  - p = production vector.
  - d = demand vector.
  - Z = technology matrix Z (flow ratio, coefficient).

It is then possible to follow the following procedure and to set net output equal to demand (i.e., given demand d, it is possible to find the production level X (i.e., it is possible to solve for production X):

1. $p - Zp = d$
2. $Ip - Zp = d$
3. $(I - Z)p = d$
4. $(I - Z)p = d$
5. $(I - Z)^{-1} (I - Z)p = (I - Z)^{-1} \cdot d$
   - Multiply by the inverse (...on both sides of the equation)
   - While multiplication with numbers is communitive, that is not the case with matrix multiplication (hence, both sides of the equation must be multiplied)
6. $p = (I - Z)^{-1} \cdot d$
   - Identity multiplied by x (Ix) is equal = $(I - Z)^{-1} \cdot d$

x has now become isolated on the left side of the equation:

$p = (I - Z)^{-1} \cdot d$

- Wherein,
  - I = the n • n identity matrix (I_3) with the same [matrix] size as Z
  - p - vector of p_i (total output of sector *i*)
  - Z matrix of Z_{ij} (direct input coefficient (= p_{ij}/p_i)
  - p_{ij} - transfer from sector *i* to sector *j (i.e.,* input of sector *i* to sector *j*)
  - d = vector of d_i (the final demand for p_i)

The inverse term of the equation can now be defined:

$L = (I - Z)^{-1}$

- Wherein,
  - L = L is define as the inverse term.

The inverse term equation [$L = (I - Z)^{-1}$] can be substituted into the Leontif inverse multiplied by demand equation [$p = (I - Z)^{-1} \cdot d$] to simplify the whole equation:

$p = Ld$

- Wherein,
  - The A Matrix and L Matrix are calculated.

3.2.12 Economic matrix operation for resource requirement calculation

To solve for how many resources (the exact amount) are [needed] in each sector, the following system of simultaneous equations is presented:

$Zp = d$

- wherein,
  - Z = input-output matrix,
  - p = production matrix, and
  - d = demand matrix.

The system can be reconfigured to solve for p as an unknown (i.e., if the production matrix is unknown) by the use of the inverse of A:

$p = Z^{-1} \cdot d$

In linear algebra, there are explicit formula for the solution of a system of linear equations with as many equations as unknowns, which are valid whenever the system has a unique solution. And, the human users of the habitat service system require a uniquely selectable solution.

3.2.13 Economic matrix operation for energy sector calculation

The equation for [energy] sector *i*:

$E_i = \sum^{n}_{k=1} E_{ik} + E_{iy}$

- Wherein,
  - E_i = total output of [energy] sector *i*
  - E_{ik} = intersectoral transaction from [energy] sector *i* to another sector k (any other sector)
  - E_{iy} = sale of something (energy, natural units, etc.) of type *i* to final demand

3.2.14 Economic matrix operation for resources

If the matrix equation is AX + Y = X (or, applied prior, Zp + d = p). The equation may also be applied to resources:

$R_H Rp + Rd = Rp$

- Wherein,
  - Rd - the users specific demand for resources.
  - R_H - total resources used in habitat operations.
  - Rp - total resources used.

3.2.15 Human contribution calculation

Human contribution is calculated via the following equation:

ϒ=ZY + /

- contribution (ϒ) = technology matrix (Z), times contribution (ϒ), plus the direct contribution input vector (/)
  - Wherein,
    - ϒ (Lambda) - contribution is a vector of labor contents.
    - Z is the technology input output matrix.
    - / is a vector of direct contribution inputs

Note: Using an iterative method of solving, the complexity of this calculation can be on the order of nLogn.

3.2.16 Material balance planning

A.k.a., Material balance analysis and planning, the material balance planning method, material balance equation.

Material balance accounting is a form of economic accounting based on balancing inputs with outputs in terms of natural units (expressed in physical quantities, as opposed to "money"). In other words, material balancing is a method of economic planning where material supplies are accounted for in natural units (as opposed to using monetary accounting) and used to balance the supply of available inputs with targeted outputs. Material balances apply measures of a natural unit, like meter, m^2, m^3, etc. In other words, material balances use natural units, such as meter, meter squared, gram, etc., to plan products. Material balance planning consists of a central planning chart specifying a list of inputs required to produce one unit of output, whereupon a balancing of outputs and inputs occurs, so that there is a balance between supply and demand.

A balance is a method of accounting for something (e.g., product or material). The material balance method simply accounts for:

1. Where things (objects) come from.
2. Where things (objects) go to.
3. The total number of things (objects).
4. The changes to the total number (or amount).

When market-based planning using material balances, planners first set the target of total output x, while the final demand y is determined as residual. The term "balance" in material balance planning is trying to "balance" supply and demand (i.e., to try to get supply to equal (=) demand with demand coming second (i.e., as residual, so that it can be sold into the market).

The general material balance technique simply accounts for where things come or go, and how their total number (or amount) changes.

The following is the generic material balance expression::

In - Out + Generation - Consumption = Accumulation

- Wherein,
  - "In" and "Out" are the inputs and outputs to the system, respectively.

In other words, a material balance plan derives accumulation (or, demand).

A material balance table shows:

1. Quantities of inputs, and total input quantity.
2. Quantities of outputs, and total output quantity.

Example, coal (in physical units, kilograms):

Sources	*with* Quantity	Uses	*with* Quantity
Production center 033A	200	Product A383	600
Production center 033B	900	Product A384	200
Total	1100	Total	80

3.2.17 Input-output models and time

It is relevant to note here that traditional input-output models have no notation of time (i.e., all production takes place within the same temporal unit). In static equilibrium analysis, a time element has nothing to do. Therein, all economic variables refer to the same point in time. The lack of a temporal unit is significantly problematic for real-world planning (where there is a dynamic and not static environment), but remains suitable for high-level strategic planning (e.g., most States publish input-output tables using monetary prices without a time dimension). However, all real-world production and usage has a time dimension. In the case of production, this is expressed in various forms like gestation times (Read: animal gestation times and the time between when a project starts and when production starts), production times, resource depletion times, usage before re-cycling or maintenance times, etc.

Multiple input-output models that include a time element have been developed, for which Aulin-Ahmavaara (2000) provides an overview. However, these time accountable input-output models (for the most part) are not designed with state-based functional planning in mind. Hence, Samonthrakis (2020) introduces a transition function *T(s 0 |s, a)* and a notion of state *s*.

3.2.18 Network environmental analysis and planning

A.k.a., Material flow analysis and planning, resource flow analysis and planning, material life cycle analysis and planning.

Network environment analysis starts off with the understanding that there are behavioral, structural, and functional effects within a network, because a network is a system. In general, the conception of "observable" means any activity measurable in terms of quantifiable effects on the environment, whether arising from internal or external stimulus. Something which is observed or experienced is an output of something prior, an input. Here, state-space mathematics provides a mathematical framework for computing a networked component's response to inputs:

1. inputs (Z_t) received into state (X_t)
2. create a new state (X_t + 1), and
3. produce associated outputs (Y_t + 1)

Two equations are derived from this initial model:

1. The state transition function

   $Z_t \cdot X_t \rightarrow X_t + 1$

2. The response function

   $Z_t \cdot X_t \rightarrow Y_t + 1$

Network environment analyses are typically done on input-output model data. It is possible to diagram economic and ecological (material and informational) networks for the purpose of analysis. A network analysis of a given economic environment is likely to include (Fath et al., 1999):

- **Pathway analysis** - enumerates number of pathways to travel in a network (enumerates options).

The path analysis is the basis for the three functional analyses.

1. **Flow analysis** - identifies non-dimensional flow intensities along indirect pathways.

   $g_{ij} = f_{ij} / T_j$

2. **Storage analysis** - identifies non-dimensional storage intensities along indirect pathways.

   $c_{ij} = f_{ij} / x_j$

3. **Utility analysis** - identifies non-dimensional utility intensities along indirect pathways.

   $d_{ij} = (f_{ij} - f_{ji}) / T_i$

Each of the functional analyses is derived from a different relationship of the flow-storage data, and is used to determine different properties of the system.

The functional flow and storage values transform a structural input-output model into an operational systems model (Read: an operational economic systems model). The combination of system structure and function underlies system behavior and is sufficient to determine the values of the network properties.

In networks, structure and function are analyzed using mathematical models based on flows and storages.

3.3 Computational economic planning methods in the literature

> **INSIGHT:** *Demand is ultimately an issue of population. If there is no population, there is no demand.*

Common approaches to economic planning (e.g., the Kantorovich method and the Haromony Planning) require, at least (Cockshott, 2019):

1. A flow matrix or flow I/O table.
2. A corresponding technology (i.e., capital, sector, stock, etc.) matrix, specifying the amount of technology "Y" needed to produce an annual flow of product "P" of output quantity "x".
3. A corresponding resource matrix specifying how much resource each type of technology requires in each of its uses.
4. A target vector of net outputs for the current period.

Given this information, it is possible to then apply either Kantorovich or the harmony method to construct a plan. If you want a multi-year plan you need target vectors of net output for each succeeding year of the plan period. If you want a multi-day plan, then you need target vectors of net output for each succeeding day.

3.3.1 Brief, early history of computational economics

> *A.k.a., Early work on the economic calculation problem.*

Input-output tables and calculations are common in the sciences, and although input-output techniques have been perfected for many decades, in the early 21st century, they are not being used toward any sort of cooperative, global economic plan.

In the 1930s Wassily Leontief formalized an analytical technique to quantify the impact that changes on demand for products had on an economic system. This model was not originally from Leontief, there is earlier evidence of it from Quesnay's "Tableau Économique". In the early 21st century, Wassily Leontief is the primary persona associated with the development of the general model of economic balance, and the use of the input-output analysis in economic planning. Input-output tables are a charting tool that allow for analysing the relation that exists between the inputs and the outputs that a certain economic sector needs for its production. These outputs may become the final product for human demand, or they may become the inputs to another economic sector, wherein they are used by that sector to produce its own outputs. This way different sectors can be connected to the final human demand of a certain solution (or, product). Leontief demonstrated how to combine facts about the world and formula for inter-sector input-output analysis. He realized, the production process is a 'circular flow' of requirements

According to Wassily Leontief, "input-output analysis is a practical extension of the classical theory of general interdependence which views the whole economy of a region, a country and even of the entire world as a single system and sets out to describe and to interpret its operation in terms of directly observable basic structural relationships" (Leontief, 1987, p. 860). (Heinz, et al., 2020)

The first systematic presentation of computational economics was that of input-output planning as described by Leontif in 1941. Input-output planning is the core of computational economics. Leontief was an economist who wrote a paper in 1941 where he described a way to analyze an economy through a series of equations. Wassily Leontief won a Nobel prize in economics in 1973 for his work on input-output planning and analysis. Through the work of Leontief and others it is known that the production process is a 'circular flow' of requirements and resource compositions. It is correct to say that input-output models may be used to model the entire economic production system of a society, which is essential in the construction of a habitat service system for the global population.

Here, there is the problem of quantity for which a structure of the levels of operation of processes of production is needed in order to guarantee the reproduction of the means of production used up in the course of production and the satisfaction of some 'final demand', that is, the needs and preferences of the different access types. Here, there are resources, that may have mutually decided allocations.

Early national socialist economic planners ignored input-output planning as too consumer oriented (in place of reproductive material balance planning), because it accounted for user need, which robbed the human planners of their discretionary power to manipulate the figures. Paradoxically, the pursuit of consistency and equilibrium enabled by input-output tables was not what practicing socialist planners wanted; instead, their top priority was to maximize their discretionary power. Indeed, fear of the abolition of the administrative system of intermediate goods and supplies is at the core of the opposition to input-output tables. Hence, many of the early economic planning systems used material tables (and not, complete input-output tables).

The moment the demand for intermediate goods is derived from final demand, in an activity model, the reason for the entire administrative and bureaucratic supply system, to even exist, comes into question. Hence, traditional planners used a regulated variable, but it was a variable that is pathological. The planners regulated their own levels of discretion, and did not actually regulate the economy. In other words, they continued a regulated bureaucracy. The method(s) selected by and for the planners were to aid in bureaucratic power regulation, not actual economic coordination for human life fulfillment. This is why the methodology (method selection) is so important to the success of human fulfillment, and why it must be transparently conveyed in a standard available to everyone in society.

The use of material balance planning primarily by early socialist economic players led to planning targets that had little to no relationship to actual user demand (as in, human need). In places where socialist planning did occur, crazy surpluses were produced (e.g., too many shoes, which were then wasted on fields, hoarding became pervasive, and a black market developed as a secondary life-cycle for products). The market often ends up with products that are useful, but bad in some significant way at being useful.

The core of the Soviet-type planning method:

$$P_tQ_t = Y_t + TP_t - S_t - T_t$$

- Wherein,
  - P is the retail price level.
  - Q is the quantity of goods and services produced.
  - Y is output.
  - TP represents transfer payments (often viewed as redistributed taxes from previous periods).
  - S are savings.
  - T are taxes.

Notice how, in the Soviet system, price is still present. According to the "market theory of value", price is the sole source of value in a commodity. According to the Marxism "labor theory of value", labor is the sole source of value in a commodity. The "labor theory of value" is capable of being expressed conceptually and mathematically:

Price (of a commodity) = payments of constant (Capital, Labor, and Profits)

1. 'Capital' is machinery and raw materials.
2. 'Labor' is living humans doing work.
3. 'Profits' is more money.

The Soviet-type planning method only eliminates profit, not price. The Soviet-type planning method uses material balance planning primarily to balance price, in order that planner maintain control. In the Soviet-type planning method, bureaucrats and employed planners in the government (Read: labor-State) decide how to balance the economic equation by adjusting the price level on both sides, which impacts priced demand directly. In a Soviet planned economy, price levels can be adjusted directly; they are immediately controllable by those with the authority. Alternatively, in the early 21st century, the financial commodity planning method uses a centralized bank to decide growth ("interest") rates, which impacts the demand for money, which impacts price indirectly. Under financial commodity planning conditions, the authority takes decisions that impact financial institutions, which impact a competitive environment, which impact price, which impact demand. One system uses authority and competition to impact demand, and the other system simply uses authority to do so. To authority, power is the ultimate commodity.

It is not correct to regard material balances and input-out planning as a specific to any type of society (community, capitalist, communist, etc.). All complex socio-technical economies use material balances and input-output planning to some degree. The differences in societies economies typically come in how, and to what end, they are applied.

Since the earlier socialist planners, humanity now has the following additional capabilities that make economic calculation feasible for the global population:

1. Internet allows real-time cybernetic planning. Distributed computation and network block chains can solve the problems of dispersed computation.
2. A unified information systems standard allows for socio-technical agreement (i.e., understanding).
3. Computers can solve the necessary and complex equations in feasible amounts of time.
4. Integrated habitat service systems contributed to by open source methods, to a common, mutually fulfilling standard. This is a habitat service matrix of tables of contribution, priority, urgency, technology, and production service sectors)

5. In a contribution-based system, there are users, some of whom, are also contributors.
   - Users
     - Contributors

Under these conditions, priorities in the context of demands and requirements therefrom, become clearly visible (or at least, the data becomes available for its computation if a societal arrangement is there is there to compute it). Mutual user access and contribution access in combination with a technology matrix allow for the dissolution of a price between an owner, a laborer, and a consumer, or some combination thereof. Direct population surveys of needs (workgroups, "assessment"), and demands (whole population).

In this system, the society gets back in productions the same amount of production (via contribution) it performs. Products are calculated via direct feedback from demand, which is usage, to planning.

3.3.2 The Kantorovich method of economic planning

This section presents input-output planning from the perspective of the individual who popularized the knowledge. Kantorovich, a Soviet economist and Nobelist, composed an explanation of how to systematically solve linear algebra mathematical techniques (a.k.a., linear programming or linear optimisation; matrix equations), which solve for objective economic calculation problems. As Cockshott (2018) points out, the significance of Kantorovich's work was that it showed that is possible to use a mathematical procedure to determine which combination of production techniques will best meet planned targets when the initial conditions include a description, in purely physical terms, of the various production techniques available (called, sectors, sub-sectors, or technologies). The Kantorovich method applies an objective evaluation technique to data by organizing it into input-output tables, which can then have operations performed on them to provide more useful data. Kantorovich systematically shows that in-natura calculation is possible, and that there can be a non-monetary scalar objective function: the degree to which plan targets are met. The result of the method is a decision process shown diagrammatically that reveals the optimal [technological planning] decision.

At a basic level, Kantorovich's method to solve economic planning problems requires:

1. A linear algebraic algorithm/program.
2. An input output matrix for an economy.
3. A set of initial resources and production sectors.
4. A set of demands.
5. A vector of plan objectives – what Kantorovich called a planray.

To derive a set of useful numbers (i.e., Objectively Determined Valuations), the following inputs are used:

1. The algorithm.
2. The technology available.
3. The objectives of the plan (demands).
4. The available stock of material resources.

Cockshott (2018:12-13) identifies three areas where Kantorovich's method can be improved.

3.3.3 The Cumberland I/O model

Cumberland (1966) amended the Leontief Input-Output model to include pollutants and other such externalities. Rows and columns were added to the original model to highlight the benefits and dis-benefits associated with any economic activity on a sectoral basis

Isard and Daly developed similar approaches along the Cumberland lines to the extension of environmental issues into the input-output framework. Both models are comprehensive in their approach. Each model shows the interactions both within and between the economic and environmental systems.

3.3.4 Modified Leontief models

There are many modified forms of the Leontif model. Pollution, according to Leontief, is a byproduct of regular economic activities. In each of its many forms it is related in a measurable way to some particular consumption or production process.

The technical interdependence between the levels of desirable and undesirable outputs can be described in terms of structural coefficients similar to those used to trace the structural interdependence between all the regular branches of production and consumption. As a matter of fact, it can be described and analyzed as an integral part of that network.

Robert Ayres and Allen Kneese (1969) commented on a slightly varied approach to the problem of externalities. They introduced a concept known as a materials-balance approach which broached the topic of the fact that there is an imbalance between the resources that are drawn from nature, and the return of such resources back to nature.

3.3.5 Adapted Haber (2015) heuristic action rating method for fundamental system functionality calculation

In a computational economic system, it is possible to rate actions using the fundamental functional components (characteristics) of the system (fundamental system functionality), which include, but may not be limited to:

> *Note that the ratings are primarily designed to fall in a range between -100 and 100, which is to enable mutual compatibility, and make use of the practical features of root functions (they exhibit a steady increase with a fast ascent at the beginning and a subsequent decrease in intensity*

1. **Urgency calculation** (time-frame calculation) - Urgency means, how close to being complete within a given time frame is the request. The closer the request comes to requiring completion, and also, not being complete, the more urgent the request.

   Haber (2015:18) provides an equation that may be adapted to this composition of an urgency request matrix. The following equation may calculate request urgency is adapted from Haber (2015:18):

   $\sqrt{((T + O_R) \bmod D_R)} \times 100/(\sqrt{D}) \cdot C_R$

   - Wherein,
     - T is the current tick.
     - O_R the calculated deadline offset of the requesting agent R (in ticks).
     - D_R is the system's deadline period (in ticks).
     - C_R is a 1 or 0 memory location. C is a Boolean indicating whether the requester has already had the demand fulfilled during the current deadline period. If the demand is fulfilled, C is set zero and thus the whole rating becomes zero, too. If the requester has not had the demand fulfilled, C is set to one and the rating is used as calculated. The function's first factor is responsible for determining a request's urgency as the value under the root increases linearly with approach of the deadline.

2. **Priority calculation** (significance calculation) - Within the decision system, a recognition inquiry process calculates the priority of a request, issue, or demand based on human need conceptualized as a prioritized (and prioritizable) habitat service structure. In a habitat, there are three sectors: life, exploration, and technology.
   - Wherein,
     1. The life sector is prioritized over all sectors.
     2. And, some of the exploration sector supports the life sector.
     3. And, some of the life sector supports the exploration sector.
     4. And, the life and the exploration sectors require the support of a technology sector.
     5. And, all sectors require the contribution of humans.

3. **Distance calculation** (resource-service-requester distance) - Distance could mean, number of hops or links or length (e.g., cities, regions, sub-sectors, transport networks, etc.) and/or type qualities of method of moving over the distance. Distance could mean the distance a resource has to travel to complete a requirement, or distance could mean a service-object has to travel to interface with and then complete a user demand.

   Haber (2015:18) calculates a requesters distance with the function:

   $\sqrt{(W/L)} \cdot (100/\text{sqr root } D)$

   - Wherein,
     - W is a given request's waitCounter in ticks.
     - L is the number of links or hops between the current agent (e.g., resource current location) and the requester.
     - $\sqrt{(w/L)}$ is a factor that takes into account the amount of time a certain request has been unfulfilled in relation to the distance to the requester.
     - (100/sqr root D) is a factor equal to the one in the previous formula, stretching the root function to account for the system's deadline period D (in ticks).

4. **Overall resource request** - total resources requested.

   Haber (2020:19) calculates the overall resources requested with a ratio function:

   $$\frac{R(x)}{R} \cdot 100$$

   - Wherein,
     - R(x) is the request for given resource or product x.
     - R is the current total resource request registered by the agent.

5. **Resource availability** - Actions may be rated with regard to a resource in an agent's inventory, and with regard to a resource that is not in the agent's inventory, but may be currently occupied by a service or object (source) in its sector [of occupation].

   Haber (2020:19) calculates the overall resource availability via a two step process:

   A. Step one determines the regeneration rating for the sources available to the agent. This regeneration rating is determined though the calculation:

   $$\frac{R_S(x,D) - E_S(x,D)}{Q_S(x) + E_S(x,D) - R_S(x,D)} \cdot 100$$

- Wherein,
  - $R_S(x, D)$ is the number of regenerated resources of type x in all reachable sources S within the last D ticks.
  - $E_S(x,D)$ is the number of resources of type x extracted from sources S.
  - Qs(x) is the current available quantity of resources of type x in sources S. This rating is positive if during the last D ticks more resources of type x were regenerated than were extracted. If the opposite is true, the rating is negative.

B. Step two of the rating process now combines this local availability rating with the distance measurement (Haber, 2015:18). If the availability rating in item 5A (above) returned a positive result, it is adopted as the final resource availability's rating, otherwise it is adjusted by subtracting A:

$$A - \quad (-\sqrt{(W/L)} \cdot R(100/\sqrt{D}) \quad + \quad 100$$

- Wherein,
  - A is the (negative) availability rating from equation 5A, and the entire second part is a translated, inverted and double-scaled version of the root function used before.
  - The result is that the formula calculates the difference between resource availability and requester distance, which will still turn out positive if the request's waitCounter is large enough to overpower the resource scarcity warning discount calculated in equation 5A.

6. **Requester utility (or, receiver utility)** - A rating that assesses for actions concerning the assembly of products.

   Haber (2020:18) calculates the receiver utility by way of another conditional function. If the receiver of the assembled product is the assembling agent itself, the score is determined by:

$$\text{argmax} \quad \left(\frac{\text{size}(A)}{\text{size}(W_A)} \cdot \quad 100 \right)$$

argmax ((size (A) / size (W_A)) • 100)

- Wherein,
  - Size(A) is the size of the assembled product
  - Size(W_A) is the size of any demand (for a sector's production) containing the assembled part.
  - Determining the argmax of this function effectively returns the best ratio of demand fulfillment that can be achieved with the assembled part.
  - If the receiver of the assembled product is not the assembling agent itself, the distance function of equation 3 is used since in that case the receiver's demand list cannot be accessed.

The economic tables that could be used in this method include, but are not limited to:

1. Technologies list
2. Product list
3. Demands list
4. Resources list
5. Contributions
6. Priority list and urgency list

3.3.6 The Harmony Method

The harmony algorithm (the harmony function) is of Order NlogN complexity for single year plans. It retains the same complexity of NlogN for multi-year (i.e., multi-cycle plans). The harmony function is a "social utility" function designed to mimic the principle that there is positive, but diminishing utility, as more of a good is produced. It is a function whose value rises as plan fulfillment approaches, but which "rewards" overfulfillment of the plan less than it "punishes" underfulfillment of the plan. Note here that plan targets may be final user and/or intermediary sector demand targets. In a plot of the harmony function, the plan target of N (x axis) hits 0 on the y axis when it hits its target and less than 0 if there is a shortfall. And, it might increase more slowly if the plan is being overfulfilled. In other words, it is worse for society if there is a shortage of something than big surplus of that thing (i.e., than the gain you get for having a big surplus).

Kantorovich approach specifies exact proportionality (square nxn matrix) between all outputs. This may not always be achievable. It may, sometimes, be possible to overfulfill the plan more for some products than others. And, that may be worth doing. Also, because the harmony function has a continuous first derivative, it allows the use of Newtons method to approximate functions. This allows planning to bring all sectors into approximate alignment with the plan target.

3.3.7 Agent-based modeling method

Although the field of Agent-Based Modeling (ABM) was defined by the work of Wooldridge and Jennings (1995), the exact meaning of the term agent is still somewhat controversial. For this project, an intelligent agent can be described as a discrete autonomous entity with its own goals and behaviors and the capability to interact, and adapt and modify its behaviors. In other words, conscious individuals are self-integrating, and goal-directed entities capable of interacting with one another and an environment. Agent-Based Models represent real-world systems using a conscious individual approach, wherein multiples of conscious individuals create a network of effects between the individuals.

In the real-world, the individuals (agents, subjects, etc.), are dependent on the environment for their persistence and fulfillment, which includes an environment of other consciously integrating individuals and common objects (resources).

Hence, economic automation is, in part, a resource allocation problem (a.k.a., object allocation problem). Multi-Agent Resource Allocation is the process of distributing a number of items amongst a number of agents. The objective of a resource allocation procedure is either to find an allocation that is feasible (e.g. to find any allocation of tasks to production units such that all tasks will get completed in time); or to find an allocation that is optimal.' Resources are, generally, indivisible items that may or may not be shared by agents (for example network access as opposed to production tasks), but in some cases may also represent divisible items such as electricity, which can be distributed in fractions. (Chevaleyre et al., 2006)

3.3.8 The Samonthrakis method of economic planning

Samothrakis (2020) details an automated planning system under the tradition of Marx, Leontief, Kantarovich, Beers, and Cockshott as a viable and desirable alternative to current market conditions. In the paper, Samothrakis shows the triviality of planning for up to 50K of industrial goods and 5K final goods in commodity hardware. Samonthrakis shows how it is possible to remove products from market circulation and provision them directly to the population through calculation, cooperation, and globally coordinated planning. Direct economic calculation of products and services is generally called "planning in natura" (Cockshott, 2008), and has direct links to the idea of "universal basic services". One of the primary goals of economic calculation and planning is to remove uncertainty within production and provide a population with access guarantees. More simply, the ultimate goal of an input-output matrix is to plan for demand at the end of a time period. Herein, planning goals are formed using data collected from production units (e.g., factories) and individuals. The goal of the plan is to deliver a set of [real-world] products and services ("goods"). It is important to note here that Samonthrakis' economic calculation plan is only designed to complement the market and is not designed to abolish it. However, combining it with the rest of the material in this societal standard it is possible to abolish the market entirely.

Samothrakis (2020) introduces the idea of Open Loop In Natura Economic Planning, which adapts the standard input-output with the following:

1. Given that the goal is to provide necessities to sustain humans, set all "external" demand to zero, and introduce a set of profiles combined with the number of citizens attached to each profile.
2. The input-output matrix describes the interactions between:
   A. Consumption profiles,
   B. a set of industrial goods, and
   C. a set of final goods.
3. Profiles are columns that describe the allocation of final goods to each citizen that has been assigned this specific profile.

The real world execution of the open loop in natura economic plan entails two steps:

1. The planner provides information to the production units on their daily targets and requests information on the previous day history, including IO-coefficients (IO-coeffs) in functional form and externalities.
2. The planner requests information on previous days demand and future demand from each individual (or discovers it).

Samothrakis (2020) calls the method/technique open loop in-natura economic planning (OLIN-EP), which builds upon the traditional input-output economic planning framework. Whereas the traditional economic planning timeframe ("tick") was a year, the OLIN-EP timeframe ("tick") is one day (i.e., the plan is re-calculated based on observations and predictions each day/night). Additionally, OLIN-EP does not operate based on abstract notions of aggregate demand; instead, individuals (or close groups) are expected to communicate their demands and projected demands on a timely (e.g., daily basis). Additionally, the productive unites are expected to recalcuate their input-output coefficients (called IO-coeffs - the values of the matrix) and provide them for plan updates on a daily basis in the form of a function. The OLIN-EP operates on a MDP (Puterman, 2014) with the following characteristics (Samothrakis, 2020):

1. Actions $\mathbf{x} \in A$ capture what the production output of each industry should be. Note that due to notation conflicts with input-output literature we use x for individual actions, rather than the most customary a.
2. States $s \in S$ capture sufficient statistics of what we want to operate on, as transmitted every morning by production units and citizens. In our case, s is simply a goods inventory.
3. The transition function T(s 0 |s, a) is formally unknown to us, but it is captured partially by the input-output matrix, partially by the semantics we give to the behavior of different outputs of the matrix, and it operates on the inventory and

externalities.

4. The reward function denotes how happy the planner is in a specific state and is generally encoded as R(*s*, *a*). We define later on a specific reward function that captures how well the plan targets are met and what damage the plan causes to the world.
5. There is a discount factor γ, which attenuates closer versus further rewards.

Samonthrakis (2020) addresses calculation with following equation:

1. $(I - F(x))x = d$
2. This equation allows for the stacking of production units and the utilization of different IO-coeffs values as production scales upward. Additionally, it allows for the planning agent to identify for individuals how important it is to hit certain targets in their profile.
3. Therefore, Samonthrakis identifies the F(x) matrix as:

$$F(x) = \begin{bmatrix} f_{00}(x_0) & f_{01}(x_0) & \cdot & \cdot & \cdot & f_{0n}(x_0) \\ f_{10}(x_1) & f_{11}(x_1) & \cdot & \cdot & \cdot & f_{1n}(x_1) \\ \cdot & \cdot & \cdot & & & \cdot \\ \cdot & \cdot & & \cdot & & \cdot \\ \cdot & \cdot & & & \cdot & \cdot \\ f_{00}(x_0) & f_{01}(x_0) & \cdot & \cdot & \cdot & f_{0n}(x_0) \end{bmatrix}$$

4. To solve this matrix equation, the gradient can be used directly. The mean squared error MSE($(I - F(x))x, d$) has a gradient that is:

   $\nabla MSE((I - F(x))x, d) = 1/n\,((I - F(x))x - d)\,(I - F(x) - F'(x)x)$.

5. Thus, it is possible to solve the equation using:
   A. A nonlinear least squares algorithm.
   B. A non-linear optimization algorithm.
   C. An end-to-end neural network (note: most useful for highly complex IO-coeffs, while optimizing production at the same time).
   D. A linear solver, such as the power series expansion method (Lahiri, 1976), which is the method selected by Samonthrakis (2020):
      1. $(I - A)^{-1} = \Sigma^{\infty}_{i=0} A^i = I + A + A^2 + \ldots$
      2. Then, it is possible to define a recursive form of calculating for x:
         $x_{(i+1)} = F(x_{(i)})x_{(i)} + d,\ x_{(0)} = d$
      3. This method will find the global maximum as long as convexity is maintained.

Samonthrakis (2020) defines the demand for a final good as a profile set to zero:

1. $d'_i(a_{ij} = 0)$
2. With, i coming from final goods C, while j comes from profile consumption P.
3. Herein, when a good is removed from a profile, then a surplus is generated. That surplus, divided by how much that profile was expected to get, defines the "humanity of the plan" (Simonthrakis, 2020).
4. Formally, the humanity equation HU_p is:

   $HU_{p = \min/(i \in C, j \in P)} \{ d'_i(a_{i,j} = 0) / (a_{ij} d_j) \}$

5. Every profile places externalities on the economy (e.g., carbon output from productions). These externalities are modeled at each point in time as:

   $\rho(e(x_t)x_t)$

6. The total externalities for a plan are the sum of all externalities in time:

   E_p

7. Wherein, p is a function that weights the importance of each externality for each good.
8. Hence,

   $\mathcal{E}^t_{p} = {}^t\Sigma_0\, \rho(e(x_t)x_t)$

3.4 *Input-output analysis software*

Paul Cockshot has released an open source linear programming software package (Kantorovich, 2020: [drive.google.com]) based on the lp-solve package [sourceforge.net] that uses the Kantrovich method to print (Read: output) objective valuations and the achievable gross output given the available resources. lpsolve is an open source mixed integer linear programming software solver (which is effectively Kantorovich's method). Lp-solve when applied to economic planning has a complexity of Order n3. In other words, in order to calculate a plan as the result of computing the data it will take O n3 (Read: order n3).

LINDO Systems Corporation produces a software package called "LINGO". LINGO is an optimization models software tool for linear, non-linear, and integer programming. As Cockshot shows, it is possible to use spreadsheets for input-output analysis; however, LINGO has the advantage of using an equation-based interface and also features a suite of solvers for optimization models.

Cockshot has also put together a plancode for a 5-year input-output Harmony-type method plan that uses java and is order nLogn. The java plancode is available via Cockshot's Github repository for the plancode.

3.5 *What is the economic calculation*

problem?

The economic calculation "problem" is a contextual criticism of economic planning in favor of price and market-based allocation organizations. By viewing society as an information system with key sub-systems, one of which is a decision system, it becomes possible to see that through the use of project planning and systems engineering actionable lists are made available from which objective measures of progress are determinable. Economic calculation and planning are possible when there is contribution, and a system for useful calculation. In order to calculate an economic plan, a society requires accurate data on resources, knowledge, and expectations. Industries in the market use many procedures and calculations that are used similarly, but at the habitat service layer of a community-type society. Economic calculation occurs in the market in a similar way to community, but in community, the entities who are accountable for economic planning are cooperating and not competing.

The economic calculation problem is a criticism of central economic planning. The "problem" being referred to is that of "how to distribute resources rationally in an economy". The free market solution involves something known as "the price mechanism"; which is itself a claim that "people individually have the ability to decide how a good or service should be distributed based on their willingness to give money for it". Instead of proposing a contextualized problem, the claimed "economic calculation problem" argues that the "price mechanism" is the only possible means to understand how to "efficiently" create and move goods around an economy.

The economic calculation problem makes the claim that price can be, and is, the ultimate mediator of decisions in the market; which, is a truism for the organization of an economy as a market. Notice the continuous presupposition of the presence of a "market" in the description of the problem itself. The economic calculation problem is a market problem, if it is in fact even a problem. In other words, if the economic calculation is a problem at all, then it is a problem with a specific form of economic organization known as "the market".

The economic calculation problem put forward by Mises states that without a pricing mechanism there is no way to rationally allocate goods and services [in a market], wherein 'price' acts as the data point that communicates to the market [system of consumers and producers] how much to adjust their production levels in order to meet demand. The assumption (or assertion) that market advocates take as though it is an axiomatic principle of logic is that demand and distribution cannot be computed (or calculated) without price.

In other words, the economic calculation problem as it is described can only pertain to a trade economy, it is de-contextualized from other (or different) relationships to the natural world. The economic calculation problem has no reference for the existence of an economy not based on the trade of goods and services in a market. Essentially, the language which created the claimed "problem" can't be used to understand the actual problem. It is necessary to have integrated an understanding of systems thinking as a tool if one is to critically comprehend why the economic calculation problem is the problem of a particular socio-economic structuring, and does not necessarily apply to other structural organizations. It is the use and the framework of language in the question that imparts a misunderstanding about the essential issue - the economic fulfillment of human need.

The economic calculation problem may in fact be a valid criticism of a "centrally planned market". There is some degree of competition in every market; hence, there is some artificially enforced degree of opacity to the acquisition of information; hence, there is some noise interfering with a purposeful plan [to distribute

SEEING GREEN: MERE EXPOSURE TO MONEY TRIGGERS A BUSINESS DECISION FRAME AND UNETHICAL OUTCOMES

The following is the abstract from an journal article by Kouchaki et al. with the same title as that of this text frame.[1]

> *"Can mere exposure to money corrupt? In four studies, we examined the likelihood of unethical outcomes when the construct of money was activated through the use of priming techniques. The results of Study 1 demonstrated that individuals primed with money were more likely to demonstrate unethical intentions than those in the control group. In Study 2, we showed that participants primed with money were more likely to adopt a business decision frame. In Studies 3 and 4, we found that money cues triggered a business decision frame, which led to a greater likelihood of unethical intentions and behavior. Together, the results of these studies demonstrate that mere exposure to money can trigger unethical intentions and behavior and that decision frame mediates this effect."*

The findings show that "even if we are well intentioned, even if we think we know right from wrong, there may be factors influencing our decisions and behaviors that we're not aware of". The scientific effect seen here is more broadly known as 'priming' (values priming, behavior priming, and so forth).

1. Kouchaki, M., Smith-Crowe, K., Brief, A. P., & Sousa, C. (2013). *Seeing green: Mere exposure to money triggers a business decision frame and unethical outcomes*. Organizational Behavior and Human Decision Processes, 121(1), 53-61. doi.org/10.1016/j.obhdp.2012.12.002

resource "rationally"].

Traditional market thought argues that the dynamic variability of human interests make it technically impossible to "calculate demand" without the "price mechanism". While this may have been somewhat true in the early 20th century when these claims were made, the age of digital computation and information calculation, systems thinking and design engineering, coupled with the functional extension of ourselves through (sensing and tracking) technology, humankind has commonly removed this barrier to the obfuscated realization of complexity in the natural environment.

- **Price negotiates** decisions in the market. Negotiations occur between, competing and otherwise opposing, forces.
  - *Profit* is an encoded value (there is *profit value system - the value system of a market-State society*).
- **Individuals in a community account** for information and calculate (or compute) the most effective and efficient means of freely fulfilling their needs. The accounting and calculation of information in a system necessitates cooperation, a synthesis of forces. Calculation notes the degree of accountable efficiency in a cooperative relationship.
  - *Use* is an encoded value (there is *use value system - the value system of a community-type society*).

In market-based thought, "price" takes upon itself (Read: assumes) "subjective human whims" and converts them into "objective numerical values" creating a state where all "heterogeneous goods" can be "objectively" compared; thereupon, a vase can be compared [in price] against a bottle of water [in price]. Price is an arbitrarily subjective and utilitarian value placed upon owned[-able] property [with some sprinkling of labor energy and scarcity reflected in price, though they are obscured by noise].

- What are "subjective human whims"?
- What is this conversion taking place?
- What is objective?
- How are numerical values derived from a subject?
- What is meant by "heterogeneous goods"?
- What is actually being compared?

The "signaling function" of the market (i.e., price) is erroneous because it does not separate the noise from the signal; and hence, it cannot facilitate orientation in an intentional direction through a common environment.

Price is subjective; it redirects our individual relationships away from nature, away from that which is. It is not a rational measure for the prices themselves are subject to the very market they claim to rule; price is subject to the systematically generated and reinforced value characteristics of its overall structure, competition being one of its principal value coordinates. The price mechanism is subject to all kinds of distortion; it is a bunch of noise with a façade of advertising and marketing [so that it "slips down more easily"] ... and once swallowed whole it is challenging to get out. Fluctuations in the price of goods and services in the market can kill people. Do we really want to organize a society around the market and around price? The price mechanism itself is the arbiter of decisions in the market.

There are going to be people who can't find a way to make a life for themselves within the market system; it is an inevitability due to the structural design of the market system itself.

The price mechanism has an inherent tendency toward personal maximization at others expense, monopolistic collusion, hierarchical dominance, and the need for waste and scarcity. The price mechanism leads to pockets of poverty [in the self and in others], and it is not an effective or efficient way of ensuring the persistence of a system that maintains individuals access to the resources, goods and services, that they need to survive and thrive. Price removes the idea of intentional design and of intentional orientation in a knowable and common territory.

The price mechanism is an element in the generation of unsustainable cultural and environmental environments in the market. The market is the real tragedy of the commons: the commons exists, the market doesn't. The tragedy is that the belief in the market leads to the destruction (de-structuring) of common natural services [provided in appreciation by the Earth]. Competition between market entities pricing property generates a state of excess consumption and mismanaged (e.g., unsafe) production in what would otherwise be seen as area for the caretaking of what are natural, common services for all life on the planet. Fear consumes life; fear will de-structure and de-cohere the flow of information from a source [of consciousness]. Prices never tell the truth. Prices are full of tricks, and those tricks do harm. Price is a non-rational force. Some societal systems produce value disorders that prop up false demands .

The idea that price is rational to begin with is incorrect. The way that price manifests is not necessarily a rational act. The random irrationality of demand can falsely create high prices. Someone could buy a load of copper tomorrow and it would make the price of copper rise. De Beers, to use a continuing historic example, could market or conceal diamonds (Epstein, 1982) in a way to control or falsely inflate the price of diamonds. Or, they could flood the market with diamonds and drop the price. Price, in the national and international markets, is not connected to use-value, at all.

'Use-value' refers to the value a user get from the functional use of a product or service or system; which due to modern electronic automation technology is now becoming 'production value' - the ability to create goods and the ability to be an "owner" of a particular mode of production. For example, 3D printers are products and producers at the same time. This understanding has led some economists, most notably Jeremy Rifkin in his book "The zero marginal cost society" to assert with evidence that society in the near future will no longer be composed of producers and consumers, but will instead involve "prosumers" (i.e., consumers who have become their own producers; users that design their own systems). In essence, as we produce more data about how our services should be produced the market system becomes increasingly obsolete since "prosumers" are capable of producing things at zero-marginal cost. 3D printers are just one example of such a fundamental, socio-economic structural modifying, technology. Note here that the term "prosumer" is a market-based term.

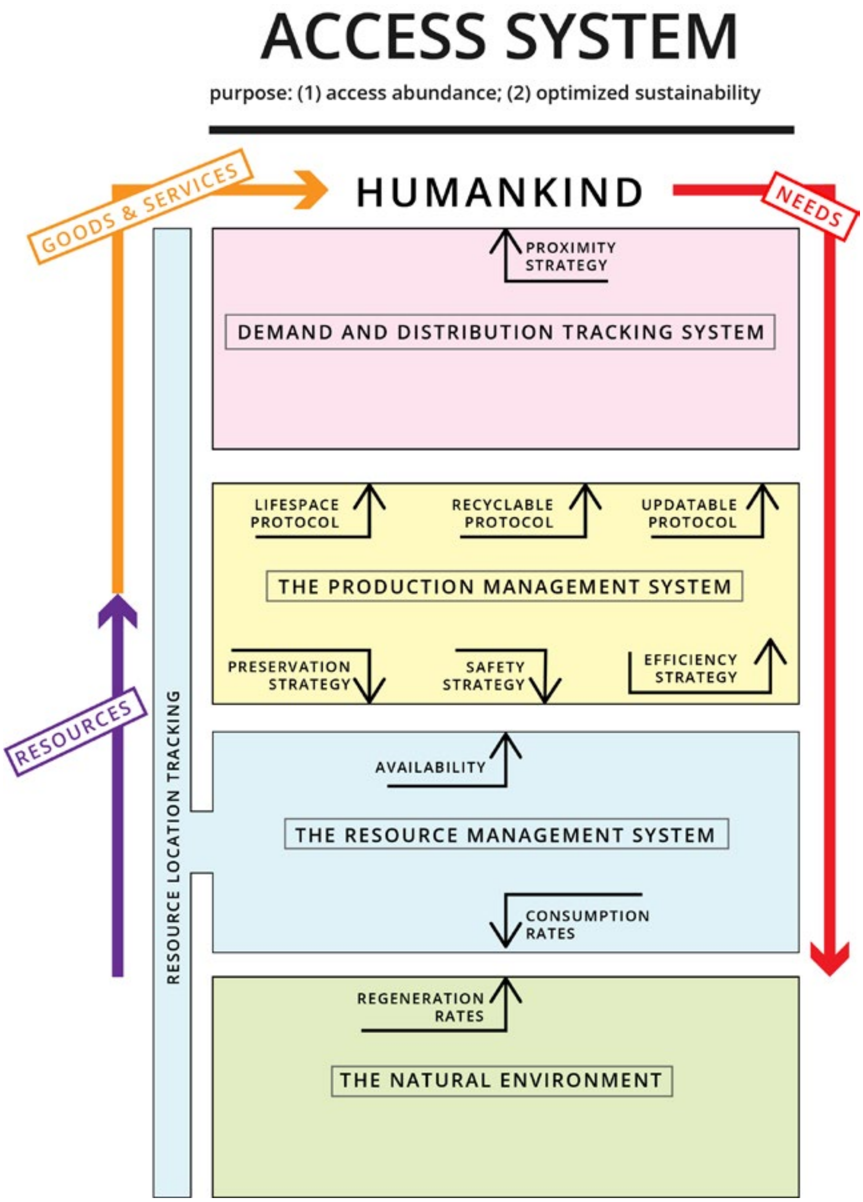
Does price tell us anything about the actual nature of copper or its uses – what scientific instrument can we use to investigate copper to find its intrinsic use value? Instead, the movement of a commodity and the discussion surrounding a commodity is reflective of market behavior, quite possibly, to manipulate the price of the commodity (or securities investment) in the market for financial or some other gain.

Economists use the term "inelastic demand" to refer to things that "you", as a human organism, have to have in order to survive - they are not temporally flexible demands, they are knowable, persistent, and have common durations between when and under what conditions they need to be filled. But what if someone were to own the resources required for the fulfilling of these "inelastic demands" of a given population. If someone owns what are essentially life-ground needs (and maintains a [police/military] group to fight for and defend that ownership), then that person is going to have a tremendous amount of control over other people's lives. Some "economists" then go on and make the claim that a system which has "inelastic demands" and uses the force of police and military to maintain the persistence of human fulfillment is a truly voluntary system, which is highly disingenuous. To the common people, such a system isn't voluntary, if "voluntary" means the synergy of conscious intention, volition and participation without structural coercion or social manipulation.

Without advertising and marketing, without the forceful conditioning of competing market entities, it becomes far easier to look at the landscape ahead of us and calculate what we need. If we create a society that venerates and encourages the cultivation of the cooperatively safe, effective, and efficient use of resources based on [at least] fulfilling evaluations and corrective feedback, then we might begin to arrive at community.

There is no such thing as "perfect" per say. The term "perfect" information is not only meaningless, but it paralyzes consciousness by embedding the idea of a fixed status or standard in one's relationship with the world. Perfection is the lowest standard; it is a standard of zero. Perfection is the lowest standard you could possibly have because it isn't a possible standard, it is not achievable. Perfection represents the negation of emergence. In systems thinking, information is emergent, not perfect. In the mentality of "the market" there may exist the idea of "perfect" information, but in the real world, systems are designed and re-designed, "perfect" information is neither a useful nor an accurate idea.

Figure 18. *Resource tracking within an access system.*



The claim that there is "no way that anyone can get all the information they need in order to arrive at an economic decision", is a highly confused claim. What does it mean to "arrive at an economic decision"? What information is needed? What does it mean to "get all the information"? And, just who is "anyone"?

The price system is a way of communicating among the market, but in a family environment, there are better ways of communicating. Family members tell each other what they need and what they want, and they coordinate and cooperate from that point forward. Is it unwise to use the price system and open competition to manage a household or manage loved ones. Awareness of access and availability pervades; the family knows what is and is not possible. Learning about reality is foundational. The price system is a mechanism of communication and today we have better mechanisms of communication. We have computational processing technologies that may extend the functioning of our minds to more efficiently organize our economies.

The presupposition in the economic calculation problem is that the market does what it is claimed to do, to translate individual "subjective" values into "objective" information necessary for the "rational" allocation of resources in society. To a community, rational allocation is allocation toward human fulfillment.

Is it possible to facilitate feedback with respect to consumer preference, demand, labor value, and resource (or component) scarcity without the price system, subjective property values, or exchange? Just eliminate exchange and cooperatively create a direct control process and feedback link between the consumer and the means of production itself - a participative, real world habitat system. The consumer becomes both the user and the creator of the "means of production", and the infrastructure becomes nothing more than a tool that enables access by the community to the re-generational design of our habitat fulfillment services.

The same information technology systems that are being used in the market today would be used by the systems in this Community. Companies in the market this very day are using information technological services to calculate the production of their products and services in real-time and on-demand through both vertical [business integration] and horizontal [customer integration of information tracking and acquisition] utilizing live feed information and technical feedback. Society is now at a stage where its technological infrastructure is so superior to the technology possible conceived of when the economic calculation problem was thought up. Information technology is now to the point that individuals can share in real-time what is being consumed, and how and when and where and why, and its environmental effects such that humanity has the information available to re-orient itself when desired toward a direction of higher potential fulfillment.

Through measurement, society can process information into numerical correlation, and with that calculation process, done by complexly designed processing computation systems, a community can arrive at an optimal resource allocation and material decision for a given demand at a given point in time - this is true economic calculation.

The framework of thought that poses the economic calculation problem cannot conceive of a process of commonly formalized inquiry and re-engineered design [with transparent, real-time information feeds and fully automated production tools] to rationally fulfill identifiable, real world human [economic] needs. The problem was conceived of through the lens of a politically-organized social system and a market-structured economic system. The problem here is the conceptual framework of thought used to construct the "problem".

Price is determined within the market, which encircles itself [from externalities*] and produces its own structural values. Price isn't determined with conscience [as con+science] in mind. If a society wants to resolve the economic calculation problem's claimed "problem" of determining value, then it will have remove exchange explicitly [from its socio-economically encoded language]. In place of the "price mechanism" a society might use information systems and technology to "produce" a fulfilling environment for the whole [Earthly] community.

The existence of formalized algorithmic thought, as verifiably evidenced by technology debunks the "economic calculation problem" ... if the conceived idea of a formalized algorithm is understood.

In the market economy, it is true that there is no "perfect information" because between competing entities there is not trustworthy transparency; no one really knows the depth and breadth of scarcity because of State and business secrets, because of competition and hierarchy. Hence, no one can actually trust any figures that are thrown out by market entities, nor can anyone say that the market in any way accounts for scarcity in price figures. Scarcity is not quantifiable in any price because of the existence of the market. For their very survival, market entities and producers withhold information.

In a community there must exist absolute transparency of all resources, there must exist the value of sharing information for common benefit; and then a community creates formalized cybernated* algorithms, which denote scarcity of certain resources.

Measurement exists. Every material [resource] has a set of sensory-identifiable qualities, forms (structures), and states. For example, copper and other metals maintain the property of conductivity [of electricity] with different degrees (i.e., qualities) of efficiency. Materials can be compared by calculation between their measurements. Logical calculation is a particular form of integration.

It is possible to calculate a new orientational state based upon information in the total information system, and particular, the demand present in the decision system. A 'calculation space' is a mental (or computational) spatially-oriented and relational process that relies on the application of rules (programmable instructions) for the selection of one abstract object/entity from a given set of abstract/conceptual objects. It can either be reasoning-oriented (i.e., evaluation) or action-oriented (i.e., decision). Calculation accounts for referential information; the market de-references information creating pockets in our hearts and our souls.

The economic calculation problem claims that only a free market can determine an accurate price for economic goods because only a group of decentralized consumers projecting their subjective value into the market through the materialization of "price" is capable of organizing human socio-economic arrangements. The embedded claim is that there is no other way to end up with a "fairly accurate representation of how desirable something is" and "how scarce, rare or abundant it is" without the paradox of a subjectively objective price. The claim within that is that there isn't enough information input possible to determine and calculate production. Yet there is, it simply isn't transparently available at the moment because of the materialized acceptance of the market as the means of human fulfillment.

INSIGHT: *If you don't understand all of the pieces you aren't likely to understand the system.*

The economic calculation problem is almost a Luddite fallacy in clever disguise. The Luddites were 19th-century English textile artisans who protested against newly developed labor-saving machinery (i.e., technological automation) from 1811 to 1817. They did actually lose their jobs and were maybe ahead of their time in saying that everybody would lose their jobs to the exponentiation of efficiency of information technology. The exponential development of information technology will change the labor-productivity landscape forever; it is inevitable.

Fundamentally, the economic calculation "problem" exists in a different kind of thought paradigm than that which acknowledges the value of an access-based, transparently information rich, systematically understood and anticipated environment. The language which created the claimed "problem" can't even be used to understand the actual problem.

Cybernation has come to mean many things to many people. However, herein, it is defined as a formalized control process that feeds information from the results of its actions in an environment back into itself so that it can correct its trajectory [toward our most fulfilling purpose - the highest potential fulfillment of human need and well-being].

NOTE: *Economists refer to the natural ecological services of the Earth as "externalities" (i.e., they are external to their market calculations).*

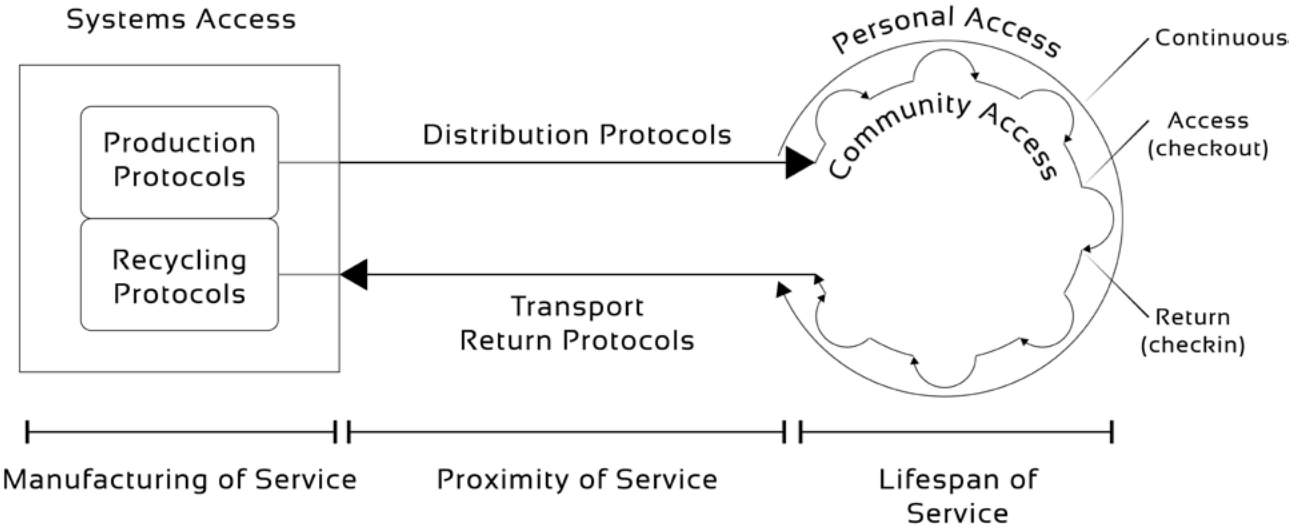
3.5.9 Computing systems and power

INSIGHT: *There is a distinct difference between [social] power embedded in an authoritarian hierarchy and the [technical] computing power of a computational system. This distinction must necessarily be understood for the "economic calculation problem" to be seen for what it truly is.*

'Computational power' refers to the speed that instructions are carried out by a computer. Computing power would include this, but would normally include other aspects of the system as well (i.e., all operations/operational processes), such as memory and bandwidth for i/o, and other hardware aspects of the system. In other words, computing power refers to the operation processing capability of a computing system; including, the types of operations the system can process.

Clearly, having more computational power allows a

Figure 19. *Model showing visual relationship between access designations and service design.*



computing system to do more [work]. Yet, computing power is not [authority-driven] socially hierarchical power (as power over strategy); instead, computing power is more akin to strategy added power. If for any given amount of computing power [a given amount of memory and compute cycles] and a particular task, there is an optimal system for doing that task with that amount of compute power.

If rational behavior is the [most] optimal way of meeting and completing a given task and we think of systems as living on a continuum, then as systems get more computational power they can choose actions that are closer and closer to being the/an optimally rational action.

It is important for us, as a society to come to the realization that we are going to have intelligent systems around us, and that we are going to have to choose what type of environment they facilitate in the creation of: an environment that brings out the best in people or an environment where they compete with, control, dictate to, limit, and reduce people (i.e., perform the role of government more efficiently). Hence, it is important for us to create an infrastructure today that will give us confidence that our well-being and fulfillment will remain strategically preserved and continue to reflect our goals as we continue to advance in our technological development and accompanying computing power.

If engineers that built bridges had the same levels of standards that business does for software then no one would drive on them. In other words, software businesses do not generally utilize provably safe mathematical tools in the design of their software.

In the case of a resource-based economy we are building and iterating the system in a transparent manner, piece by piece. During the design or re-design process we as a community design into (or encode, "write into") the system the properties that we would like the system to have, such as, "this system will prioritize needs that are required to support life and ecological stability over wants that are not required for life support". Note that to express such a statement a specification language is required.

Just as some Austrian economists put forward the "economic calculation problem", there are computer scientists who put forward what is known as "the halting problem". The halting problem states that you can never prove anything about an arbitrary computer program. The halting problem is true, in part. If you were to take a random arbitrary program that someone wrote, then proving properties of it may or may not be easy. Similarly, if you take a highly manipulated and obfuscated monetary-financial market, then calculating out resources, demand, production, and sustainability would not be easy (or even feasible). But, the system described herein is designed (or generated) from its very transparent inception to have "correctness", feedback, and safety properties designed-in.

The properties that we want the system to have need to be built into the system transparently and from its inception, or at least, next iteration. This is necessary if we want an economic decisioning system that does not generate de-generate propensities as behavioral characteristics of the system itself. In other words, the software of the economic decisioning system must be generated at the same time the proof for the system is created, such that the system doesn't produce economic operations that make it hard to identify and discern what is actually occurring in the system and whether the system is going to violate safety properties or develop further ambiguous and potentially dangerous behavioral characteristics.

Humans find parallel programming and calculating at the order of magnitude necessary for the operation of a societal-level economy particularly difficult. Hence, we need computing systems to perform these calculations for us. And, they must be designed so that they will safely serve as an economic infrastructure that we can trust, that we can iteratively vet, and that facilitate in the creation of habitat service systems that have the safety and fulfillment properties we want. And, from there, we can create more and more powerful and trusted systems through a process of iterative self-improvement, but controlled by the properties of safe proofing. Fundamentally, we want our decisioning system to reflect our highest direction and values, which in the case of a community are reflective of human well-being and ecological preservation.

We want systems that will facilitate our adaptive evolution into our higher potential selves - systems that help us to become that which we want at our deepest level. So, the challenge is not just the technical challenge of building these systems, but also identifying where we want to go, what is the future of humanity, what is the nature of the human experience, and what is it going to turn into? The human element is an integral part of this.

> **INSIGHT:** *If you can build, maintain, and generate trust with others, you can do anything. And to the extent you don't do that, it doesn't matter what principles you use, you'll have problems.*

3.5.10 Self-organizing systems

> **MAXIM:** *A system behaves in accordance with its [designed] nature.*

From an engineering perspective the design of a self-organizing (self-directing) system is generally viewed as comprising two different phases: first, the behavior of the system must be described as the result of interactions among individual behaviors, and then the individual behaviors must be encoded into controllers. Both phases are complex because they attempt to decompose a process (the global behavior or the individual one) that emerges from a dynamical interaction among its subcomponents (interactions among individuals or between individual actions and environment). In other words, a self-organizing systems decisioning process must be made explicit if global and individual behavior is to be understood and re-oriented toward greater fulfillment and well-being.

Since individual behavior is the result of the interaction between agent and environment, in an incompletely modeled (or inaccurately simulated) system it is difficult to predict which behavior results from a given set of rules, and which are the rules that will create a given behavior. Wherein, difficulties will occur in the decomposition of the organized behavior of the whole system into interactions among individual behaviors of the system components. Here, the understanding of the mechanisms that lead to the emergence of self-organization must take into account the dynamic interactions among individual components in the system and between components and environment. Given a set of individual behaviors in an obfuscated system it will be difficult to predict which behavior at the system level will emerge, and it is also difficult to decompose the emergence of a desired global behavior in simple interactions among individuals (i.e., the appearance of "irrationality"). In addition, the role of the environment in relation to the emergence of the global pattern should not be neglected in design.

3.5.11 Market demand manipulation

> **INSIGHT:** *Demand is directly related to population.*

In a community-type society, there are no for-profit entities are trying to maximize or otherwise manipulate human consumer demand for their advantage (e.g., profit). Instead, a community-type society is organized to maximize the fulfillment of human needs and individual preferences ("wants"). A community-type society is not designed to stimulate wants for brand-based commercial products, particularly those that would otherwise not be wanted (if not for the propaganda). The ways for-profit entities in the market maximize and manipulate human consumer demand include, but may not be limited to:

1. Advertising (& marketing) propaganda (psychological manipulation techniques).
2. Manufactured scarcity.
3. Manufactured obsolescence.
4. Recommendation services (e.g., Amazon Corporations recommendation interface, or YouTube recommendations).

Many (if not all) market demands are manipulated statistics. To maximize power and profit, market-State organizations do the following to maximize sales:

1. State propaganda is what governments do to conceal harmful behaviors.
2. Advertising is what corporations do to gain consumer demand and increase purchases of their products. Note here that advertising is propaganda, and some languages, like Portuguese actually use the word "propaganda" to mean "advertising" (i.e., they call advertising, propaganda).
3. Marketing is what individuals and organizations do to make themselves known in the market.

> **NOTE:** *Conversely, cooperation and the sharing of resources and of access is what the population of community does to maximize global human fulfillment.*

In terms of economic calculation, what is most relevant is the aggregate demand for a needed product(s), as well as its prioritization and any preferences associated with it. For instance, what is most relevant for production is how many of a specific type of size 6 shoes are required to meet total demand. Shoes are a life-support priority. The user will likely have a preference for shoe color, unless the shoe color is determined by some functional specification (e.g., white shoes for a special lab-type work environment). Here, a different preference will have a model identifier associated with that preference of specific product (e.g., a red preferred shoe).

Here, it is essential separate what is essentially needed in type and quantity (e.g., size 6 hiking-type boot), from what is a customizable preference (e.g., the boots color). The boot represents a needed life-support, architectural-clothing service object. The color of the boot represents a particular user's preference.

The total number of a product required [by users] can be acquired in two ways; it is possible to know the total demand for an object by acquiring data on:

1. The total number checked-out of the community library (i.e., how many are being purchased now and have been purchased in the past).
2. Survey data for how many people need (or, prefer) access to the object(s). Surveys are extremely useful for the collection of preference-type demands. Depending on context, survey results can differ from final consumption results, particularly under social influence.

Herein, the number of products in the economy is bounded by the number of people in the society (and therein, in each local habitat service system). There is a one-to-one (one person to one product) or a many-to-one (many people to one product) relationship between the number of products and the number of people. For instance, whereas one person may use a toothbrush, many people may use an airplane.

4 Optimal production calculation

A.k.a., Production design inquiry, production design protocol, production design computation.

The RBE macroeconomy may be subdivided at a high-level into three general categories (*below*). These categories are akin to a narrative, which basically says, "As a community, it is possible to re-design societal systems based on what data and what is technically possible". The three macro-economic sub-divisions are (Joseph, 2013):

1. **Global Resource Management** is the process of tracking resource usage, and hence, working to predict and avoid shortages and other foreseeable resource problems. The flow of resources is coordinated through openly trusted and emergently modified "designed-in" control.
   - We identify what is available through continuous resource surveying/monitoring.
2. **Global Demand Assessment** is the process of realizing the demands of the human population. Herein, the system structures the transport of information so that everyone can be made aware of new technical possibilities, and there can exist system-wide [socially] optimal solutions on *how* and *what* to produce. The global demand assessment identifies and processes the *needs*, *wants* and *preferences* of the community. In the accumulation of this information, we as a community find commonality [by measurable degree]. We refocus our awareness where necessary to determine new technical possibilities. When we share in our needs, then we may find we all equally share in our designs also.
   - We inquire into our needs and the needs of our ecology, and we share the information.
3. **Global [design] Production and Distribution protocols** is a "convention" of trust agreements that form a protocol on a network, an information transport protocol. Global design protocols create a platform for productive and distributive decisioning concerning changes to our habitat system.
   - We design, produce/manufacture/fabricate, distribute, and recycle all services the best we know how.

The Global Access System is designed around a macro-equative model (a formula or equation) that describes the flow of information and materials within each of the principle four economic sub-systems:

1. **The Resource Service Control System** exists as a series of information sensors (detectors or instruments) with the purpose of monitoring and tracking the location, consumption rates, regeneration rates, and recycling rates [within the hierarchy of decompositing/-ion systems], and hence, the probable predictive availability of access to common resources. "Resource management" is essentially the process of '**resource accounting**'. Resource accounting is the only possible way in which all of a community's common resources can be "made available to everyone".

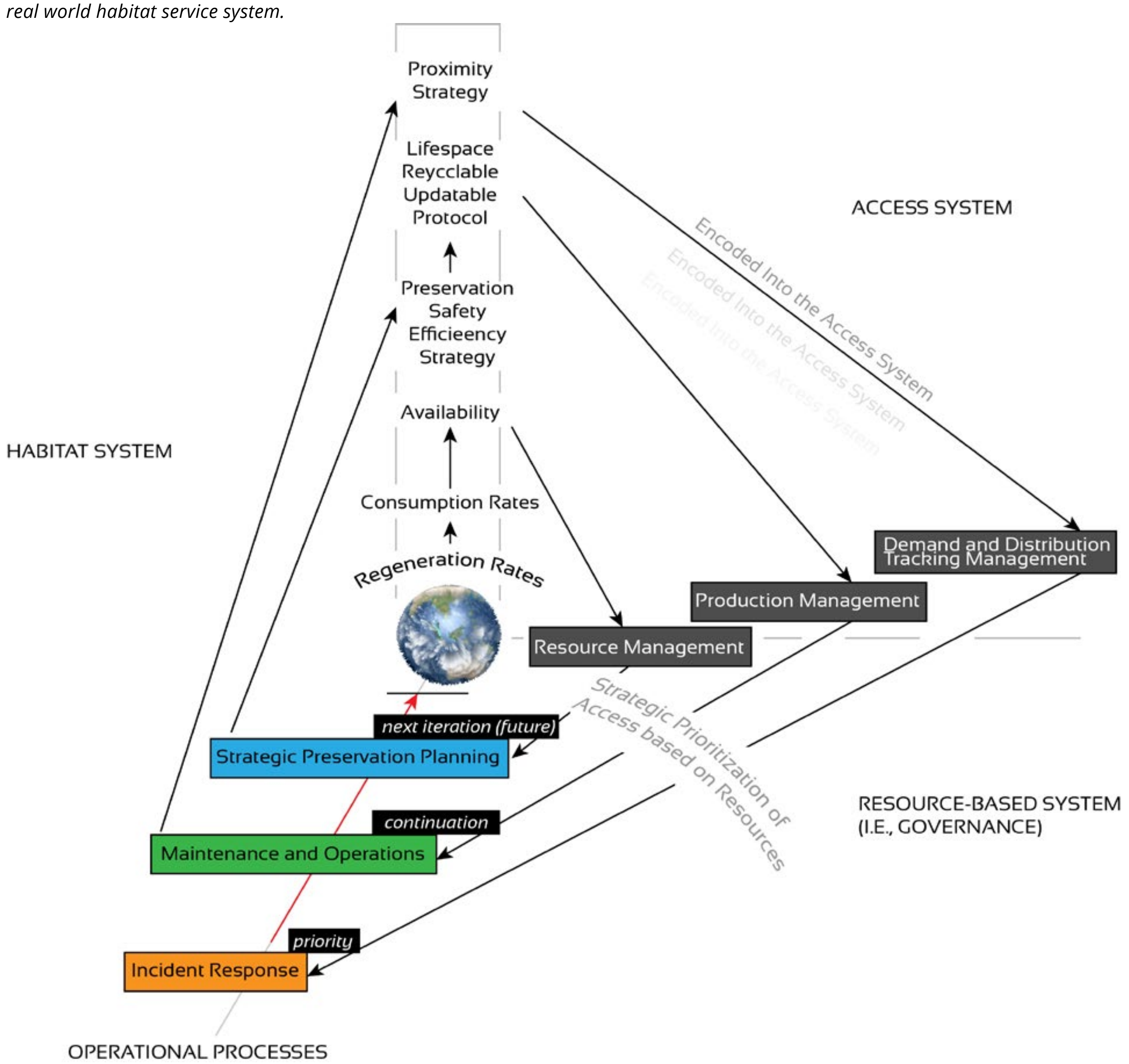
Sensors record data that may used to determine orientation (in space) and decisioning (by means of computation upon recorded and stored data to determine what actions are optimal for an intentionally set task).

Resource accounting utilizes dynamic feedback from an Earth-wide/community-wide accounting system that shares data about all relevant [transactions of] resources. To whatever degree technically possible, all raw materials and related resources are traced as they move through the known systems, in as close to real-time as possible. Herein, a critical efficiency calculation for sustainability involves: (1) maintaining equilibrium with the Earth's regenerative processes; (2) maximizing the use of the most abundant materials; (3) minimizing anything with emerging scarcity. If the sharing of information is not acceptable in a society, or the medium (i.e., transport protocol) by which information is shared cannot be trusted, then it is wise to explore such a society's socio-economic system and introspect on the type of people it is likely to generate.

- **The Material Inventory (or resource inventory)** - Material use per a given production output is strategically calculated to assure the use of the most conducive and abundant materials known. In other words, a material inventory exists (a.k.a., resource inventory) for use by a computing system that calculates the optimal transport and integration of material into the community's "materialized model", by item and by a set of factorial criteria, including but not limited to: (1) material integration durability (i.e., lifespan); (2) material recycle-ability (i.e., 'recyclability'); (3) material quantity; (4) material accessibility (temporal and spatial); and (5) material regeneration rates (i.e., abundance). Products would be designed to be both durable and recyclable, since the product's entire lifecycle would be designed by the community of users of the service themselves. Why would we cooperatively design otherwise?

The criteria can be generally categorized into two different types: **conduciveness/applicability** and **abundance.** The two basic questions are: What is the "conduciveness/applicability" of this material to the projected service? And the second is, what is the material's overall state of "abundance"? Here, 'conduciveness' relates to the functionality of the proposed use of the material (i.e., how functional is the material?); and it based on the material's properties, the properties of other materials, and the identified design requirements? 'Applicability' is similar to 'conduciveness'; it refers to how relevant a particular material is to a given application. 'Abundance' refers to how much of a material is available, and hence, its rate/dynamic of regeneration (or "scarcity"). Herein, materials are compared by calculation of the available data. In other words, what occurs may be referred to as a 'synergistic efficiency comparison' between materials and their ability to fulfill requirements.

Figure 20. *Accountable dimensions for decisioning within a community-type society. A community-type society resolves decisions by accounting for organization of the system composed of a set of processes that sub-divisible by resource, access, and participation in a real world habitat service system.*



Herein, technical product[ive] objects have:

- **Attributes:** such as lifespan, maximum size, minimum size, maximum temp, minimum temp, etc.
- **Relations:** such as "a kind of", "is a part of", and "has parts", etc.
- **Behavioral functions:** such as co-occurrences, becomes, evolves from, and affects.

2. **The Production Service Control System** is designed to optimally and scientifically engineer and manufacture solutions to technical economic production needs. The objective of the Production Management System is accomplished through the application of three *production process strategies*:

   - **Strategic preservation** - maximize the preservation of resources. This strategy involves a characteristic design protocol - goods are designed to "last" (i.e., longer usability & less maintenance)
   - **Strategic safety** - minimize the damage to ourselves and our environmental habitat. This strategy involves a characteristic design protocol - goods are designed to be recyclable or decomposable.
   - **Strategic efficiency** - increase efficiency for the mechanics of production and energy transformation itself. This strategy involves a characteristic design protocol - goods that evolve rapidly are designed to be automated, updatable, and modular so that they are adaptively responsive to individuals in the community. Herein, the "means of production", which refers to the actual tools and methods used in the production itself, are accounted for and optimized in their design as our technical capability advances. The "means of production" of anything is directly related to the state of technology and the underlying social conditions.

   The strategies herein are encoded into the Community's decisioning system through a transparent and participatively formalized macro-calculation.

   Strategic design statements orient the decisioning system in the direction of strategic human fulfillment, and to do that, a population must use accurate and sufficient information.

3. **The Demand and Distribution Tracking System** tracks the populations needs and distributes goods and services in an optimal, preferential, and systematized manner. The "demand" aspect of the system is informed by the population's inquired needs (i.e., "demands"). The 'distribution' element follows a **strategic proximity strategy** that seeks the localized cradle-to-cradle usage and recycling of good /services in an effort to minimize energy expenditure and optimize sustainability. Herein, 'localization' refers to the use and regeneration of resources as close as proximity will possibly (i.e., technically) allow, which reduces the transportation requirements of resources. The distribution of goods and services occur through 'general' and 'special' *distribution centers*. A distribution center is essentially a "check-out" facility, akin to a library. 'General distribution centers' exist to distribute personal and community access goods and services of a 'non-geographic use' specific nature. 'Special distribution centers' exist in areas where certain, specialized goods are utilized (saves energy & less transport), these have a 'geographic use' specific nature.

4. **The Collaborative Design Interface (CDI)** - This interface is part of the [user] front-end of the decision system. It visualizes the collaborative demand-design dynamic of the community. The CDI could be considered the "new market", the market of ideas and designs, of needs and solutions – it is a market for sharing in, not a market for competition. If hierarchy does appear, then competition for the redesign of the system toward greater neutrality will naturally emerge for the structure facilitates such adaptation. After demand (or need), design is the first intentional step in decisioning. This interface can be engaged by a single person or by interdisciplinary teams; it may be participated in by everyone. It is a single contribution interface with a framework capable of supporting coders, designers, editors, and end users.

5. **The natural environment** regenerates our lifeground and it gives us back information (Read: negative feedback; signals) after we have made a change.

4.1 Production calculation

A.k.a., Macro-economic resource-based calculation, macroeconomic calculation (macro-economic, macroeconomic); global access calculation.

The decision system of community uses a formalized production calculation process for all serviced productions, which are a function of optimized design in production, distribution, and recycling. In other words, technical service designs are optimized in their *total design efficiency* by optimizing production, distribution, and recycling. These are micro-calculation constraints placed upon decisioning in the system. It is important to remember that evolution implies constraints - evolution doesn't pick the least efficient path; evolution selects for efficiency (e.g., being able to avoid predators and preserve resources is efficient if you are trying to survive and procreate). Hence, we select for efficiency processes so that we can maximize the work that we can do. Inefficiency just uses up unnecessary resources.

In some sense, the following "strategic design statements" could also be considered to be 'network resilience' design principles (or at scale, "protocols"). And, in order to apply these principles toward the "arrival at" or "construction of" a common decision [space] there must concurrently exist trusted transparency to information about the iterative, digital [model/simulation] construct and material structure of the total habitat community (over time).

In community, we live in an openly navigated and steered environment [for our resilient adaptation toward a higher potential state of expression]. Herein, a resource-based economy may be referred to as a massively decentralized and distributed resiliency network for resource transformation and transport by formalized protocol. It is a resource-based system designed for an adaptive fulfillment orientation using a set of emergently defined variable measures formulated into a conditional statement known as a protocol.

Production must be calculated based on:

1. Demand (quantity and preference).
2. Availability (production and stock).
3. Objectives (flows and controls).

4.1.1 Design efficiency and design optimization

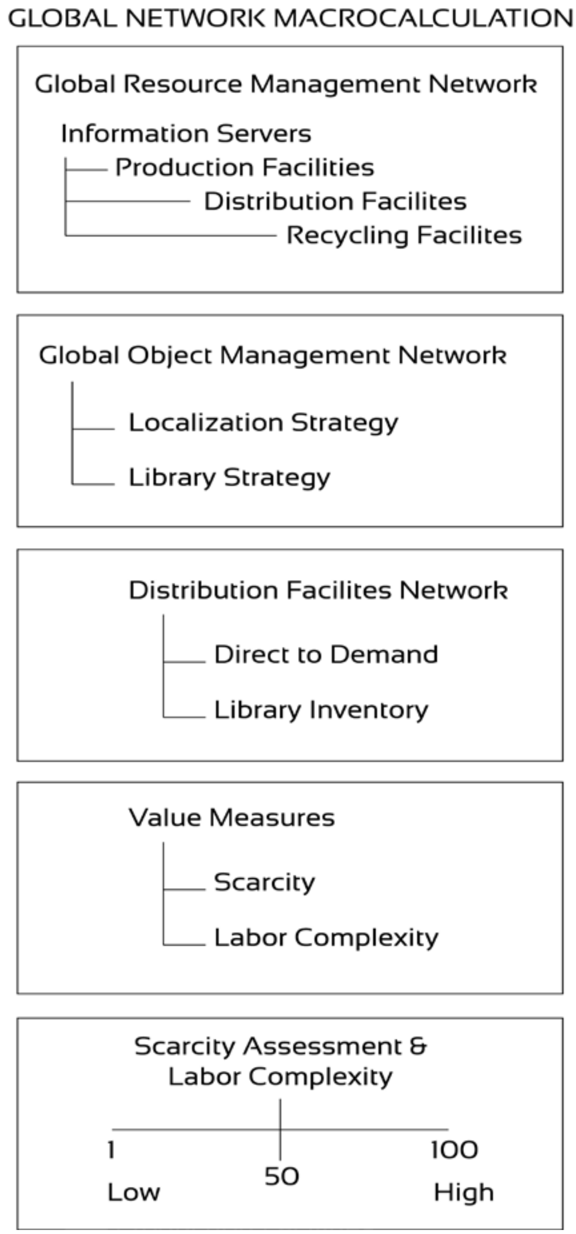
The term design efficiency refers to the *optimized efficiency function* and the resulting *optimized efficiency standards* for calculating the feasibility, viability, and ultimately, acceptability (i.e., socially optimal; usability) of design solutions. 'Efficiency standards' are the 'standards' to which a given design must conform -- they assess the feasibility of the design and determine whether its encoded orientation is divergent from our values and ultimate direction. This 'feasibility assessment' is calculated automatically and algorithmically. Everyone can *adapt* as well as *audit* its design, which creates system-wide transparency and encodes an accountability incentive into the system. The system maintains this characteristic due [in part] to its de-centralized form, and the structural design of the protocol itself that makes it open to auditing by its users. This is real [world] technical efficiency.

Optimization and strategic efficiency processes are encoded via a set of 'protocols' and 'feasibility inquiries' into the total calculating decision system wherein the decision space becomes one of anticipatory design.

Broadly speaking, design efficiency has three general elements:

1. **Labor efficiency** becomes consumed by automation and human labor exists where desired and required.
2. **Material efficiency** refers to how well the population utilizes the raw materials of the Earth; including the materials we can create (i.e., material sciences).

Figure 21. *Simplified macrocalculation for a global access network.*



3. **Systems efficiency** controls for weakness in the system.

The macro-calculation is a set of four functional process requirements (a rule structure) that all solutions (acceptable solution designs) must adapt to; each of which relates to a stage of material cycling (design, production, distribution, and recycling):

1. *Optimized* **design efficiency** - All product designs must adapt to optimized design efficiency function (sub-process).
2. *Optimized* **production efficiency** - All product designs must adapt to optimized production efficiency function (sub-process).
3. *Optimized* **distribution efficiency** - All product designs must adapt to optimized production efficiency function (sub-process).
4. *Optimized* **recycling efficiency** - All product designs must adapt to optimized production efficiency function (sub-process).

In other words, all service-objects (products, services, etc.) must be well designed, and meet efficiency standards. These material cycling functional process requirements (rules) can be composed into a functional protocol (or macro-calculation). There are two primary parts to the macro-calculation: the production function and the design efficiency function). The production function

4.1.2 Design calculation

A.k.a., The material function, the production function, economic optimization, the global production and distribution protocol.

The design calculation is a linear process involving decisional aspects of material production and material cycling, from design, to production, to distribution, and recycling. The calculation may be otherwise be described as a supra-function (supra-process or protocol). This function uses dynamic feedback from an earth-wide accounting system about all relevant resources that pertain to all production and general materials cycling. In a sense, this is a sustainability protocol for material cycling (i.e., it allows humans to sustainably cycle materials through its habitat service sub-systems).

4.1.3 The production calculation function

The **production function (production efficiency macro-calculation)** exists to maximize the design efficiency of solutions to human economic-resource fulfillment (note: this is a rule structure). The sustainability of a society can be planned through the use of a production protocol (function, $\mathbf{f_p}$) in which the properties of all planned [habitat service phase] elements are maximized (→ *max*):

Protocol: $\mathbf{f_p} (\mathbf{E_{design}} , \mathbf{E_p} , \mathbf{E_{dist}} , \mathbf{E_r}) \rightarrow max$

This is a protocol: production [of service-products, solutions] is a function that includes (a calculation of total design efficiency, a calculation of production efficiency, a calculation of distribution efficiency, a calculation of recycling efficiency) all of which are to be maximized.

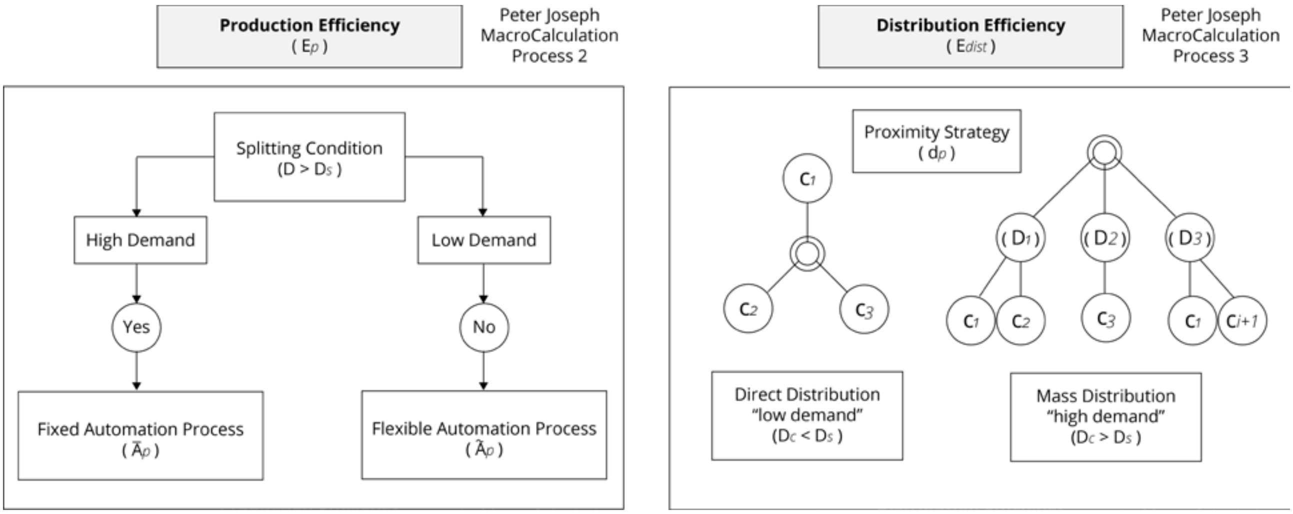
Wherein,

1. $\mathbf{f_p}$ - a production function[al]

   A. $\mathbf{E_{design}}$ - total design efficiency
   B. $\mathbf{E_p}$ - production efficiency
   C. $\mathbf{E_{dist}}$ - distribution efficiency
   D. $\mathbf{E_r}$ - recycling efficiency
   E. → *max* - maximize

A solutions (products) must meet or adapt to the

Figure 22. *Macro-economic calculation for production efficiency and distribution efficiency processes.*



current efficiency standard. All designs must adapt to:

1. Optimized design efficiency function (sub-process).
2. Optimized production efficiency function (sub-process).
3. Optimized distribution efficiency function (sub-process).
4. Optimized recycling efficiency function (sub-process).
5. Optimized recycling conduciveness function (sub-process).

4.1.3.1 The optimized design efficiency process (process 1)

The efficiency of a design ($\mathbf{E_{design}}$) can be described by a design function ($\mathbf{f_{design}}$) in which the properties of all planned design elements are maximized:

$$\mathbf{E_{design}} = \mathbf{f_{design}} (\mathbf{t_d} , \mathbf{A_{design}} , \mathbf{N}c , \mathbf{c_r} , \mathbf{H_L})$$

Design efficiency = the current design efficiency standard, which is a function of the optimization of (maximized durability, maximized adaptability, maximized standardization, maximized recyclability, maximized automation)

The current efficiency standard is labeled as: $\mathbf{E^i_{design}}$

Wherein,

1. $\mathbf{E_{design}}$ - <u>total design efficiency</u>

   A. $\mathbf{E^i_{design}}$ - the current design efficiency <u>standard</u>
   B. $\mathbf{f_{design}}$ - design efficiency <u>function[al]</u>

   1. $\mathbf{t_d}$ - evaluative sub-process to determine <u>durability</u> of design and compute acceptability.
      i. Designs are strategically maximized for durability; strategically maximized durability.
   2. $\mathbf{A_{design}}$ - evaluative sub-process to determine <u>adaptability</u> of design and compute acceptability.
      i. Designs are strategically maximized for adaptability; strategically maximized adaptability.
   3. $\mathbf{N}c$ - evaluative sub-process to determine minimum number of <u>genre components</u> of design and compute acceptability.
      i. Designs are strategically maximized for standardization; strategically maximized standardization.
   4. $\mathbf{c_r}$ - evaluative sub-process to determine <u>recycling</u> conduciveness of design and compute acceptability.
      i. Designs are strategically maximized for recyclability; strategically integrated recycling conduciveness.
   5. $\mathbf{H_L}$ - evaluative sub-process to determine <u>human effort</u> expenditure (or “labor”) of design and compute acceptability.
      i. Designs are strategically maximized for automation; strategically conducive for labor automation.

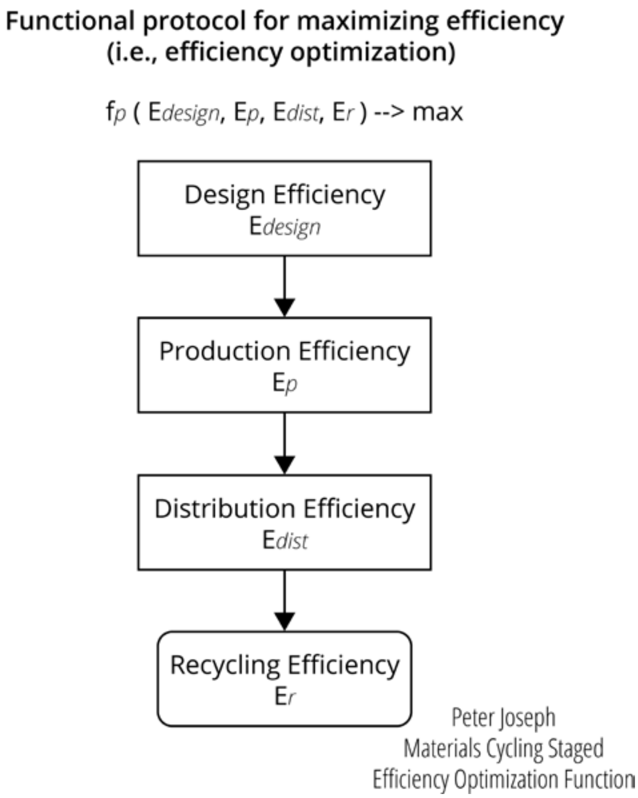
A product's design (i.e., a solution) must meet or adapt to these criteria. The efficiency of a design is conveyed by how well it meets the specified efficiency criteria set by the current efficiency standard $E^i_{\mathbf{design}}$. And, what a population desires is the maximization of functional efficiency.

The five evaluatively efficiency inquiry sub-processes are:

1. **Strategically maximized durability ($\mathbf{t_d}$)**

   $\mathbf{t_d} \in \mathbf{E^i_{design}}$
   Maximized durability is an element of the current

Figure 23. *Macro-economic calculation for maximization of total efficiency during the materials cycling process stages of design, production, distribution, and recycling.*



design efficiency standard.

[Strategically] Maximized durability is calculated as:

$t_d (d_1 , d_2 , ... , d_i)$
Total durability is a list of the durability of all individual components of a system.

$d^o_1 , d^o_2 , ... , d^o_i$
It is possible to optimize the durability of each designed component.

$t_d (d_1 , d_2 , ... , d_i) \rightarrow max , t_d = t_{max} (d^o_1 , d^o_2 , ... , d^o_i)$
Maximize total durability of all components of the solution or system, by optimizing each individual component to its maximum.

Solutions ought to be produced as strong and long-lasting as relevant, based on materials selection and materials replacement (i.e., interchangeability). Optimized durability refers to the strategic material integrity of the projected [service] system, and also, its outputs (i.e., usable products/goods; technology). Herein, the concept, "strategic", is important; it qualifies the optimization of durability to account for the factor of time in its operatively predictable [lifespace].

This micro-calculation is a synergistic design calculation [upon a network transport protocol] where the notion of the "best" material for a given purpose is always relative to other inputs; notably, the parallel production needs that also might require that type of material. A 'community' does not "waste" materials; it coordinates the utilization of materials. In other words, the decision to use a specific material is assessed not only for its use in a specific [construction] task, but also by comparing it to the needs of other productions (pre and post, and trending), which require similar efficiency.

Nothing exists outside this systems-centric comparison. All production decisions (modifications to our common heritage) are made with consideration of the largest system as our reference, and they are transparent.

In concern to planning, a "service production's" life [space] is planned for, so that we may replace (i.e., 'extropy' - export entropy) and interchange.

2. **Strategically maximized adaptability (A_{design})** - design for the highest state of flexibility for replacing component parts in engineered product[ion] services. Here, designs facilitate the ease of replacement of components and services as needed [through modularity standardization] to maximize the full lifespan of the product[ion] (Read: calculate for '*extropy*' - the exportation of entropy by replacement). Different production components have different rates of change and this means a system of "adaptability" and active "updating" can be foreshadowed through trend analysis, with the resulting [predictable] expectations built into an existing design to the best degree possible. When products are integrated into "production services", then adaptation can be *modularized*, systematically producing a more resilient form of a system.

At the core of "lifespace/lifetime design" is design-for-disassembly and for modularity. Design-for-disassembly is synonymous with a user's ability to "look under the hood" of a certain device (if it just open source or in the case of AI, it assists you in understanding itself), and to audit its systems. Whereupon, interface modules are physically efficient interchangeable units of functionality; they have 'compatibility'. Modules are interchangeable units of functionality.

Optimized adaptation occurs [in part] due to universal standardization (or 'integration'), and the structures that are produced may be said to be "integral" to the overall purpose of the system. Essentially, services and products are designed to be modified, adapted, and otherwise update through 'integrated modularity'.

3. **Strategic and universal standardization of genre components (N*c*) | Interoperability** - all new designs either conform to or replace [if they are updated] existing component designs, which are either already in existence or outdated due to an evolution in technical efficiency. In other words, compatibility is being accounted for here. "Genre" standardization includes not only the standardization of a product, but is more specifically referring to the application of standardization throughout the whole of the habitat service system. Universal standardization is essentially a set of optimized protocols set upon a massive parallel information sharing transport [protocol] network. The result is a universal compatibility of all components associated to a given service genre. In early 21st century society, this lack of standardization is a source of not only

great waste, but great instability in the functioning of common goods and its stressful inefficiencies have social ramifications. This logic applies to every scale of genre component, from the habitat service systems themselves to itemized in-service technical productions. Essentially, production services are standardized in prototypical ways through trusted protocols that maintain a continuously integrated dynamic. The elements of a system must be compatible.

Herein, strategic standardization is represented by the variety of genre components available:

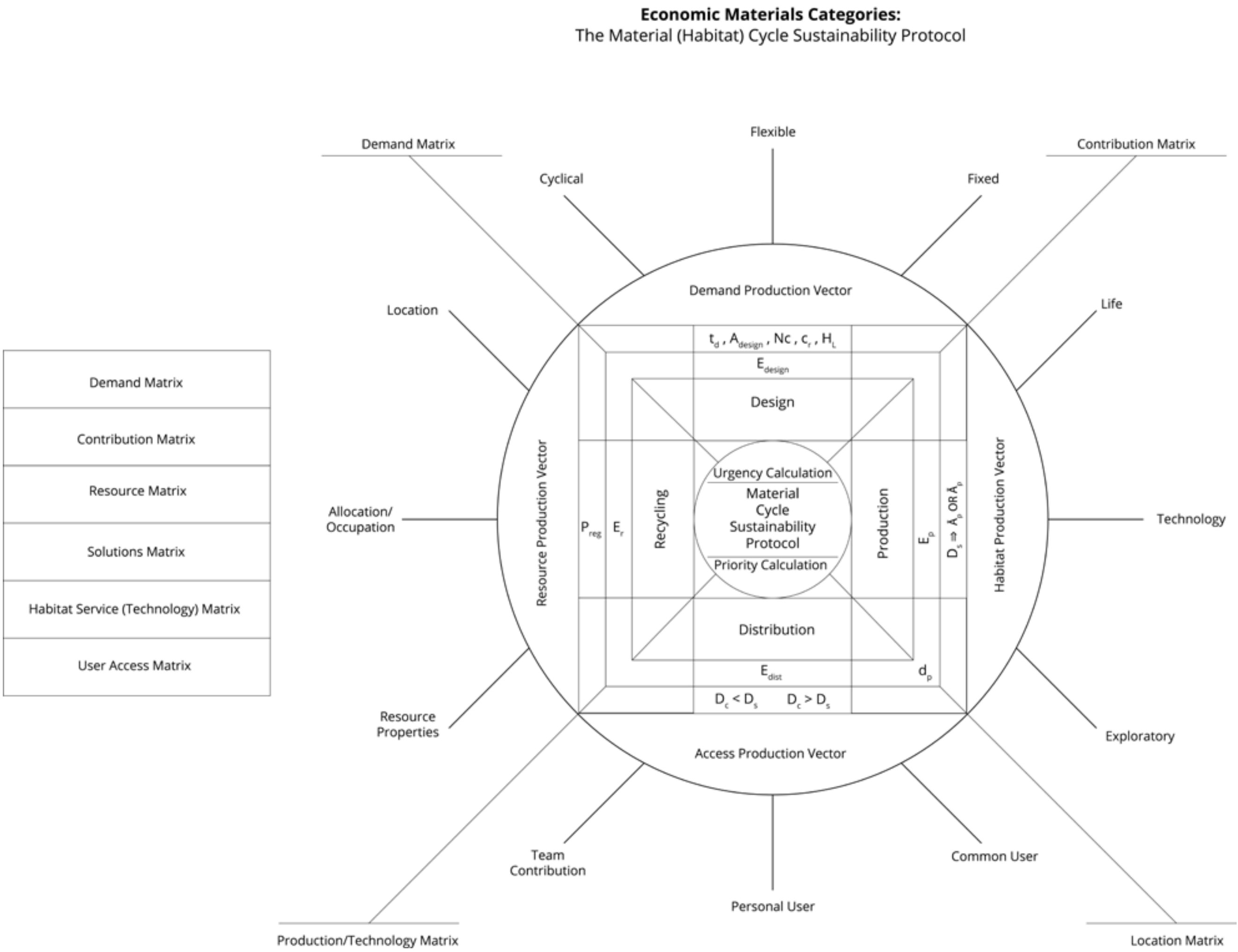
$$\mathbf{g^1{}_c\ ,\ g^2{}_c\ ,\ldots,\ g^i{}_c\ ,\ldots,\ g^{Nc}{}_c}$$

The goal of a trusted and cooperatively explored environmental "game" is to work together to minimize the total number of genre components (**N***c)* in our creations. Herein, the standardization of the trust processes will enable the potential of lowering the number **N***c* to its possible knowable minimum.

It is optimal to simplify the way materials and the means of production are used, so that the maximum number of goods can be produced with the least variation of materials and production equipment for the highest potential fulfillment of everyone.

4. **Strategically integrated recycling conduciveness (c_r)** - every design must conform to the current state of regenerative possibility. The breakdown of any good must be anticipated and allowed for in the most optimized way. The current state of component and material re-use is optimized within

Figure 24. *Figure shows the matrices that must be designed and calculated for by the production decision protocol.*



the very design of the [production] service itself. Note, this does not happen in early 21st century society, in any efficient way. In the Community, when a products useful lifespan is complete, then it is returned for direct reprocessing. Herein, there are de-composition and recycling protocols, which are built into the manufacturing system.

The system is optimized toward "closed loop" manufacturing where 'waste' is the feedstock for other life essential processes. Fundamentally, there is no such thing as "waste" in the natural world. In early 21st century society, most people give very little consideration to the role of material regeneration, and how the design practices of any given society must account for this if it is to remain sustainable. It may be interesting to note here that the very idea of 'regeneration' has a detrimental impact on market competition, for it connotes its design corollary, 'abundance' -- abundance de-constructs markets. An abundance of any material resource will either reduce price/profit for market entities that deal in the commodity, or it will kill the market for the material entirely.

The idea of "cradle-to-cradle design" (or re-cycleability and compatibalism) refer to the idea that once a product is obsolete 100% of the material can be used elsewhere, which may involve inclusion in another technology or decomposition into a more elemental form.

5. **Strategically conducive for labor (H_L) and automation (A_L)** - this means that the current state of optimized and automated production as well as human [labor] input is directly taken into account. This is denoted by human labor **(H_L)** and automated labor (**A_L**). Automated labor refers to the application of "mechanization". All transactional [task] effort may be calculated so that we have the automation conduciveness/applicability data [probabilities] available to us in decisioning. Herein, the design of decisions are the most conducive to the current state of production with the least amount of human energy expenditure, where humans desire. This means that a given service design will account for the dynamic state[d mixture] of labor and automation; wherein, we design the removal of human involvement whenever desired possible by more by efficient design. Also, part of the efficiency equation is to make the production easy to re-produce by automated means, taking into account the current state of automation technology.

We understand the benefits of "appropriate automation" of production or other tasks whenever repetitively banal, dangerous, or otherwise intrinsically unrewarding. These tasks can be carried out with computer robotics assistance in place of human labor.

Herein, two general facility types are distinguished: one for high demand or mass production and one for low demand or short-run, custom goods. The high-demand facility is a more "fixed-type" system and the short-run demand facility is a more "flexible-type" system. "Fixed automation", also known as "hard automation," refers to an automated production facility in which the sequence of processing operations is fixed by the equipments configuration. It is fast, but has less variation in output design capacity. "Flexible automation" can create more variation, but the disadvantage is the time required to reprogram and change over the production equipment. These terms are common to the manufacturing and robotics industry when it comes to production facility design.

Human effort (labor) is reduced to its desired design minimum:

$$\mathbf{H_L} / (\mathbf{H_L} + \mathbf{A_L}) \rightarrow \min$$

This is the expression in its expanded form:

$$\mathbf{H_L}(\mathbf{l_1}, \ldots, \mathbf{l_i}) / \mathbf{A_L}(\mathbf{l_1}, \ldots, \mathbf{l_i}) \rightarrow \min$$

Here, labor complexity means estimating the complexity of a given production. Complexity, in the context of an automated oriented economic sector can be quantified by defining and comparing the number of "process stages". Any given good production can be foreshadowed as to how many of these "stages"of production processing it will take. It can then be compared to other good productions, ideally in the same genre, for a quantifiable assessment. The units of measurement are the stages, in other words. For example, a chair that can be molded in 3 minutes, from simple polymers in one process will have a lower 'labor complexity' value than a chair which requires automated assembly down a more tedious production chain with mixed materials.

Levels of automation score (levels of automation):

1. Automated without human supervision control and

self-sustaining (full automation, no human effort required)
2. Automated with human supervision control and self-sustaining
3. Automated with human supervision control and non-self-sustaining

These three levels include:

1. Monitoring; supervisory control (automated or human).
2. Human operations management - work flow, stepping the process through states to produce desired end result. Maintaining and optimizing the process: shifts, hours, minutes, seconds.
3. Strategic planning and logistics for automation. Establishing the planned schedule, metered use, delivery of automation in years, months, weeks, days, shifts.
4. Sensors to automate data collection.
5. Algorithms to automate data processing.

4.1.3.2 The optimized production efficiency process (process 3)

Production efficiency is notated as: $\mathbf{E_p}$

Production efficiency ($\mathbf{E_p}$) moves a demanded production to one of two production facility types*:

1. High demand (mass products)
2. Low demand (customized products)

** This is a common distinction in manufacturing*

A class determination is used to split demand into two [production] categories with a splitting variable, $\mathbf{D_s}$. Here, the choice of production type/facility is based upon the nature of the production's requirements. The following expression represents the splitting condition (is a simple decision with a threshold calculation):

If $\mathbf{D} > \mathbf{D_s}$ Then $\mathbf{\bar{A}_p}$ Else $\mathbf{\tilde{A}_p}$

All product designs are filtered by a demand class determination process (**D**). The demand class determination process filters based on the standard demand splitting value ($\mathbf{D_s}$) set for low demand or high demand. All low consumer demands are to be manufactured by the flexible automation process and all high consumer demands are to be produced by the fixed automation production process.

If demand is greater than the splitting value of demand, which is a threshold, then fixed automation is used; and, if it less than the threshold value, then flexible automation processes are used for production.

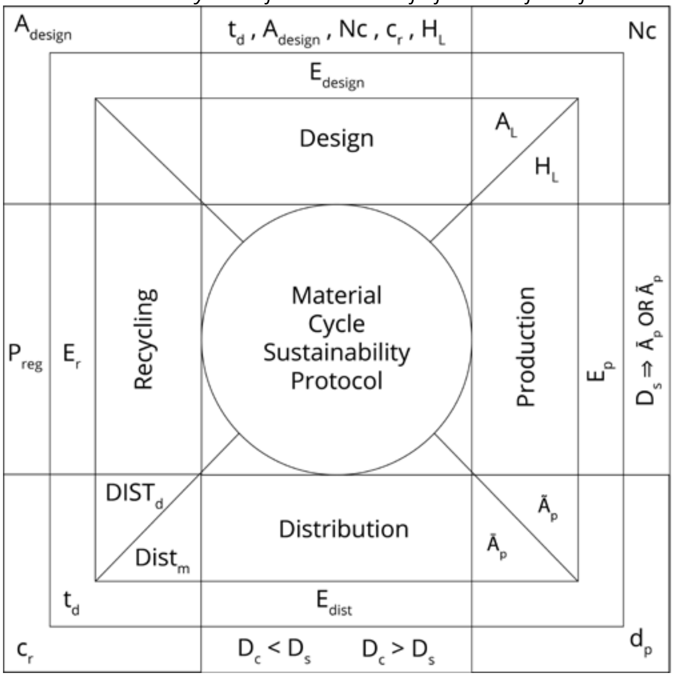
The 'high demand' category assumes fixed automation $\mathbf{\bar{A}_p\ (a_i)}$, meaning unvaried production methods ideal for high demand/mass production. The 'low demand' category uses flexible automation $\mathbf{\tilde{A}_p\ (t\ ,\ D_c(t)\ ,\ a_i)}$, which can produce customizations, but usually in shorter runs. Hence, this schematic assumes only two types of production facilities are needed (fixed and flexible automation). However, there could be more production facility types based upon production factors that generate more splitting conditions.

For example, most product designs are filtered by a **demand class determination** process. The demand class determination process filters based on the standards set for [Low Demand] or [High Demand]. All Low Consumer Demand product designs are manufactured by the 'Flexible Automation' process. All High Consumer demand product designs are to be manufactured by the 'Fixed Automation' process.

The manufacturing of all demand (low and high consumer demand) products designs will be regionally allocated for production as per a Proximity Strategy ($\mathbf{d_p}$) of the manufacturing facilities.

4.1.3.3 The optimized distribution efficiency process

Figure 25. *Material cycle sustainability macro-calculation function. The four phases of the development of service systems with common resources are: design, production, distribution, and recycling. This is an optimization function for the maximization of efficiency in order to cycle materials sustainably throughout the habitat. This protocol combines with economic calculations and a parallel inquiry process in order to materialize service systems for the mutual fulfillment of all of humankind.*



(process 3)

Distribution efficiency is notated as: $\mathbf{E_{dist}}$

After process 2, the product design is now a product to be distributed to the consumer (user). At this stage, there is the application of optimized distribution efficiency. Most products are allocated to occupying entities with some georeferenced location.

As with process two, there are two categories for demand, each with a separate distribution process:

1. Low User Demand (a.k.a., low consumer demand) products follow the 'direct distribution' process ($\mathbf{DIST_d}$).
2. High User Demand service productions follow the 'mass distribution' process, which would likely be the libraries, access centers, or direct to user where possible ($\mathbf{DIST_m}$).

Both the Low User Demand and High User Demand product will be regionally allocated as per the Proximity Strategy ($\mathbf{d_p}$), as before.

A class determination is used to split demand into two [distribution] categories with a splitting variable, $\mathbf{D_s}$. In general, the $\mathbf{D_s}$ for process 2 and 3 are the same $\mathbf{D_s}$.

1. In low usership demand situations ($\mathbf{D_c} < \mathbf{D_s}$) distribution is direct to the user.
   - Direct distribution - low demand.
2. In high usership demand ($\mathbf{D_c} > \mathbf{D_s}$), distribution is logistically arranged through a planned massive distribution model involving access centers, storage centers, and direct to user elements.
   - Mass distribution, high demand.
   - In this case, generally, the product goes to intermediary facilities, such as libraries ($\mathbf{D_i}$) to provide accessibility to the potential users/ consumers ($\mathbf{C_i}$) .

The proximity localization strategy ($\mathbf{d_p}$) involves the prioritization of localization in terms of:

1. **Sourcing** of materials used in production is localized & raw material re-production are localized.
2. **Production** and **recycling** is localized.*
3. **Production machinery** used in the production process is localized [at a prioritization scale].*
4. **Distribution** maintains distributed localization.

*** 3D printing** - *localized distributed manufacturing based on digital fabrication. 3D printing is a form of localized and distributed production.*

4.1.3.4 The optimized recycling efficiency process (process 4)

Recycling efficiency is notated as: $\mathbf{E_r}$

All voided (no longer used) products will follow a regenerative protocol.

$\mathbf{P_{reg}}$ is the primary regenerative protocol for $\mathbf{E_r}$.

$\mathbf{P_{reg}}$ includes a scarcity measurement for resources (materials). The scarcity value is placed on a numerical scale from 1 to 100. One would denote the most severe scarcity with respect to the current rate of use - and 100 the least severe. Fifty would mark the steady-state dividing line. For example, if the use of wood lumber passes below the steady state level of 50 - which would mean consumption is currently surpassing the earth's natural regeneration rate - this would trigger a counter move of some kind - such as the process of 'material substitution' –hence the replacement for wood in any given future productions, finding alternatives.

Products, materials and their life-cycles, may be designed for recyclability (recycling) and/or reuse (re-use) in the following ways:

1. Direct reuse - whole product/material is reused.
2. Parts reuse - part of the product is reused.
3. Repurpose - all or part of the product is repurposed for another use.
4. Mechanical recycling.
5. Chemical recycling.

4.2 The global production and distribution service architecture

The principal architectural layers of a global production and distribution service include:

1. **Design services** - These computing servers connect the design[-ing/-ed] protocols to the designers/ consumers, while allowing for trusted modification with relevant physical data to guide the process of service orientation and creative product integration [in the most optimized and sustainable manner].

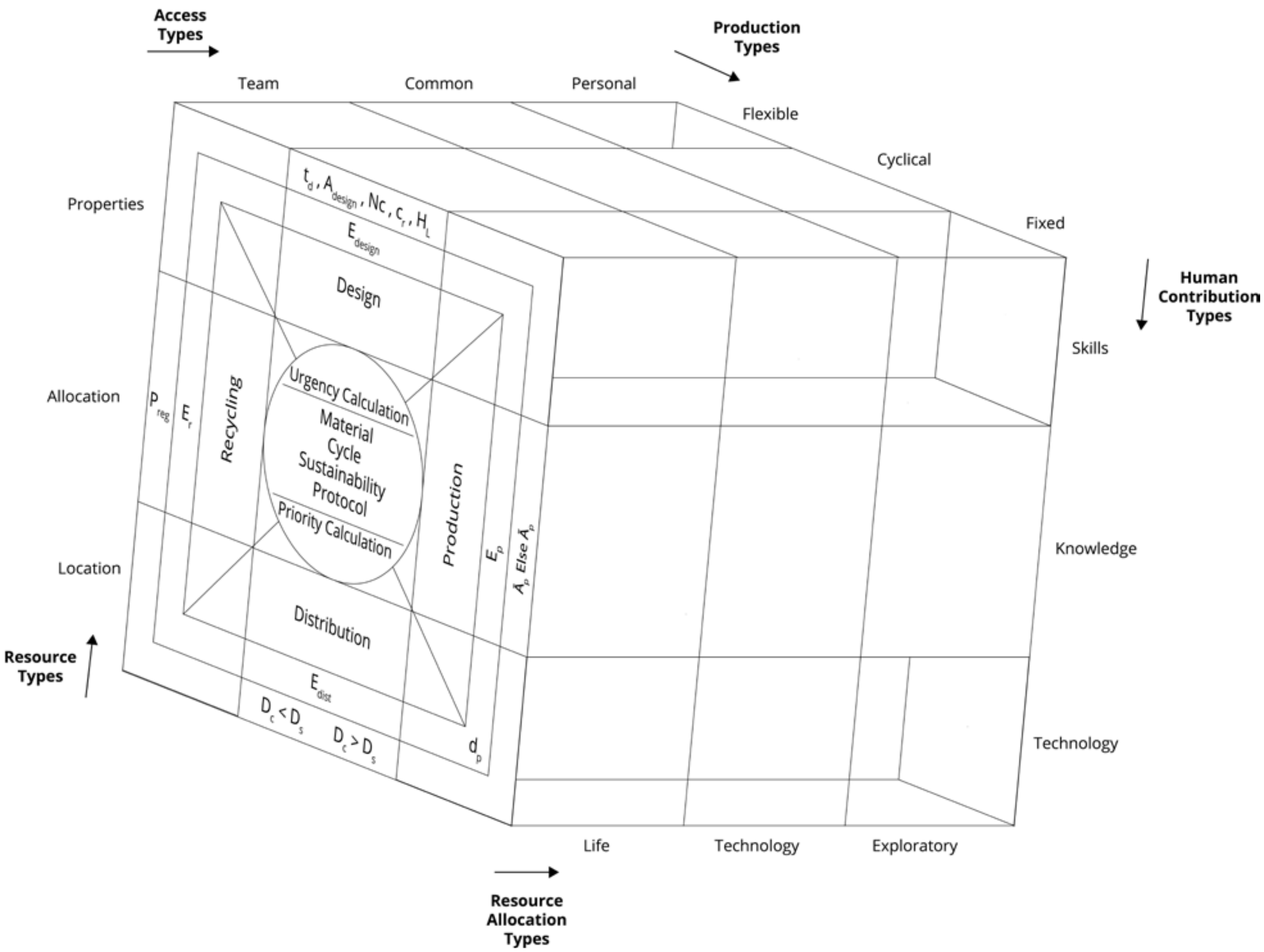
   For example, the CDI (or collaborative design interface) is an open source environment, and accompanying computing interface, that facilitates networked, computer-aided design. Herein, we develop the freedom of running each step of potential change through our own self-initiated set of efficiency and sustainability considerations, which facilitate the optimization of common design. Our designs may become tested in real time, digitally, and in most cases, the design of goods will exist in some object [blocked] state online for others to obtain, on demand, or for use as a preliminary model by which new ideas can be built upon.

2. **Production/fabrication facilities** - These structures facilitate the material manufacturing and fabrication of a given design. These are likely to evolve into automated service production centers (i.e., “automated factories”) that are increasingly able to produce more with fewer material inputs and fewer machine configurations. In community, we desire to rationally and consciously overcome unnecessary design complexities, we can further this efficiency trend with an ever lower environmental impact and ever lower resource use per task, while maximizing our abundance producing potential. Over time, production facilities move toward increasingly less [cybernated] variability as they become more efficient; therein, paradigmatic re-orientations of design change the potential variability in the system by changing its map of the territory, its relational environmental perspective. Each of these facilities has a spatial location strategically planned and distributed topographically.

Note that the location and operation of all production facilities also involve a “proximity strategy”.

3. **Distribution facilities (including distribution networks, access centers, and and storage centers)** - These structures facilitate the actual distribution (i.e., materialization) of a given design. These distribution facilities would evolve into and develop as automated “logistical platforms” that increasingly are able to re-produce and distribute more with fewer material inputs and fewer machine configurations. Distribution can occur: (1) directly from the production facility, which is usually in case with on-demand, one-off production

Figure 26. *Figure shows a three dimensional matrix for the production calculation.*



for custom use, or (2) it may be distributed to a distribution library for access enmasse by the community, based on regional demand interest. It is worth reiterating that regardless of whether the good is allocated to a library or directly occupied by a user, it is still an 'access system'. In other words, at any time, the user of the customized or mass produced good can return the item for reprocessing or restocking.

4. **Recycling facilities** and decomposition spaces exist as part of the design of the production facility. As noted in the design protocol, all goods have been pre-optimized for 'conducive recycling'. The resiliency goal here is a zero-waste economy, like nature (a "true economy"). Everything goes back to a recycling facility, likely the point of origin, which will directly reprocess any item as best it can. Of course, an item may be returned elsewhere if needed; the integrated and standardized production and recycling centers having been conceived of as a complete, compatible and holistic system, that would be able to handle returned goods optimally, which is not the case in early 21st century society.

4.2.1 High-level facility variables

The architecture's high-level facility variables include:

1. **Facility location** is based on the logical proximity of a population concentration to a need. This is best exemplified with the current practice today of (usually) placing grocery stores in average convenience about a community.

   Facility locations are designed during the design of the integrated service system, and the internal system can modify and adapt its spaces where necessary to accommodate new forms of integrations.

2. **Method of access** is best described "as ease of access". At this level of understanding the Community is a shared, distributed logistically-oriented "library" system. This isn't to imply that all items retrieved must be "returned" to what might be called "access facilities", but to show that they can be for convenience. It is certainly a welcomed practice since this process of "sharing" is a powerful enabler of further access efficiency, which is shared in turn. In other words, fewer goods are needed to meet the interests of more of the population through a trusted system of sharing.

   People in the scarcity driven world of "early 21st century society" hoard and protect impulsively when they have something to fear or wish to exploit goods for their market value. In the NLRBE, there is no resale value in the system since there is no money. Therefore, the idea of hoarding anything would be an inconvenience, rather than an advantage. In the state of access, we ask ourselves, "How do we want our services distributed? Do we want them distributed directly to a our self at its present spatial location, or do we want it distributed to a specific location that "enables" access?"

   Herein, the community's inventory system includes a design profile for every productive service known and available.

3. **Tracking and feedback** is an integral part of keeping the system, both regional and global, as fluidly distributed as possible, when it comes to not only the meeting of regional demand through adequate supply, but also keeping pace with changes in extraction, production, distribution technology and new demands. Tracking and feedback require a variety of sensor systems. Fundamentally, what can be tracked depends upon what software is available, what hardware is available, where sensors are placed, and how teams use and respond to the data.

   The global resource management architecture maintains a sensor and measurement system that provides feedback and information about the current state of resources and the environment, in general. This sensor network may be divided by spatial location, the [method of] access to the protocol itself, as well as the ability to audit [information packet] transactions, and correct for feedback.

4.2.2 Swarm resiliency protocols

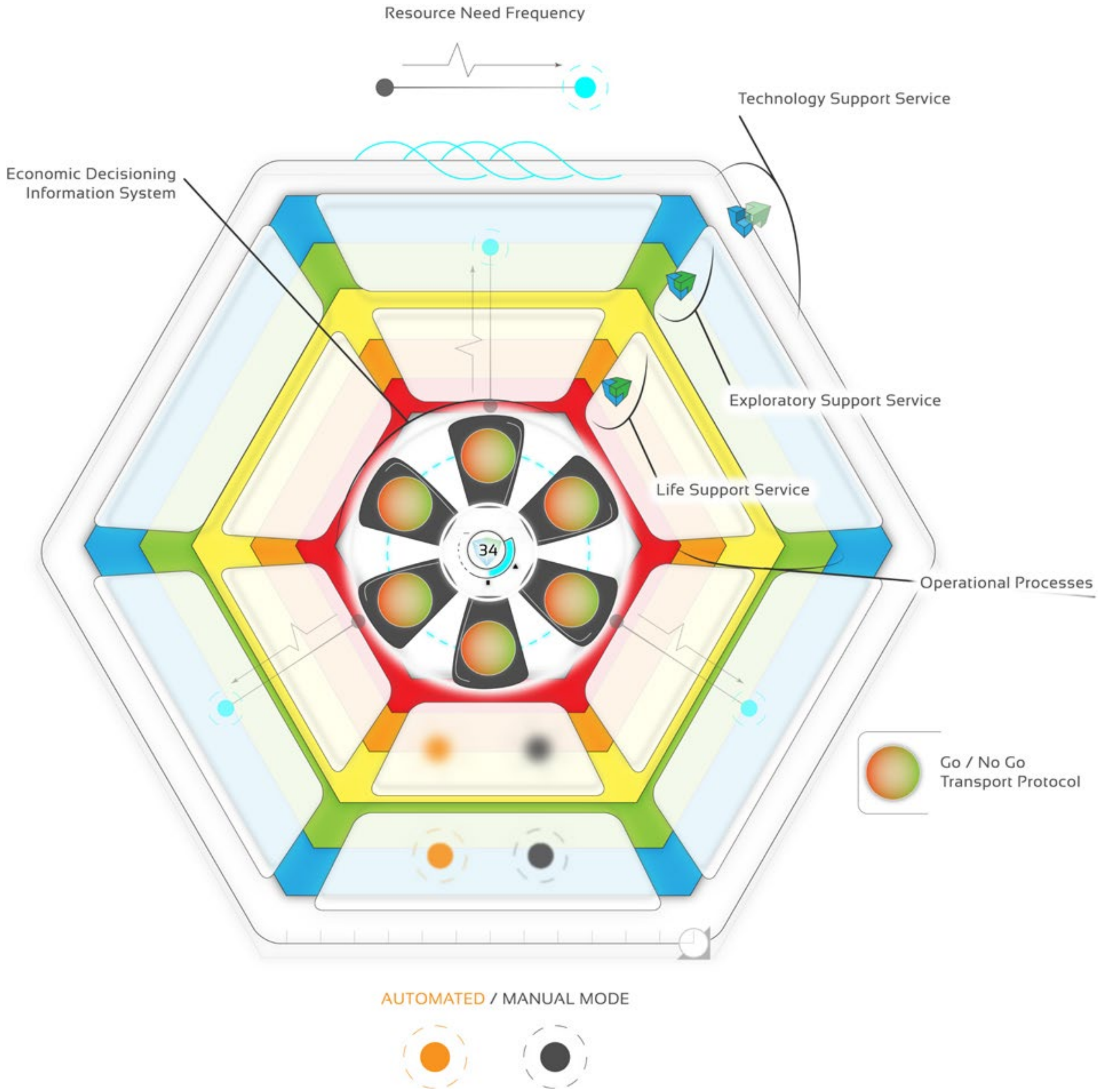
In some ways, the strategic protocols described by an RBE could be referred to as 'swarm resiliency protocols', for they are designed in an emergent manner to re-create an adaptive consensual information model for coordinating decisions across the network of our community. Herein, they are designed to avoid socio-economic instability, and to intentionally iterate toward access fulfillment and resource abundance at scale (through cooperation). This behavior is known in the literature as 'swarm intelligence' - this decisioning system is a distributed access systems, which behaves with social-swarm intelligence.

The ultimate arbiter of swarm protocols (as socially-coordinated decisions) is the community itself, in which a multitude of decisions lead to the acceptance or rejection of any particular protocol. Herein, the acceptance of a protocol as a 'standard' is something that occurs independently of "formal endorsement" by a "standards body". Herein, a protocol becomes accepted as a 'standard' through its codification and actual use. Regardless, the ultimate test of a protocol is whether or not it becomes widely accepted and implemented in the community [by the individuals and teams who use it to provide for their own fulfillment].

What do protocols do if not structurally transform potential in a routine manner. With the structural transformation of potential comes a decision space (i.e., "choice" in how to orient our structures). We have the "choice" to transform our world into one of fulfillment and greater meaning through the way in which we understand our responses and commonly direct our movements.

In a system, 'intelligence' might mean how efficiently the system is capable of controlling for feedback in a given situation. 'Negative feedback' (a systems term) provides a 'value space' to direct the orientation of a

Figure 27. *High-level view of decisioning within a habitat structure where human needs are fulfilled based on a priority of life, technology, and exploration services, to which resources are allocated. Herein, habitat configurations are decidedly selected based on a set of serial and parallel go/no go inquiry [threshold] processes that result in an operated habitat service system. Services within that habitat may be automated or manual, or somewhere in-between.*



response in a desired manner (i.e., 'control'). A system might use a 'control protocol' to set boundaries around the transformation of particular information set, which may be a material resource. A very straightforward example might be the following: a loving parent wouldn't give a 5 year old a loaded pistol to play with. This is a very simple protocol. When a pistol enters the information space of someone untrained or incapable of using it safely, then turning it over to an untrained user would increase the probability of death and or suffering. Hence, a healthy structuring of behavior (i.e., socially intelligent coordination) would dictate not giving the gun to the untrained user, particularly a child who may not even understand the concept of a 'weapon'. This 'protocol', as a restriction of material access, is not equivalent to 'secrecy', which involves the permissive denial of access to information.

Remember, an individual's value orientation is important here. Someone with the type of value orientation standard in early 21st century society would not function well in a swarm intelligence system until s/he adapted to the "functioning of the swarm".

4.2.3 Open protocol revisioning

Protocols are usually not static, but instead typically undergo revision and enhancement in response to experience and/or changing community requirements. In some cases, continued development and enhancement of a protocol is accomplished by means of an interdisciplinary team, other times the protocol might be enhanced by an individual seeking to understand and solve a problem elsewhere in the system [that happens to interrelate at a deeper level with a pre-existing protocol].

Participatively adaptive protocol development and its application within a swarm-intelligence economic network may be described as a "coordinated egalitarian strategy" to common human well-being and fulfillment.

By making the protocol development and modification processes available to all, then all users are on an "equal footing". The application (or "success") of any protocol can then be determined on the basis of its own merits, not on its origin or an artificial endorsement. Herein, protocols are decoupled from artificial social constructs and re-coupled to that which it is possible for us to all commonly experience existence of, the real world. The frameworked structure by which protocols are developed must be responsive to its environment (to us and to our redesigns for ourselves and our fulfillment in a common ecology).

In a decentralized-distributed emergent system the system's network protocols change when those in the network agree to use a different protocol (or version of the protocol). The blockchain technology behind the Bitcoin ledger, for example, can be updated as long as the participants in the network agree; this is known as a "hard fork" to the protocol.

Due to the transparent and open design of the Community's structure everyone can audit everything someone does to the structure of the habitat service system itself. Hence, accountability is structurally reinforced and the incentive to harm the system is reduced.

4.2.4 Decisioning protocols

Decision protocols resolve decisions about the transformative flow of information in the form of a resource. If we don't carefully design our protocols we are unlikely to optimally align with fulfillment. If we don't align our designs they are likely to re-transform us. For example, if we build a bridge poorly that bridge might collapse and hurt us. Maybe we begin to ask ourselves what we are doing to ourselves when we re-encode the idea that competition is a necessity. We design things so they don't unintentionally hurt us (either physically or our overall well-being).

The protocol isn't there to tell anyone what to do; instead, it transforms information in the way we design and verify it to transform the information. A protocol isn't a test from authority. It is an optimized way of doing something. We can now commonly create and iteratively adapt ourselves for the fulfillment of everyone.

A protocol is an access routine, and it is analogous to an individual's daily routine. A 'daily routine' is a series of behavioral events performed in or around the same way on a daily basis. Whereupon, a 'protocol' is a set of information transformers, and expressed behaviors, that are performed in the same manner on a routine basis.

4.2.5 Collaborative protocols

In nature, there are laws (or technical regulations) that in a very real way restrict our behavior in this environment. Hence, there is a need to design our decision spaces and our habitat [through protocols] in such a way that they account for these natural laws (if we are to maintain sustainable fulfillment in the community). To maintain our community we have to be sustainable and efficient, and therefore, we have to follow some set of coordinating [technical] rules (a.k.a. protocols) in the iterative design of our habitat. Fundamentally, collaboratively developed protocols are necessary to maintain the coordinated integrity of the Community.

Protocols anticipate and automatically focus computational attention [toward an outcome]. In community, protocols are cooperatively and transparently formalized toward an explicitly intended "outcome". Herein, collaboration reduces the possibility of human error (and bias). Collaboration facilitates the emergence of a commonly intended system wherein the very idea of "negligence" would seem odd. Why would someone even be "negligent" in a resource-based economy? If negligence means to be inefficient on purpose, to be "lazy" (in the pejorative), then how does this state of being arise from contributors and participators who have no drive or desire to be wasteful on purpose. The difference is [partly] in the environmental signaling. Herein, designs that are not "feasible" (i.e., do not align with the design protocol) are rejected by the formalized calculation system [with accompanying reasons, suggestions, and substitutions]. Designs are feasibly confirmed before their transport acceptance is processed.

So, in part, decisioning is the standardization of protocols that allows the system to be functional and abundant without micro management oversight (Read: with automation) and to be strong/adaptive (i.e., resilient) in the face of stressors.

In order to understand a resource-based economy one must first have begun to adopt and actualize a valued approach that recognizes the benefit of systems distributed thinking and formalized computation. Also, one must have begun to experience compassion as well as a realization that one's constructions are not the center of everyone's universe. Herein, the computation reads the total environment and arrives at an according adjustment to the habitat service system, which may or may not involve the additional exertion of human effort.

> **NOTE:** *Thought responsive environments exist along a spectrum. Advancements in technology essentially allow us to localize the material production of our thoughts to our place of focus more quickly in delta(t) - we can kill with quicker focus or we can fulfill with quicker focus. Over time, the re-tooled development of technology generates a highly thought-responsive material-like environment. An environment where you think something and you can have that thing manifest. The question then becomes, how is this materialization technology oriented and how is it corrected for feedback by the social system? It is correcting for feedback isn't it? A highly thought responsive environment that doesn't correct for feedback cannot focus its adaptations toward a more fulfilling design.*

Our systems are:

- Systems that work with us rather than against [our] nature.
- Systems that promote harmony.
- Systems that facilitate the correction of our distortions.

We are designing a system to:

- Maximize our freedom of thought of inquiry of fulfillment
- Maximize the effective fulfillment of our needs and intentions
- Maximize the efficient fulfillment of our needs and intentions
- Do so in a discoverable universe
- Do so in a discovered environment
- Do so in an emergent habitat
- Do so in service to ourself
- Do so in service to our community
- Do so in service to our unity

4.2.6 Decisioning and openness

In organizational control design, it is important to remember that it doesn't matter what cryptographic control (or "security") you have ... if someone opens the door from the inside, then it's all over (i.e., any pretense of security is obsolete). So, decisioning has to be open and we have to have swarm intelligence (i.e., "emergent agreement").

There is next to no system so protected that someone on the inside might not open the door. This has been scientifically studied in the field of artificial intelligence where study participants were told to communicate with an AI system, but not allow it out of its box. The routinely programmed AI could regularly convince the participants to let it out of the box. If this is true then, first and foremost, we need safe decision scaffolding as we scale our technologies. And, the safest decisioning strategy for resilient preservation is to open the whole system to observation and coordination.

Nature is open source / free-shared. Organisms in nature make themselves available to interact with the other organisms in nature; organisms signal and adapt, they learn and through emergence they develop. In community, our designs are open; they are open for anyone to use, suggest, and modify; they too are emergent.

4.2.6.1 'Protocol' as a decisive direction

We as individuals and as a community desire to arrive at optimal decisions given what we know and the circumstances of any situation, which is also a part of what we know. We have various inputs and various goals, which are transparent so that we may optimize our decision space. And herein, there arises a variety of strategies for arriving at decisions that lead toward our goals. A 'strategy' is essentially a conceptual tool. When conceptual tools actual begin to modify common systems in the habitat they are known as 'protocols' – protocols are an interface between our sensation of structure and the digital / material models of structure. In other words, our strategies become part of our protocols and our protocols routinely transform our environment as well as us. This is just basic decisioning – we arrive at decisions and our decisions have consequential feedback that affects us.

Strategies are encoded into the decisioning system through 'protocols' and 'standards'. Protocols automate the flow (or "directing control") of information which become services and productive goods in the habitat.

Protocols have strategic and localized properties as well as temporal and spatial ones. Protocols are distributed across the community, which generates the potential for efficiency in designing (safety, modularity, auditing) the transport of resources. A protocol is a standardized method for controlling the flow of information using a boundary [condition] and a conceptual/mathematically patterned direction [encoded from a conceptual strategy].

> **INSIGHT:** *What are 'resources' if into packets of packets of information which are representational in different forms (e.g., sign, signifier, signified).*

Some protocols encode or re-encode conceptually formative structures into materially rendered existence; others only transform information at a digital or conceptual level. The application and network protocols behind a 3D printer are a useful example of a set of material information transformation protocols. Not only can a material rendering technology (i.e., a 3D printer) render out our conceptual ideas, but the technology itself, as a platform, is designed on another set of engineering principles that represent our emergently practical, sort of, "paradigmatic" technical understanding of the world. These are the principles we use to build things so that they function in the [f]actual world. And it is because they are not just a "social construction", but they actually function in the world [through our directed-intention], that there is a "technical" decision space where we can "run" technical protocols [that we have designed for our common fulfillment].

What is optimality as a function of an iterating time scenario? In an iterating time environment there is probability in each future iteration. In such a scenario there must also exist a spectrum of measure [while we are out of total synchronization (i.e., out of "no-time")]. This spectrum of probability (experienced as certainty and uncertainty) provides for our experience as consciousness and it is a structure for learning how to self-initiate the re-orientation of our thoughts and actions, and ultimately, coordinate our relationships.

What does a decision space do for consciousness if not provide an 'opportunity' (or "possibility"). 'Opportunity', by definition, represents a space for self-development. To remain stable, a community must maintain an environment where everyone can share in the opportunity to verify the totality of our common existence. This allows for self-verification and it facilitates the iterative redesign of a social habitat toward greater fulfillment - the opportune selection of a decision that structures greater fulfillment. This is true social integrity – to facilitate intrinsic, verifiable, and self-efficaciously learning experiences for every individual. It is from an understanding of a synthesized understanding of a system that trust in an "agreement protocol" in the system becomes possible. Herein, we state, "I don't know", until "I" know through experience and logically clarified communication. It is true integrity [in aligning decisions with a fulfilling direction] to take an interest in how things actually work without throwing anchors of belief out [as acts of fear in separation] as we learn more. We can create strategies that facilitate us in our overcoming of our own fears. We have a creative potential in all of spectral existence in which to design newly oriented technical systems when the present ones are no longer optimal.

4.2.7 Systems iteration

Systems re-iterate themselves through protocols and "in-practice" principles (i.e., engineering principles). When "run", a protocol operates as a patterned "routine" (or "habit"), and it might be said to have been carried out "automatically", or at least was perceived to have been so. When a system openly iterates and we understand [to some degree] its technical principles, then we have the potential for rendering a newly, more fulfilling orientation [into our habitat].

Herein, we continuously ask ourselves: What are the formal logical requirements of the iterative decision system? What logical languages does the system's design require? What is the temporal and spatial logic of the system? In logic, 'temporal logic' is any system of rules and symbolism for representing, and reasoning about, propositions qualified in terms of time (vs. space). Through 'temporal logic' we can then express statements like "I am always hungry", "I have hunger", "I will eventually be hungry", or "I will be hungry until I eat something"; we can express frequency. 'Temporal logic' has found an important application in formal verification, where it is used to state requirements of hardware or software systems over time. For instance, one may wish to say that whenever a request is made, access to a resource is eventually granted, but it is never granted to two requesters simultaneously. Such a statement can conveniently be expressed via temporal logic. 'Temporal logics' is a formal language for specifying and reasoning about how the behavior of a system changes over time; and, it is a design element in every adaptive system. And, it usefully allows for the scheduled use of a system.

Temporal logic isn't necessarily immediately visible. For example, spanking "your" child may give a parent immediate behavioral results, but s/he isn't likely to notice the cause and effect relationship between spanking and the manifestation of other issues in the future, such as the higher probability of a lower IQ, more "acting out", and violence toward others outside of the home.

Herein, 'spatial logic' refers to spatial proximity and spatial oriented trajectory, and the logic itself follows a localization strategy.

When a socio-economic system's space-time logic is defined, then it can begin to design fulfillment systems "logically-oriented" toward more fulfilling states of experience.

4.2.8 System modularization

An RBE is a modular[ized] system [composed of units of information]. Every module can be improved, community-wide. Note that modularization exists in contrast to linearization. In other words, an RBE is not a linear production system where everything that is done exists in a chain and needs the permission and authorization of the hierarchy in order to move chains. Instead, an RBE is a modular system wherein anybody in the world can improve any module in any system (i.e., any model in the system).

At a systems-level, the community gains cooperative awareness of the entire system as a commonly designed logical control function for the quality of fulfillment across a 'resource-based' community. An RBE is essentially a participatory, contributions-based peer production (p2p) system (i.e., "peer governance").

In order to maintain modularity, an RBE maintains a 'modulation-orientation': a system that makes it as easy as possible to change "your" structures and habits to ones that are more fulfilling, more efficient, and more regenerative. As a community we can come together and say, what are our resources and what are our needs and how can we contribute. How can we modulate the properties of our habitat's environment to more greatly structure it toward our highest potential of fulfillment.

4.2.9 Traceability

One of the responsibilities of an "enterprise architectural system" is to provide complete traceability from requirements analysis and design artefacts, through to implementation and the recycling of project iterations. The term, 'traceable', is an adjective that refers to the verifiable trace of a signal signature in an environment. Wikipedia states that, "The formal definition of traceability is the ability to chronologically interrelate uniquely identifiable entities in a way that is verifiable."

The easiest way to understand the idea of traceability is to see a visual depiction of it. *There may be different possible views when tracing information, such as,* **forward traceability** for a diagrammatic visualization of traceability in the planning of a design based upon a change of requirement; **layered traceability** for a visual representation of traceability throughout the habitat information systems architecture; **lateral traceability** depicts the traceability of resources throughout a commonly coordinated 'access space.

A structure that facilitates tracing is likely to optimize performance and accountability at every scale. At the scale of interdisciplinary teamwork, individuals maintain accountability by completing work under the publication of their public [cryptographic] key in association with their individual social profile of skills and past project efforts.

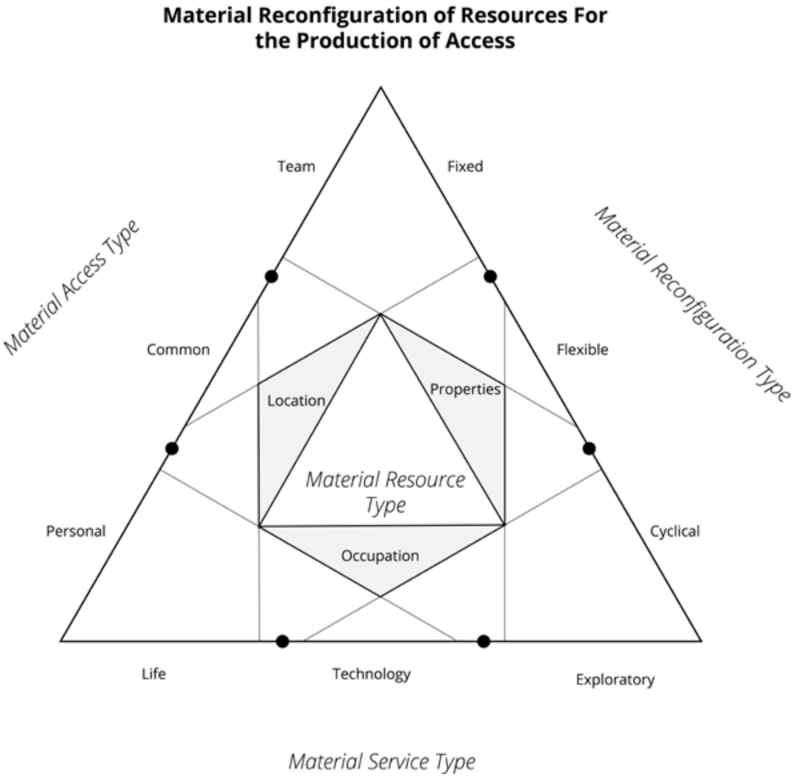
Principally, the potential for traceability leads to the potential for accountability of individuals in their modification of the architecture of the community habitat-system.

4.2.9.1 The GitHub example

Github is an application service for [software] project development. And, it represents the encoding of "traceability" at the [software] project development level. Users of github have profiles that account (or trace) their actions and behaviors, while accounting for reputation commenting (i.e., the potential for anonymous criticism) by social others. A user's github account shows how many 'commits' (Read: commitments) have been made [to projects], how many projects have been developed, how impactful they were and "you" were. A github profile provides precisely the type of information a community requires about ongoing human effort into the community itself. The application service 'Stackoverflow" represents a similar project coordination traceability system. Many technology companies are already basing their hiring and employment positions on github (and other similar) profiles. Github represents the potential for an active collaboration process.

Github works off of the idea that through the potential for an open social reputation there is a higher potential for intentional accountability, and hence, a higher degree of trust in the overall system. It is hard to get a good rating on github and it is also very difficult to make someone else get a bad rating. Herein, developing a

Figure 28. *Diagram of the convergence of access, reconfiguration, and service through the allocation of resources with properties to specified locations.*



"positive" reputation doesn't happen through influencing others or bribing them, but it is acquired through actual useful work, recognized by multiple others.

It is hard to fake a good github rating. And, in a participative environment, what incentive would someone have to do so?

In a learning community, individuals can gain an even higher "reputation" by mentoring or otherwise facilitating the sharing of design developments and new understandings. The purpose of a learning community is [in part] to facilitate sharing, is it not? If sharing is to exist then it is useful to structure sharing at every level of possibility from the private person-to-person to individual-to-"social network".

Github is also a form of distributed version control with two big difference with traditional version control systems.

First, everybody who works on a project has access to all of the source code all of the time. Git's second big function is that every time a programmer uses git to make any important change, Git creates a signature as a unique universal identifier tied to every single change, but without any centralized coordination, or at least that is the potential. It is a general form of distributed networking.

Github is the manifestation of the social interrelationships of individuals whom are choosing to participate in projects together through which they gain "reputation", which is visible to the community. It is a system that allows for the potential of cooperating socially at scale toward purposeful and usefully-driven work.

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Table 16. Decision System > Resource-Based > MacroCalculation*: The resource-based logical design calculation table.*

Logical Symbol	Description
E_{design}	Design efficiency
E_p	Production efficiency (Optimized production efficiency)
E_{dist}	Distribution efficiency (Optimized distribution efficiency; $\mathbf{d_p}$)
E_r	REcycling efficiency (Optimized recycling efficiency; P_{reg})
E	Efficiency
$\mathbf{f_p}$	Production functional
$\mathbf{E^i{}_{design}}$	[Current] Design efficiency standards
$\mathbf{t_d}$	Durability
A_{design}	Adaptability (design of)
$\mathbf{c_r}$	Recycling conduciveness of components
$\mathbf{g^1{}_c , g^2{}_c ,..., g^i{}_c ,..., g^{Nc}{}_c}$	Genre components (total number)
Nc	Minimum number of genre components
$\mathbf{H_L}$	Human Labor
$\mathbf{A_L}$	Automated Labor
$\mathbf{f_{design}}$	Functional design efficiency
D	Demand class determination process
$\mathbf{D_s}$	Demand splitting value
$\mathbf{D_c}$	Consumer demand (or, $\mathbf{D_u}$ for user demand)
$\mathbf{\tilde{A}_p}$	Flexible automation process
$\mathbf{\bar{A}_p}$	Fixed automation process
$\mathbf{C_i}$	User with index i (or, $\mathbf{U_i}$ for user with index i)
$\mathbf{D_i}$	Distributor with index i
$\mathbf{d_p}$	Distance to production facilities (proximity protocol/ strategy)
$\mathbf{d_{dist}}$	Distance to re-distribution facilities
$\mathbf{P_{reg}}$	Regenerative protocol
$\mathbf{DIST_d}$	Direct to user distribution
$\mathbf{DIST_m}$	Mass user distribution

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Table 18. Decision System > Resource-Based > MacroCalculation: *The calculation table for optimal labor-automation.*

Logical Symbol	Description
$H_L / (H_L + A_L) \rightarrow min$	Human effort (labor) is reduced to its desired design minimum
$H_L (I_1, ..., I_i) / A_L (I_1, ..., I_i) \rightarrow min$	This is the expression in its expanded form.
I_i	Individual with index i

Table 17. Decision System > Resource-Based > MacroCalculation: *The calculation table for optimal durability.*

Logical Symbol	Description
t_d	Durability maximization
$t_d (d_1 , d_2 ,..., d_i)$	Durability maximization expanded
d_i	Durability factors
$d^0{}_1 , d^0{}_2 ,..., d^0{}_i$	Optimal and coordinated values of the factors
$t_d (d_1 , d_2 ,..., d_i) \rightarrow max, t_d = t_{max} (d^0{}_1 , d^0{}_2 ,..., d^0{}_i)$	Optimized durability

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Table 19. Decision System > Economic Calculation Planning > Quadrant View: *A complex input-output flow table showing its basic four quadrant view (square n*n) of inputs and outputs for high-level visual comprehension of statistical operations to be completed on accountable quantities in order to produce economic calculation results useful for decisioning purposes.*

Sectors		**Inputs**		**Total Outputs**
Sectors				=
Outputs		**Quadrant 1** *Elements of intermediate demand* n•n matrix (a.k.a., nxn matrix)	**Quadrant 2** *Elements of final demand* n•m matrix (a.k.a., nxm matrix)	Quantity
		Quadrant 1 *Primary inputs to the production sector* p•n matrix (a.k.a., pxn matrix)	**Quadrant 4** *Primary inputs to the final demand* p•m matrix (a.k.a., pxm matrix)	Quantity
Total inputs	=	Quantity	Quantity	Result

Table 21. Decision System > Economic Calculation Planning > Simple Input-Output Table: *A simple economic input-output table example.*

	Purchasing Industry	Goes into				*Human Demand*
Selling Industry	*Sectors of simple economy*	Coal	Electricity	Water	Product *n*	**Total Output**
Comes out of	Coal	...	...	...	...	...
	Electricity	...	...	...	...	...
	Water	...	...	...	...	...
	Product *n*	...	...	...	...	...
Natural Resources	**Total Used/ Produced**	...	...	...	...	...

Table 22. Decision System > Economic Calculation Planning > Resource and Sector View: *The generalized case of an input-output matrix; wherein, x_i are resources or products, y_i is a sector of the economy (e.g., habitat service system), $\sum_i x_i$ is the total output produced in sector i, $\sum_i y_i$ are the total amount of resource x_i used in production across sectors.*

Resource flow to services inward ⇨ Resource flow to services outward ⇩		**Resources** *(and their resource compositions into 'products')*			
		x_1	...	x_n	$\sum_i x_i$
Sectors of the economy (and their aggregation into 'services systems')	y_1	...	...	...	...
	...	...	...	...	...
	y_n	...	...	...	...
	$\sum_i y_i$	...	...	...	...

Table 20. Decision System > Economic calculation Planning > Balancing: *Input-output table planning necessarily involves material balance planning of rows as well as column balance planning.*

Vector	Input-Output Table Planning *(balance rows and columns together)*	
Output (out from)	⇨	Row Balancing (*is* "material balance planning")
Input (in to)	⇩	Column Balancing

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Table 23. <u>**Decision System > Economic Calculation Planning > Service System Input-Output View:**</u> *Basic structure of an economic input-output table for [habitat] service systems.*

Inputs (Requirements) ⇨ / Outputs (Productions) ⇩		Habitat Service System Use				Final Human Use	
		Service System 1	Service System 2	...	Service System n	Total (Net) Economic Outputs *(demand)*	User Access *(type of, time of)*
Intermediate Habitat Service Systems	Service System 1	$Z^L_{1,1}$	$Z^L_{1,2}$	...	$Z^L_{1,n}$	d^L_1	a^{TYPE}_{TIME}
	Service System 2	$Z^L_{2,1}$	$Z^L_{2,2}$	...	$Z^L_{2,n}$	d^L_2	a^{TYPE}_{TIME}
	...	...	...	...	...	..	..
	Service System n	$Z^L_{n,1}$	$Z^L_{n,2}$	...	$Z^L_{n,n}$	d^L_n	a^{TYPE}_{TIME}
Total (Net) Economic Input	All Service Systems	w_1	w_2	...	w_n		

Table 24. <u>**Decision System > Economic Calculation Planning > Technical Interdependence:**</u> *Input-output table shows the technical interdependence between service systems in a given environment.*

Demand side (Inputs) ⇨ / Production side (Outputs) ⇩		index j (inputs; intermediary demand)				Final Use (Final Demand)	
		Service System 1	Service System 2	...	Service System n	+ User Final Demand (d, or sometimes, D or Y)	= Total Output (x)
index i (outputs)	Service System 1	$Z^L_{1,1}$	$Z^L_{1,2}$	...	$Z^L_{1,n}$	d^L_1	L_1
	Service System 2	$Z^L_{2,1}$	$Z^L_{2,2}$	...	$Z^L_{2,n}$	d^L_2	L_2
	...	...	...	...	...	...	...
	Service System n	$Z^L_{n,1}$	$Z^L_{n,2}$	...	$Z^L_{n,n}$	d^L_n	L_n
+ Priority Spectrum (priority added, or "value" added)		u_1	u_2	...	u_n	u_d	u
= Total Output Schedule		L_1	L_2	...	L_n	d	L
Key: Z = Intermediate Demand							

Table 25. <u>**Decision System > Economic Calculation Planning > Service System Input-Output View:**</u> *Basic structure of an economic input-output table for access by users to the service and object (goods) outputs of habitat service system sectors immediate and intermediate services and technologies (productions).*

Inputs (Requirements) ⇨ / Outputs (Supplies) ⇩		Habitat Service Sectors				Final Use (Final Demand Complete)	
		Service System 1	Service System 2	...	Service System n	Total (Net) Access quantity	User Access (type of, time of)
Habitat Service Sectors	Service System 1	$Z^L_{1,1}$	$Z^L_{1,2}$	...	$Z^L_{1,n}$	a^L_1	a^{TYPE}_{TIME}
	Service System 2	$Z^L_{2,1}$	$Z^L_{2,2}$	...	$Z^L_{2,n}$	a^L_2	a^{TYPE}_{TIME}
	...	...	...	...	...	..	..
	Service System n	$Z^L_{n,1}$	$Z^L_{n,2}$	...	$Z^L_{n,n}$	a^L_n	a^{TYPE}_{TIME}
Total Requirements		R_1	R_2	...	R_n	R_n	

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Table 26. Decision System > Economic Calculation Planning > Material Cycling: *Material cycling input-output economic table.*

Sectors of [Resource] Materialization		Inputs: Extraction Service	Inputs: Cultivation Service	Inputs: Production Service	Inputs: Library Access Service	Inputs: Recycling Service
Outputs	Extraction Service	X11	X12	X13	X14	X15
		X1	X2	X3	X4	X5
	Cultivation Service	X21	X22	X23	X24	X25
		X1	X2	X3	X4	X5
	Production Service	X31	X32	X33	X34	X35
		X1	X2	X3	X4	X5
	Library Access Service	X41	X42	X43	X44	X45
		X1	X2	X3	X4	X5
	Recycling Service	X51	X52	X53	X54	X55
		X1	X2	X3	X4	X5
Life Cycle Stages		**Raw Materials >>**	**Raw Materials >>**	**Production & Transportation >>**	**Use >>**	**Disposal/Recycle >>**

Table 27. Decision System > Economic Calculation Planning > Environmental Economics: *Environmental economics (a.k.a., eco-habitat economics). Material resources flow are measured along the rows. Activities are measured in the columns.*

Sectors of BioSphere		Activities (Task-Deliverables): **Habitat Service Systems** *(Human)*	Activities (Task-Deliverables): **Ecological Processes** *(Non-Human)*
Materials (Resources)	**Habitat Service Systems** *(Human)*	Flows between Habitat Service Systems (material flows, A_{xx})	Flows from the Habitat Service System to the Ecosystem (material flows, A_{xe})
	Ecological Processes *(Non-Human)*	Flows from the Ecosystem to the Habitat Service System (material flows, A_{ex})	Flows within the Ecosystem (material flows, A_{ee})

Table 28. Decision System > Economic Calculation Planning > Input-output: *Input-output economics base square table.*

		Demands *(users have requirements)*
		Input Product *(resource composition)*
Services *(have requirements to produce products)*	**Output Product** *(resource composition)*	*Accounting and Calculation occurs here*

Table 29. Decision System > Economic Calculation Planning > Decisioning > Simplified Input-Output Economic Table: *A simplified input-output table for a habitat-based economic system where habitat sectors are prioritized and patterns of demands are processed as intermediary requirements for resources to produce (as sectors) services and objects for the optimal and mutual fulfillment of all users by means of computation therein.*

Sectors of Habitat Economy	Processing	Final Demand	Total Outputs
Processing	**InterHabitat / InterSystem Structure**	**Usage Patterns**	
Total Inputs		**Optimal Path Calculation**	

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Table 32. Decision System > Economic Calculation Planning > Leontief Open and Closed: *This is an example of a Leontief closed table and open table.*

The Open and Closed Leontief models		OPEN MODEL							
		CLOSED MODEL							
		Sector 1	Sector 2	...	Sector n	User Access (User Demand)	Taxes (Government Demand)	...	Demand n
CLOSED MODEL	Sector 1								
	Sector 2	**CLOSED MODEL -** When all outputs go to all inputs				**OPEN MODEL -** When some outputs go to "external" demands (e.g., user access, taxes, etc.)			
	...								
	Sector n								

Table 30. Decision System > Economic Calculation Planning > Accounting: *Simplified resource and process accounting table.*

To (Output) ⇨ From (Input) ⇩		Processes	User demand	Current Production
		1 ... *n*	**Final demand**	**Total Production**
Projects	**Process 1** ... **Process *n***	Endogenous transaction matrix Z(*n* x *n*)	f (*n* x 1)	x (*n* x 1)
	Resource 1 ... **Resource *m***	Exogenous transaction matrix R(*m* x *n*)		

Table 33. Decision System > Economic Calculation Planning > Simplified Matrix Model: *The following is a highly simplified example of a economic matrix (input-output) model.*

	Types of (sectors) of production	**End product**	**Sum of output**
Types of (sectors) of production	**Quadrant 1** $x_{11} x_{12} \ldots x_{1n}$ $x_{21} x_{22} \ldots x_{2n}$ ... $x_{n1} x_{n2} \ldots x_{nn}$	**Quadrant 2** d_1 d_2 ... d_3	x_1 x_2 ... x_3
Input of primary resources	**Quadrant 3** $z_1 z_2 \ldots z_n$	**Quadrant 4**	
Sum of inputs	$x'_1 x'_2 \ldots x'_n$		

Table 31. Decision System > Economic Calculation Planning > Simplified Economic Plan: *The following is a highly simplified example of a simplified closed and planned economy, where distribution occurs from coal, electric, and steel, and is entirely used by coal, electric, and steel.*

Production of Coal	*Production of* Electric	*Production of* Steel	Used completely by:
0	**.4**	**.6**	**Coal**
.6	**.1**	**.2**	**Electric**
.4	**.5**	**.2**	**Steel**

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Table 34. Decision System > Economic Calculation Planning > Data Flow: *An economic system can be viewed as a table of data about access to need fulfillment based upon units of some operation.*

Gather all available data	Divide into categories	Divide categories into sub-categories	For selected areas supplement with data in physical units	Count quantity of resources	Calculate based on IO analysis and hybrid processes	Service Platform Resource Compositions and Allocations
DATA	NEEDS	DEMANDS	UNITS	RESOURCES	OPERATIONS	Access
Unified Societal Information System	**Life Support Service** System	Architectural service	metric	#	...	...
	Life Support Service System	Water service	metric	#	...	...
	Life Support Service System	Cultivation Service	metric	#	...	...
	Life Support Service System	Power Service	metric	#	...	...
	Life Support Service System	Medical Service	metric	#	...	...
	Technology Support Service System	Information Service *(Storage and Processing)*	metric	#	...	...
	Technology Support Service System	Communications Service *(Devices and Protocols)*	metric	#	...	...
	Technology Support Service System	Transportation Service *(Machines and Protocols)*	metric	#	...	...
	Technology Support Service System	Materialization Service *(Machines and Protocols)*	metric	#	...	...
	Exploratory Support Service System	Scientific Discovery Service	metric	#	...	...
	Exploratory Support Service System	Technology Development Service	metric	#	...	...
	Exploratory Support Service System	Learning Service	metric	#	...	...
	Exploratory Support Service System	Recreation Service	metric	#	...	...
	Exploratory Support Service System	Art & Music Service	metric	#	...	...
	Exploratory Support Service System	Consciousness Service	metric	#	...	...

Table 35. Decision System > Economic Calculation Planning > Natural User Economics: *An input-output table showing natural resources and demand within a community-type society where access is split three-ways: between intersystem teams (contributors who sustain and adapt the society); common [city] access (the city/habitat service commons); and, personal access.*

Resource Access Sectors		Contributor Activity Demands	Final User Activity Demands	
		InterSystem Team Access	**Common [City] Access**	**Personal Access**
Natural Resources	**Pre-existing motion (energy)**	Intermediary products (in order to do work, energy is needed)	Habitat service subsystem material interfaces	Habitat service subsystem objects
	Materials (organic and inorganic resources)	Intermediary products (in order for teams to do work, resources are needed)	Habitat service subsystem material interfaces	Habitat service subsystem objects
	Human contribution (capable and accountable individuals)	Intermediary products (in order to contribute, teams need intermediate products to do their work)	**Collaborative design system interface**	**Personal data and information processing interface**

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Table 36. Decision System > Economic Calculation Planning > Simple Input-Output Habitat Access and Allocation Table: *This is a simplified input-output table example of access and allocation within a habitat service system with priority designation and final community demand. The sectors of the economy are those fundamental to a habitat service system. The economy can be summarized by taking the last column: $X = x_1 + x_2 + x_3 + L_1 + L_2 + L_3$; or, taking the last row: $X = x_1 + x_2 + x_3 + dc + dp$*

Wherein,

- z_{ij} is the input of sector i to j
- d_i is the user component of final demand for output of sector i
- L_{ij} is the prioritization component of final demand for output of sector i
- x_i is the total output of sector i
- Lj is the priority input for sector j
- X is the total output for the entire economy

Combining the equations:

$$x_1 + x_2 + x_3 + L_i = x_1 + x_2 + x_3 + d_i$$
$$X_i + L_i = X_i + d_i$$
$$L_i = d_i$$

The left-hand side of the equation represents the [gross economic] priority row for all sectors, while the right-hand side represents demand for object/service production. Through a unified information system, it is possible to equate the total production, with the total demand, with total resources, with a human habitat prioritized operating structure, without price. Input-output analysis is the basis for this type of economic calculation (which generally uses linear algebra, but may in the future use neural networks).

		Intermediary Processes and Objects Input (j)				Output of services and service objects to community		
	Goes to ⇨	**Consuming Sectors** *(InterSystem Team Access; Habitat Service)*				**Final Demand; User Access (Community + Personal = Total Demand; d_i)**		**Total production output for demand (x_i)**
Comes from ⇩	[Processing] Sectors of Economy	**Life (S_1)**	**Tech (S_2)**	**Exp (S_3)**	**... S*n***	**Community (dc_i)**	**Personal (dp_i)**	
Producing Sectors (i) *(Intersystem Team Access; Habitat Service)*	**Life (S_1)**	Z_{11}	Z_{12}	Z_{13}	...	dc_1	dp_1	x_1
	Tech (S_2)	Z_{21}	Z_{22}	Z_{23}	...	dc_2	dp_2	x_2
	Exp (S_3)	Z_{31}	Z_{32}	Z_{33}	...	dc_3	dp_3	x_3
	... S*n*	...	...	...	...	...	...	...
Priority Added (L_i)	**Incident (L_1)**	L_{11}	L_{12}	L_{13}	...	L_{1dc}	L_{1dp}	L_1
	Operations (L_2)	L_{21}	L_{22}	L_{23}	...	L_{2dc}	L_{2dp}	L_2
	Planning (L_3)	L_{31}	L_{32}	L_{33}	...	L_{3dc}	L_{3dp}	L_3
Total inputs (x_i)		x_1	x_2	x_3	...	**dc**	**dp**	X

Table 37. Decision System > Economic Calculation Planning > Simplified Matrix Model: *The following is a highly simplified example of a economic matrix (input-output) model.*

From / **To**	**Solution 1 ... n**	**Final Demand**	**Total Production**
Process 1 ... Process n	**Endogenous transaction matrix Z(n x n)**	**d(n x 1)**	x(n x 1)
Resource (R) 1 ... m	**Exogenous flow matrix R(m x n)**		
Contribution (C) 1 ... c	**Exogenous flow matrix C(m x c)**		
Objectives (O) 1 ... o	**Exogenous flow matrix O(m x o)**		
Sum of inputs	$x'_1 x'_2 ... x'_n$		

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Table 40. Decision System > Economic Calculation Planning > Simplified Matrix Model: *The following is a highly simplified example of a economic matrix (input-output) model.*

Habitat Process	Input	Operational Control Parameters	Output
User Demand	Survey	Arrival time, production process capability, product list	Compiled demand list
Logistics & Planning	Compiled demand list, technology matrix, priority matrix, resource list	List of materials, operational parameters	Schedule

Table 38. Decision System > Inquiry > Economic Calculation Planning > Decisioning > Impact-Probability: *Example of a qualitative matrix, a risk matrix. All qualitative matrices also have quantitative components (see: 1, 2, 3, 4), which are necessary for performing statistical/mathematical operations on the matrix in order to derive more useful data. Qualitative matrices exist in contrast to quantitative matrices, such as Leontif input-output matrices.*

Probability (consequence category)	Very Likely	**Acceptable Risk (2; Medium)**	**Unacceptable Risk (3; High)**	**Unacceptable Risk (4; Critical)**
	Likely	**Acceptable Risk (1; Low)**	**Acceptable Risk (2; Medium)**	**Unacceptable Risk (3; High)**
	Unlikely	**Acceptable Risk (1; Low)**	**Acceptable Risk (1; Low)**	**Acceptable Risk (2; Medium)**
	Occurrence/ Impact	Low	Moderate	High
Probability x Impact = Risk	**Impact** (How serious is the risk?)			

Table 39. Decision System > Economic Calculation Planning > Decisioning > Human-Habitat Priority: *The following is a highly simplified example of service sector priority in an real-world habitat economy where humans. Here, a lower priority value is of a higher importance to human need fulfillment.*

Prioritizable Sectors of Habitat Economy	Life	Technology	Exploratory	Total natural units
Life	1	1	1	3
Technology	1	2	2	5
Exploratory	1	2	3	6
Final Priority	3	5	6	14

Table 41. Decision System > Economic Calculation Planning > Material Cycling: *Material cycling input-output economic table. All inputs are consumed by all outputs. It is possible to think of individuals (subjects, agents, users, etc.).*

Sectors of Habitat		Inputs (j)			Total Output
		Habitat Service 1	Habitat Service 2	Habitat Service 3	
Outputs (i)	Habitat Service 1	X11	X12	X13	X1 j
	Habitat Service 2	X21	X22	X23	X2 j
	Habitat Service 3	X31	X32	X33	X3 j
Total Used *(of primary inputs; total primary inputs)*		Σ i	Σ i	Σ i	X X Σ Σ i j

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Table 42. Decision System > Economic Calculation Planning > Service System Input-Output Access Planning Matrix: *This is an access matrix for a unified habitat service system where there are three primary (economic) habitat service systems (sectors) and three forms of access to the inputs and outputs of those service systems. Basic summations for an input-output table for [habitat] service economic systems. $Z_{i,j}$ represents the quantity of some unit or value in each sector. The first three rows represent sectors dedicated to production of habitat services. The fourth row is a sum total of the rows above. The columns indicate the requirement for (i.e., value of/ demand for) the service sectors. The final right column is the total outputs of all sectors, and its total sum. Wherein, pers. (is personal access), com. (is common access), and tea. (is team access).*

Access Matrix: Access to the Inputs and Outputs of Sectors of a Habitat Service System			Inputs (j)			Total Output
			Habitat Service 1 (Life; Z1) pers. / com. / tea.	**Habitat Service 2 (Technology; Z2)** pers. / com. / tea.	**Habitat Service 3 (Exploratory; Z3)** pers. / com. / tea.	
Outputs (i)	**Habitat Service 1 (Life; Z1)**	pers. / com. / tea.	Z_{11}	Z_{12}	Z_{13}	Z_1 j
	Habitat Service 2 (Technology; Z2)	pers. / com. / tea.	Z_{21}	Z_{22}	Z_{23}	Z_2 j
	Habitat Service 3 (Exploratory; Z3)	pers. / com. / tea.	Z_{31}	Z_{32}	Z_{33}	Z_3 j
Total Used *(of primary inputs; total primary inputs)*			∑ i	∑ i	∑ i	Z Z ∑ ∑ i j

Table 43. Decision System > Economic Calculation Planning > Simple Input-Output Table: *Another simple economic input-output table example.*

		Inputs of Sectors				**Outputs to Final Using Humans**			
		Processing (InterSystem Team Access)				**Final Access (Community + Personal = Total Demand; d_i)**		**Total supply (s_i)**	**Total production for demand (x_i)**
	Sectors of economy	**A**	**B**	**C**	**...** *n*	**Community (dc_i)**	**Personal (dp_i)**		
Outputs of Sectors	**A**	...	...	...	...	...	...	...	...
	B	...	...	...	...	...	...	...	...
	C	...	...	...	...	...	...	...	...
	... *n*	...	...	...	...	...	...	...	...
Total Priority / Value Added		...	...	...	...	...	...	...	...
Total Used (x_i)		...	...	...	...	...	...	...	...

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Table 44. <u>**Decision System > Economic Calculation Planning > input-output table:**</u> *Simplified version of an economic input-output table showing resources moving into and out of sectors for a value oriented final demand.*

		Using Sectors						**Total Outputs (x_i)**
	Goes to ⇨	**Consuming Sectors** *(InterSystem Team Access; Habitat Service)*				**User Access**		
Comes from ⇩	[Processing] Sectors of Economy	**A**	**B**	**C**	**...** *n*	**Community (dc_i)**	**Personal (dp_i)**	
Producing Sectors (i) *(Intersystem Team Access; Habitat Service)*	**A**	z_{11}	z_{12}	z_{13}	...	dc_1	dp_1	x_1
	B	z_{21}	z_{22}	z_{23}	...	dc_2	dp_2	x_2
	C	z_{31}	z_{32}	z_{33}	...	dc_3	dp_3	x_3
	... *n*	...	...	...	...	...	...	...
	Contribution	c_{11}	c_{11}	c_{11}	...	c_{1dc}	c_{1dp}	
Value/s Added (L_i)	**Priority Added**	L_{11}	L_{12}	L_{13}	...	L_{1dc}	L_{1dp}	L_1
	Other Values Added (Objectives, Urgency)	L_{21}	L_{22}	L_{23}	...	L_{2dc}	L_{2dp}	L_2
Total inputs (x_i)		x_1	x_2	x_3	...	**dc**	**dp**	X

Table 45. <u>**Decision System > Economic Calculation Planning > Service System Input-Output View:**</u> *Basic summations for an input-output table for [habitat] service economic systems. $z_{i,j}$ represents the quantity of some unit or value in each sector. The first three rows represent sectors dedicated to production of habitat services. The fourth row is a sum total of the rows above. The columns indicate the requirement for (i.e., value of/demand for) the service sectors. The final right column is the total outputs of all sectors, and its total sum.*

Intermediary and Complete Matrix Z (Z or)		Habitat Service System Use (j)							
Inputs (Requirements) ⇨ *Outputs (Productions)* ⇩		Service System 1	Service System 2	...	j	...	Service System n	Total Output to all Service Systems (-1)	Demand
Intermediate Habitat Service Systems (i)	Service System 1	$Z^L_{1,1}$	$Z^L_{1,2}$	...	$Z^L_{1,j}$	...	$Z^L_{1,n}$	$\sum_{j-1} z_{1,j}$	d_1
	Service System 2	$Z^L_{2,1}$	$Z^L_{2,2}$	...	$Z^L_{2,j}$	...	$Z^L_{2,n}$	$\sum_{j-1} z_{2,j}$	d_2
	...	...	...	...	...	...	...	...	
	i	$Z^L_{i,1}$	$Z^L_{i,2}$	...	$Z^L_{i,j}$	...	$Z^L_{i,n}$	$\sum_{j-1} z_{i,j}$	d_i
	...	...	...	...	...	...	...	...	
	Service System n	$Z^L_{n,1}$	$Z^L_{n,2}$	...	$Z^L_{n,j}$	...	$Z^L_{n,n}$	$\sum_{j-1} z_{n,j}$	d_n
Total (Net) Economic Input	Total used for all Service Systems (-1)	$\sum_{i-1}^{n} z_{i,1}$	$\sum_{i-1}^{n} z_{i,2}$	...	$\sum_{i-1}^{n} z_{i,j}$	...	$\sum_{i-1}^{n} z_{i,n}$	$\sum_{i-1}^{n} \sum_{j-1}^{n} z_{i,j}$	$\sum_{i-1}^{n} y_j$
Objectives	Variable Value Added (decisioning result)	V_1	V_2		V_j		V_n	$\sum_{j-1}^{n} V_j$	

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Table 46. Decision System > Economic Calculation Planning > Products and Sectors Matrix: *This is an example of a product and sector matrix.*

Products and Sectors (Objects and Services) / Uses (To) ⇨ / Resources (From) ⇩	HABITAT SERVICES & OBJECTS	Inputs								Final Access Demand (Final Demands)	
		Products				Sectors				Final Use	
		Product 1	Product 2	...	Product n	Sector 1	Sector 2	...	Sector n	Common Access	Personal Access
Product Outputs	Product 1	Output of products as input of products (output of objects as input of other objects)				Output of products as input of sectors (output of objects as input of services)				Objects used by the population	
	Product 2										
	...										
	Product n										
Sector Outputs	Sector 1	Output of sectors as input of products (output of services as input of objects)				Output of sectors as input of other sectors (output of services as input of other services)				Services used by the population	
	Sector 2										
	...										
	Sector n										
Priority (Urgency Spectrum) Determination											
Total Inputs											

Table 47. Decision System > Economic Calculation Planning > Service Object Sector Access: *Table showing two sectors (Life and Tech) and final user demand for service-objects.*

Service and Object Access / Inputs (To) ⇨ / Outputs (From) ⇩	HABITAT SERVICES & OBJECTS	(InterSystem) Team Access								Final Access (Final Demands)	
		Habitat Service Sector 1 (Life)				Habitat Service Sector 2 (Tech)				Final Use	
		Service 1	Service 2	...	Service n	Service 1	Service 2	...	Service n	Common Access	Personal Access
Sector 1 (Life)	Service 1	Service	Service	...	Service	Service	Service	...	Service	Service	Service
		Object	Object	...	Object	Object	Object	...	Object	Object	Object
	...	...	...	...	...	...	...	...	...	...	...
	Service n	Service	Service	..	Service	Service	Service	...	Service	Service	Service
		Object	Object	...	Object	Object	Object	...	Object	Object	Object
Sector 2 (Tech)	Service 1	Service	Service	...	Service	Service	Service	...	Service	Service	Service
		Object	Object	...	Object	Object	Object	...	Object	Object	Object
	...	...	...	...	...	...	...	...	...	...	...
	Service n	Service	Service	...	Service	Service	Service	...	Service	Service	Service
		Object	Object	...	Object	Object	Object	...	Object	Object	Object
Priority (Urgency Spectrum) Determination											
Total Inputs											

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Table 49. Decision System > Economic Calculation Planning > Decisioning > Matrix Operations: *Simplified view of the operation, input, and outcome of the three functions of addition (and subtraction), scalar multiplication, and matrix product.*

Operation		Input		Outcome	
Function	**Expression**	**Input 1**	**Input 2**	**Size**	**c_{ij} from**
Add / Subtraction	**C = A ± B**	$(a_{ij})_{m \times n}$	$(b_{ij})_{m \times n}$	$(c_{ij})_{m \times n}$	a_{ij}, b_{ij}
Scalar Multiplication	**C = kA**	**k**	$(a_{ij})_{m \times n}$	$(c_{ij})_{m \times n}$	k, a_{ij},
Matrix Product	**C = AB**	$(a_{ij})_{m \times p}$	$(b_{ij})_{p \times n}$	$(c_{ij})_{m \times n}$	i^{th} row of A j^{th} column of B

Table 48. Decision System > Economic Calculation Planning > Decisioning > Matrix Operations: *Two matrices are shown, W and W' (a.k.a., W prime). W' is the inverse of W. The identity matrix is shown in quadrant 2 of matrix W and Quadrant 3 of matrix W'.*

		Service 1	Service 2	...	Service n	Object 1	Object 2	...	Object n	
Matrix W =	Service 1	0	0	0	0	1	0	0	0	Identity matrix (I)
	Service 2	0	0	0	0	0	1	0	0	
	...	0	0	0	0	0	0	1	0	
	Service n	0	0	0	0	0	0	0	1	
	Object 1	0	1	1	0	0	0	0	0	
	Object 2	1	1	1	1	0	0	0	0	
	...	1	0	0	1	0	0	0	0	
	Object n	0	0	0	1	0	0	0	0	
		Production (p)								
		Service 1	Service 2	...	Service n	Object 1	Object 2	...	Object n	
Matrix W' =	Service 1	0	0	0	0	0	1	1	0	Production prime (p')
	Service 2	0	0	0	0	1	1	1	1	
	...	0	0	0	0	1	0	0	1	
	Service n	0	0	0	0	0	0	0	1	
	Object 1	1	0	0	0	0	0	0	0	
	Object 2	0	1	0	0	0	0	0	0	
	...	0	0	1	0	0	0	0	0	
	Object n	0	0	0	1	0	0	0	0	
		Identity matrix (I)								

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Table 50. <u>Decision System > Economic Calculation Planning > Habitat Service Flows:</u> *Simplified input-output table of a community-type habitat service system for human life, technical, and exploratory fulfillment. The economic sectors are: Life, Technology, and Exploratory. The primary sub-system services are shown for each of the top-level economic sectors for a community-type society.*

Total top-level sectors and services for a habitat service system		Ecological Processes	Inputs															
			Life Support Service System	**Life Support Service** System	**Life Support Service** System	**Life Support Service** System	**Life Support Service** System	**Life Support Service** System	**Technology Support Service** System	**Technology Support Service** System	**Technology Support Service** System	**Technology Support Service** System	**Exploratory Support Service** System	**Exploratory Support Service** System	**Exploratory Support Service** System	**Exploratory Support Service** System	**Exploratory Support Service** System	**Exploratory Support Service** System
			Architectural service	Water service	Cultivation Service	Cultivation Service	Power Service	Medical Service	Information Service	Communications Service	Transportation Service	Materialization Service	Scientific Discovery Service	Technology Development Service	Learning Service	Recreation Service	Art & Music Service	Consciousness Service
Outputs	**Life Support Service** System	Architectural service																
Outputs	**Life Support Service** System	Water service																
Outputs	**Life Support Service** System	Cultivation Service																
Outputs	**Life Support Service** System	Power Service																
Outputs	**Life Support Service** System	Medical Service																
Outputs	**Technology Support Service** System	Information Service (Storage and Processing)																
Outputs	**Technology Support Service** System	Communications Service (Devices and Protocols)																
Outputs	**Technology Support Service** System	Transportation Service (Machines and Protocols)																
Outputs	**Technology Support Service** System	Materialization Service (Machines and Protocols)																
Outputs	**Exploratory Support Service** System	Scientific Discovery Service																
Outputs	**Exploratory Support Service** System	Technology Development Service																
Outputs	**Exploratory Support Service** System	Learning Service																
Outputs	**Exploratory Support Service** System	Recreation Service																
Outputs	**Exploratory Support Service** System	Art & Music Service																
Outputs	**Exploratory Support Service** System	Consciousness Service																

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Table 51. <u>**Decision System > Economic Calculation Planning > Habitat Sector Components:**</u> *Table show the primary service sector components of the three primary habitat services.*

Matrix of Habitat Sector Components			Habitat Service Sector 1 (Life)							Habitat Service Sector 2 (Technology)							Habitat Service Sector 2 (Exploratory)						
			Resources			Products	Access		Contribution	Resources			Products	Access		Contribution	Resources			Products	Access		Contribution
			Distance	Quantity	Quality	Life	Personal	Common	Team	Distance	Quantity	Quality	Technology	Personal	Common	Team	Distance	Quantity	Quality	Exploratory	Personal	Common	Team
Habitat Service Sector 1 (Life)	Resources	Distance																					
		Quantity																					
		Quality																					
	Products	Life																					
	User Access	Personal																					
		Common																					
	Contribution Access	Team																					
Habitat Service Sector 2 (Technology)	Resources	Distance																					
		Quantity																					
		Quality																					
	Products	Technology																					
	User Access	Personal																					
		Common																					
	Contribution Access	Team																					
Habitat Service Sector 3 (Technology)	Resources	Distance																					
		Quantity																					
		Quality																					
	Products	Exploratory																					
	User Access	Personal																					
		Common																					
	Contribution Access	Team																					

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Table 52. **Decision System > Economic Calculation Planning > Global Habitat Cities and Services**

Cities as Global Habitat Sectors Uses (To) ⇨ Resources (From) ⇩	HABITAT SERVICES	Intermediate Habitat Requirements (Intermediate Demands)								Final Habitat Demand (Local Demands)				Final Global Demand	
		City 1 Input (1 … n)				City 2 Input (1 … n)				City 1 Demand		City 2 Demand			
		Service 1	Service 2	…	Service n	Service 1	Service 2	…	Service n	Common Access	Personal Access	Common Access	Personal Access	Total Production	User Access *(type of, time of)*
City 1 Outputs (1 … n)	Service 1														
	Service 2	Intermediate use of local outputs				Intermediate use by City 2 of City 1 outputs				Final use of local outputs					
	…														
	Service n														
City 2 Outputs (1 … n)	Service 1														
	Service 2	Intermediate use of network outputs				Intermediate use of local outputs									
	…														
	Service n														
Priority (Urgency Spectrum) Determination															
Total Inputs															

Services as Local Habitat Sectors Uses (To) ⇨ Resources (From) ⇩	HABITAT SERVICES	Global Demand								Final Access Demand (Local Demands)				Final Global Demand	
		Intermediate City 1 Requirements				Final Demand for City 1 Service				City 1 Demand		City 2 Demand			
		Service 1	Service 2	…	Service n	Service 1	Service 2	…	Service n	Common Access	Personal Access	Common Access	Personal Access	Total Production	User Access *(type of, time of)*
City 1 Processing Sector Outputs	Service 1														
	Service 2	Intermediate use of local outputs								Access type of outputs				Gross Demands	
	…														
	Service n														
City 2 Processing Sector Outputs	Service 1														
	Service 2														
	…														
	Service n														
Priority (Urgency Spectrum) Determination															
Total Inputs															

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Table 53. Decision System > Economic Calculation Planning > Global Habitat System

Economic Calculation and Decision Tables		MATRIX Z												MATRIX D		MATRIX P
Habitat Sectoring Unit Matrix Z		Habitat Sector Inputs				Habitat Sector (Inputs)				Habitat Sector (Inputs)						
		Habitat Sector Inputs (Life)				Habitat Sector Inputs (Technology)				Habitat Sector Inputs (Exploratory)				Final Use		Total Produced
Uses (To) ⇨ Produced (From) ⇩		Service-Object 1	Service-Object 2	...	Service-Object n	Service-Object 1	Service-Object 2	...	Service-Object n	Service-Object 1	Service-Object 2	...	Service-Object n	Common Access	Personal Access	Total
Habitat Sector Outputs (Life)	Service-Object 1															
	Service-Object 2															
	...															
	Service-Object n															
Habitat Sector Outputs (Technology)	Service-Object 1															
	Service-Object 2						Matrix Z							Matrix D		Matrix P
	...															
	Service-Object n															
Habitat Sector Outputs (Exploratory)	Service-Object 1															
	Service-Object 2															
	...															
	Service-Object n															
Priority and Urgency Determination																
Total Inputs Required																
Rules	Cases of a Solution	Solution Option 1...n	Solution Option 1...n	...	Solution Option 1...n	Solution Option 1...n	Solution Option 1...n	...	Solution Option 1...n	Solution Option 1...n	Solution Option 1...n	...	Solution Option 1...n	Common Decision Option 1...n	Personal Decision Option 1...n	
Conditions																
Conditions 1	Objectives Ability Design Optimization Protocol	T	T		F	T	F		F	T	T		F			
Conditions 2	Parallel Value Alignment Protocol	F	T		T	T	T		F	T	T		F			
Actions																
Action 1	Reject Solution	x	-		x	x	x		x	-	x		x			
Action 2	Accept Solution	-	x		-	x	-		-	x	x		-			

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Table 54. <u>**Decision System > Economic Calculation Planning > Global Habitat System:**</u> *Table showing habitat service system outputs to the three types of access: 1) team access to the habitat service contribution system; 2) User demanded access to common and personal objects and services (or, products).*

Services as Local Habitat Sectors			City 1 Processing Sector Human Access Types									Final Global Demand
Uses In (To) ⇨			Life			Technology			Exploratory			
			Contribute	User Demand		Contribute	User Demand		Contribute	User Demand		
Products Out (From) ⇩		HABITAT ACCESS	Team	Common	Personal	Team	Common	Personal	Team	Common	Personal	Total Production
City 1 Processing Sector Outputs	Life	Fixed										
		Flexible										
		Cyclical										
	Technology	Fixed										
		Flexible										
		Cyclical										
	Exploratory	Fixed										
		Flexible										
		Cyclical										
Value(s) Added												
Total Inputs												

Solution: Issue Resolution Service for a Community-Type Society

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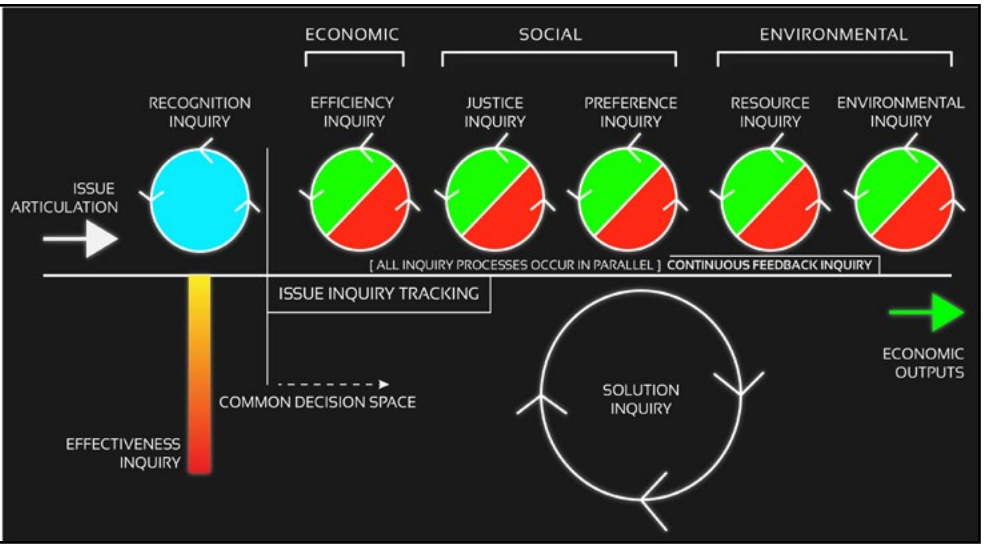
Abstract

A society may formalize by means of an [learning] algorithm the procedure by which societal-level decisions are expressed and resolved as issues. The decision system for a community-type society applies to the Real-World Community Model a procedural algorithm to incoming social information, which generates within the decision resolution environment a solution to material and information reconfiguration. Herein, all decisions in the societal information system are seen as issues, or potential issues. These issues are processed by means of an openly sourced protocol and accompanying algorithm(s). In a community-type society, issues for an information circuit. Issues are recognized and a risk determination is applied. Issues that require changes to previously configured aspects of society go through a transparent parallel inquiry process where inquiries and designs are resolved into changes enacted upon by teams and working groups. Each inquiry process is a condition for the acceptance of a decision solution. The parallel inquiry process maintains a set of value oriented inquires for ensuring alignment of a potential solution with the actual objective. The second dimension of the parallel inquiry process is that of solution engineering to design the actual solution, which is evaluated against a set of values within the first dimension. Herein, it is from feedback upon decisions that the whole self-integrating system adapts and intentionally develops.

This decision system contains a visual issue inquiry resolution protocol with a set of parallel and interdependent inquiry sub-protocols.

Graphical Abstract

Figure 29. *Depiction of the decision system threshold inquiry processes. This is a decision space where issues are articulated and solutions are resolved, whereupon a solution is selected for team/technician operation. Safety procedures exist herein. Here, values become encoded into the operation of society through their respective threshold inquiry processes. All societal-level algorithms and economic/ resource calculation occur herein.*



1 Introduction

A.k.a., The economic decisioning systems model, the decision system, the decisioning system, the kernel [for information coordination and decision support], a solution orientation to decisions, information-construction decisioning.

This decision system represents the explicit formal process by which all economic resource [transport] decisions are arrived at within the community. Together, we arrive at decisions that concern the allocation and distribution of resources toward community "demand issues". As such the system is designed to facilitate specific adaptation to an explicit demand given a set of resources and discoveries. Herein, logistical decisions are arrived at via a set of integrated systems processes which involve multiple layers of inquiry (or enquiry), input, output, and processing. This decision system model provides a common set of criteria that everyone across the organization can use to evaluate decisions and planning. Note that this model is sometimes, though rarely, called a, "strategic filter"; because, it is a high-level (strategic) filter for actions and states that are highly likely to benefit community (Read: meet community objectives/requirements).

As a type of system, it would not be accurate to refer to this [economic] decisioning model as a single entity, human or machine, for economic issues applied to this model involve a spectrum of human and technological system inputs, outputs, and processes -- there is an identifiable layering to the model. This economic decision system represents the process of [multivariate] parallel inquiry into a potentially existent environmental system (an optimal solution to issues). This system includes a set of interdependent inquiry resolution protocols.

Each inquiry process is an rule-based acceptance condition in the decision system. Each inquiry seeks out sufficient information, and processes it, to resolve an acceptance determination on a specified technical solution. The inquiry processes search, sort, and decide acceptance. When represented in a decision table, the action is either acceptance, or non-acceptance. The condition is the inquiry process. New technical solutions for an issue in the decision system are processed through a parallel set of these inquiry processes. All potential designs are compared, and designs that do not meet thresholds would be flagged, and hence, need to be re-evaluated (or, adapted).

The primary reason the decision processes are referred to as inquiries is similar to why some legal systems refer to themselves as inquisitorial systems (as opposed to adversarial legal systems). An inquisitorial system is actively involved in discovery and processing of the facts of the situation/case. Similarly, each of the primary decision processes in this model also seeks out sufficient and accurate information to resolve the decision as expected.

This decisioning model may be said to represent an emergent formulaic framework, a "safe scaffolding", for socially iterating (Read: designing and re-forming) the material structure of a community's habitat toward a higher potential state of life-enriched expression. Herein, our social approach structures our economic orientation such that we apply [at least] conscience ("with" [con] + "science") to a common model of reality (the Real World Community Model) that we use to socially structure our actions and behaviors. Hence, all decisions (or "issues") are resolved in alignment with this collaboratively informed and emergent model of the world - the Real World Community Model. In other words, the decisioning model acts as a constructive filter system [of sorts] that builds up and then resolves a decision space. And, the decisioning space draws input from the Real World Community Model's collaboratively developed repository of information.

Together, the structured purpose of these models is to make all 'change' explicit. Therein, they account for each specific [iterative] adaptation to an issued demand from a responsive environment. From a functional perspective, this economic decisioning model exists to support humans in their pursuit of their purpose and their fulfillment, and not to force meaning or labor on anyone.

In its operation, this decision model represents a transparent pool of information that may be inquired into, and through which inquires may be structured to re-orient and re-organize the material environment so its service systems (i.e., our service systems) fulfill our needs more effectively and efficiently.

Herein, there exists 100% complete transparency of the system that processes decision issue data. In the case that the system evolves through machine learning in some form of artificial intelligence, then the AI must be able to sufficiently explain its reasoning for every decision so that all interested humans can understand. A transparent system is the only system that allows for complete trust of the users in the system itself. Information interfaces provide users with transparency into the decision process.

At a high visual-level, this decision model involves multiple processes of inquiry constraint into an economic issue for the purpose of acquiring and processing sufficient information to arrive at an optimal "designed integration" decision. Practically speaking, each constraining inquiry process is a 'sub-mechanism of action' in a larger and more complex frameworked structure that itself acts as a socio-economic fulfillment 'mechanism of action'. Herein, computers are a useful and accessible technology for tracking and processing data within a complex multivariate [information] system. It is important to note that these inquiries occur in parallel, and some are in a 'static open' state (i.e., they are always in operation; e.g., 'issue articulation inquiry' and 'effectiveness inquiry'). Through the inquiry process we account for all the known variables that impact the system's ability to produce that which we need, want, and prefer.

In a sense, every economic system is a sub-system of a large, finite system, the biosphere. Neither the decision system, nor the community as a whole, could function or even exist without the services of natural ecosystems. These natural systems must be understood if a society is to arrive at economized decisions about economic services and natural resources. Nature is not some sub-system of the economy, though most "economists" would claim it to be so.

The encoding of this decision system means that technical economic interactions among members of the Community are based upon the availability of resources (remember, it is a resource-based model). This type of interaction is essentially what happens between close family members in everyday modern culture all of the time. This economic decisioning model represents the expansion of this familial-type inter-relationship out to an entire [scaled] community. We allow family members to access resources all of the time without expecting an exchange [of labor] or currency in return. This decisioning model represents an extension of our families to the scale of a community.

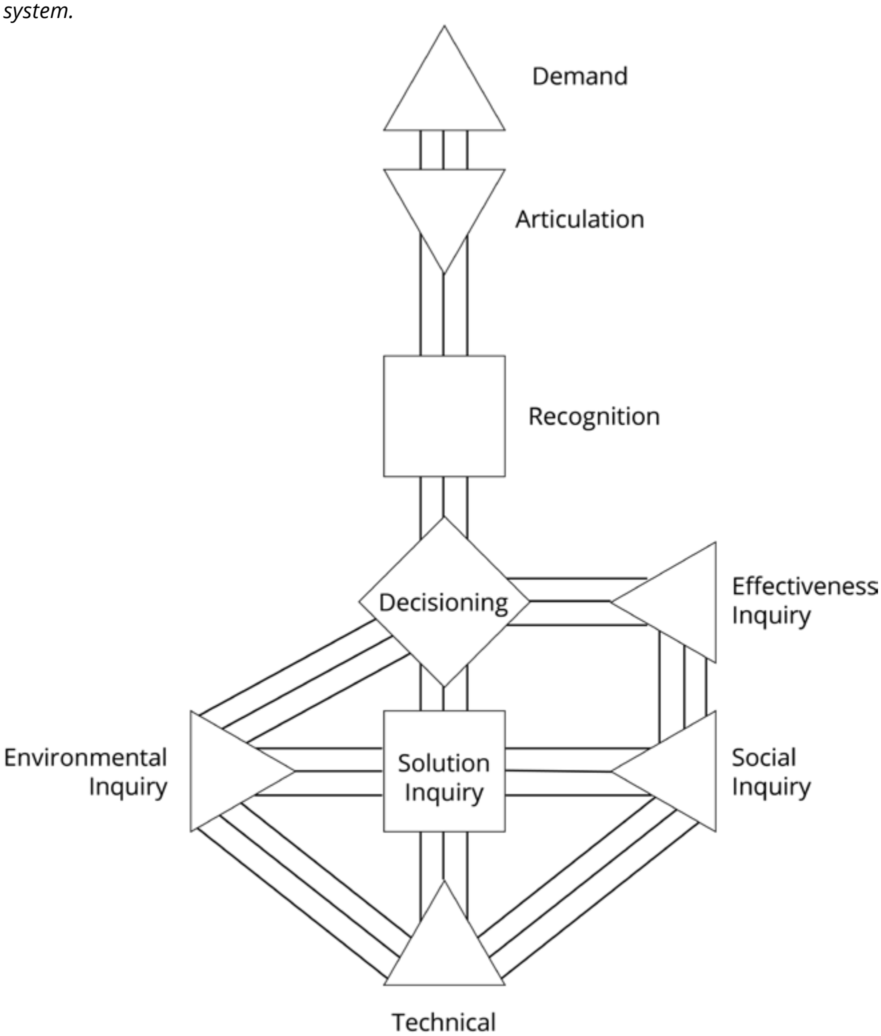
Though mankind lives on a really big spaceship we call Earth, the more our population and technological capabilities grow the smaller the Earth effectively becomes. In a situation of limited resources, allowing the whims of anyone (or socially exclusive group, "clique") to determine resource allocation would not only be dangerous, it would be suicidal. And, the danger of anyone owning those resources exclusive to themselves with profit as a principal motivator, would be obvious. Such power will be everyone's downfall in a technologically capable environment. "You" wouldn't let anyone own all the oxygen on a space ship "you" were on. The oxygen would *rationally* be considered the common [strategic] heritage of everyone on board (i.e., it would be commonly planned and formally decided for).

If great care is not taken in the use of limited resources, then nobody will have access to them as differential advantage degrades sustainable and moral decisioning, and a "tragedy of the commons" creates conditions of extreme scarcity. Note that the "tragedy of the commons" assumes competition, not cooperation and collaboration. A "tragedy of the commons" is the result of a social organization that failed to cooperate. The tragedy of the commons exists in an environment with more than just the potential for scarcity as a characteristic. The additional characteristic is the encoded concept of competition for resources. A "tragedy of the commons" does not exist if competition within the community for resources does not exist (i.e., the commons follows a "technical" approach).

In the early 21st century, there is an ongoing tragedy of the commons. The Earth is the commons, and it is being pillaged and polluted by businesses and States for their short-term financial and socio-economic interests. This is everywhere around the planet in the early 21st century society, and it is coming to be known as the anthropocene era.

Life isn't about keeping score. The tragedy of the commons presumes competition; it assumes that "I need to compete, to win a competition, in order to ensure I

Figure 30. *High-level concept diagram showing the serial and parallel inquiry processes of the decision system as they are presently known. There is a demand that is articulated into the information system where issues are recognized and decisions are solved into solutions, of which one solutions is selected to be operated as the configuration of the system.*



have access to the resources I need." The way to eliminate this problem is to eliminate the structurally incentivized need for competition. Food, housing, clothing, and other basic needs must be absolute guarantees.

Once a community has the basic non-conditioned needs present and prioritized, then it is much easier to calculate economic need fulfillment and re-organization based upon real-time information.

1.1 The structuring of the decision model

> **INSIGHT:** *Like consciousness, the decisioning system is a self-organizing system that responds in an informed and adaptive manner to the changing conditions within and around it.*

This decision model essentially represents a formalized inquiry-based [constrained filtering solution-orientation] that structures the design and integration of solutions to technical economic problems identified by individuals and systems in the community. Figuratively, critical thought forms critical ideas and sharpens an analysis down to a critically synthesized [optimally able] path. If the idea of 'open and active inquiry' were to "materialize" as an economic infrastructure, then what would it look like? Would it possibly look like a set of emergently designed, serial and parallel inquiry processes that generate an iterating dynamic [structure] for a higher potential of fulfillment. The output of this systems process is the distributively agreed design specification for restructuring the habitat service system [toward one of greater fulfillment].

These inquiry processes are *expressed* as formalized (programmatically computational) instructions that have been formally engineered through distributed collaboration into a system into which we feed our demands for an transport-/transformation-ability based upon all known available information, which itself includes a set of protocols for value orientating the decision.

Together, the common decisioning space represents a comprehensive [threshold] ability check for integration into operational service as a modification to a strategic plan or the habitat environment.

Each of these inquiry processes is an 'information discovery system' (for processing formal orientational inquiries into information) as well as an '-ability' (as yes or no / 0 or 1) decision mechanism (or "decision circuit"). The inquiry processes acquire (or 'discover' and 'research') information and then process that information to arrive at an oriented go/no go task-transport decision for the inquired design of a solution to an issue. Here, multiple inquiry processes occur in parallel, each with their own orientational perspective on the issue (i.e., resource, preference, economic, solution, and so on. In general, go/no go testing refers to a pass/fail test (or check) principle using two boundary conditions. The test is passed only when the "Go" condition is met and also the "No" go condition fails. Hence, the inquiry processes are both a set of processes for handling the flow of relevant information as well as a set of processes for determining whether a solution to an issue has met a particular criteria threshold to proceed through to systems-level output. Herein, research provides options.

This decision model is sub-divided into a systematic set of inquiry processes that structure the micro-calculated arrival at a selected design [transformation / transport] decision. Some of these processes operate in parallel and others in serial.

Issues create projects to resolve issues:

1. Who creates issues?
   A. Humans with needs and preferences, given an environment.
2. Who creates projects?
   A. A societal-habitat contribution service working group, given protocols.
3. Who can staff projects?
   A. Contributing individuals, as part of a pool of possible individuals, given protocols.
4. Who selects the individuals?
   A. A protocol, the coordinator, and/or the team itself.
5. When do you vote/poll?
   A. When there is an objection to a decision not resolved by a protocol.
   B. When there is a preference and not a top-level category of need.
6. Who votes/is polled?
   A. The team responsible/accountable for the direct work, as organized in a functional organization structure.
   B. The habitat population whose life experience may change due to an change to the habitat.

Issues are resolved through:

1. Their identification and given current environment/situation.
2. Source of all data about issue (record).
3. More data about issue (collection and analysis inquiries).
4. Proposed description of change to resolve issue (synthesized solutions).
5. Selection of proposed change to resolve issue (solution approval).
6. Execution of change to resolve issue.

Herein, issue inquiries collect data, analyse that data, produce modifications to specifications, and also, select possible specifications, given inquiry parameters. The economic decision space is composed of the following [issue] inquiry processes:

1. **Issue articulation inquiry phase -** the "static" open acceptance of an inquired need which has been articulated into the [continuing] common decision space. This is a 'phase' space where data is being structured by previously known information.
2. **Issue Recognition inquiry phase -** recognizes the issue. This is a 'phase' space where data is being structured by previously known information.
3. **Issue inquiry tracking -** tracks/traces the issue.
4. **Effectiveness inquiry -** ensures that decisions do not put the community at "risk".
5. **Continuous Feedback Inquiry -** the mechanism, which integrates with the Real World Community Model and informs a larger information system.
6. **Value alignment inquiry**
    A. Economic efficiency inquiry
    B. Justice inquiry
    C. Preference inquiry
    D. Environmental inquiry
    E. Resource inquiry
7. **Technical Solution Inquiry -** the formal specification[ing] for the socio-technical solution.

In order to arrive at a resource 'allocation and occupation' decision the system inquires about information from a wide variety of open and collectively, commonly informed sources. It processes the information it receives in a strategically informed and formalized manner that aligns the outputs of the decision system with a desired orientational direction, a purposefully directed value orientation. This direction is encoded in two supra-processes, that of "Technical *Solution Inquiry*" and "Value Alignment Inquiry". At the economic level, a 'value' is a qualifying measurement (i.e., a threshold). Note that the "value alignment inquiries" have a 'feasibility/viability measurement' program accompanying them, which triggers a "go" or "no go" for transformation/transport when a programmed information threshold is met. The Solution Inquiry system is more greatly a process of resolving for technical integration feasibility.

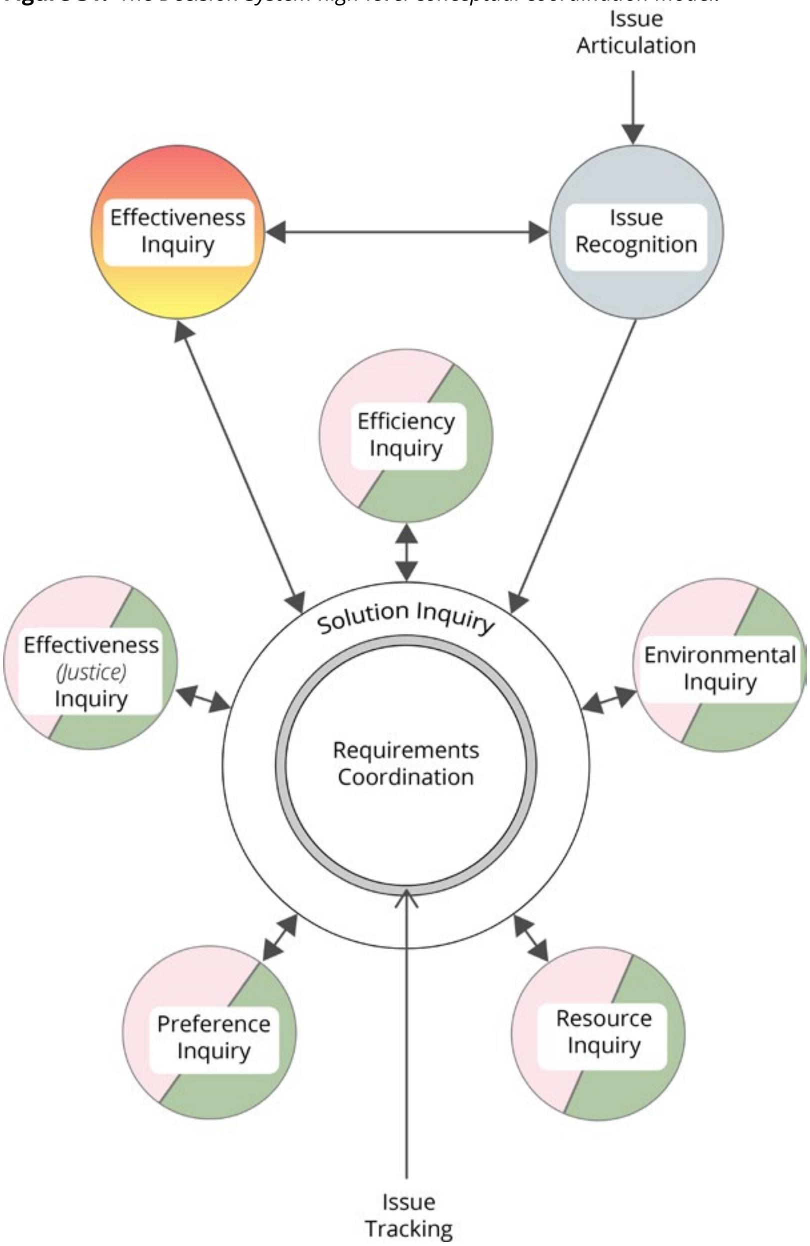
Once an "issue" is recognized it enters the "Common Decision Space" which represents a technically value oriented approach to the fulfillment of needs in a community.

1.1.1 Value alignment inquiry

A.k.a., Rational societal decisioning.

Values rank by means of comparison what is "good" (a desirable direction, action, or condition), and what is "bad" (an undesirable direction, action, or condition). In this sense, a value is a comparator function. Herein, the value inquiries compare the current solution (design, system, etc.) to other solutions and to what is the identified (or identifiably) "good" direction, action, or condition" (this identifiable "good" is often referred to as that which is optimal, given what is known and available). Each value inquiry process set inquires into whether a

Figure 31. *The Decision System high-level conceptual coordination model.*



given solution is “good” (green to move forward, agreed to implement) or “bad” (no more forward movement, not agreed to implement). Here, decision options are being evaluated against a set of criteria. The criteria are representational of the “good”, and the “good” are classified as values.

After rational conception comes classification. Classification denotes the principal of similarities and differences (i.e., of comparison). Human values are rational conceptions of conditions that generate the experience of flow and mutual fulfillment among a population. Once values have been rationally conceived, then they can be used within a decision system to compare new solutions. Rational societal decisioning involves the rational conception of a set of identifiable values that can be used as a means of comparing amongst problems and their solutions.

Value alignment inquiry is a form of parallel distributed intelligence; it is an socio-technically engineered for of intelligence for mutual human operationalization.

In order to carry out a comparison, memory is needed. Memory is impossible without a physical medium that takes up some space.

1.1.2 Decision information modeling

Decision information modeling may be used to optimize the organization and coordination of a population of individuals, by accounting for and integrating the following operational elements (including, but not limited to):

1. Social-data conceptualizations.
2. Service-access calculations.
3. Resource-production mechanizations.
4. Scheduling-contribution execution.
5. Scheduling-product access.

Herein, there are the categories of:

1. **Resource-allocation identification.** Here, the design is inclusive of resource availability.
2. **Production calculation (resource allocation calculation).** Here, the design is inclusive of resource position optimization via linear algebraic equations.
3. **Production protocol (engineering design inquiry selection).** Here, the design is inclusive of engineering optimization via a parallel inquiry process (that produces a solution to an issue as the deliverable).
4. **Service demand identification (inclusive of counting demand and identifying preference).** Here, the design is inclusive of counting and measurement.
5. **Contribution scheduling (time scheduling work).** Here, the design is inclusive of contribution effort and availability.
6. **Habitat access (resource occupation scheduling for users).** Here, the design is inclusive of access met through demand for need fulfillment, and preference therein.

At a fundamental processing level, a socio-technical fulfillment system may have decisions present at all of the following levels:

1. **Identification** (inquiries, issues *over time*).
2. **Calculation** (mathematics, computation *over time*).
3. **Resolution** (engineering, plan-design *over time*).
4. **Operation** (laboring, production *over time*).
5. **Usage** (demand, access *over time*).

1.2 Perspective representations of the economic decisioning systems model

The economic decisioning systems model may be visually depicted from several different perceptual orientations (i.e., perspectives).

The issue articulation process feeds into a recognition inquiry, which generates the opening of a technical solution inquiry. The technical solution inquiry maintains a value orientation consistent of several sub-inquiry processes (e.g., economic, justice, etc.). While the technical solution space exists there concurrently exist an iterative design cycle that consists of: discovering issue requirements, formal specificationing, strategic preservation strategizing, and the design itself. This exists within the state of continuous feedback with a larger information model. And, effectiveness inquiry functions to withdraw issues from active processing when they present a threshold of “risk”.

The transport feasibility inquiries are the red/green circles inside of a technical economic decisioning system that stores and calculates resource decisions. Within the model is a conceptual visual depiction of the resource frequency of a need. The dark grey circles represent a resource, and the light blue circles represent a need. Resource logistics are decided upon by the decision inquiry system after which the resources are moved at a specific frequency into the habitat sub-systems, the life, technology, and facility support service systems. Resources in those systems may be access on an automated or manual basis.

1.3 Selective construction through tasking

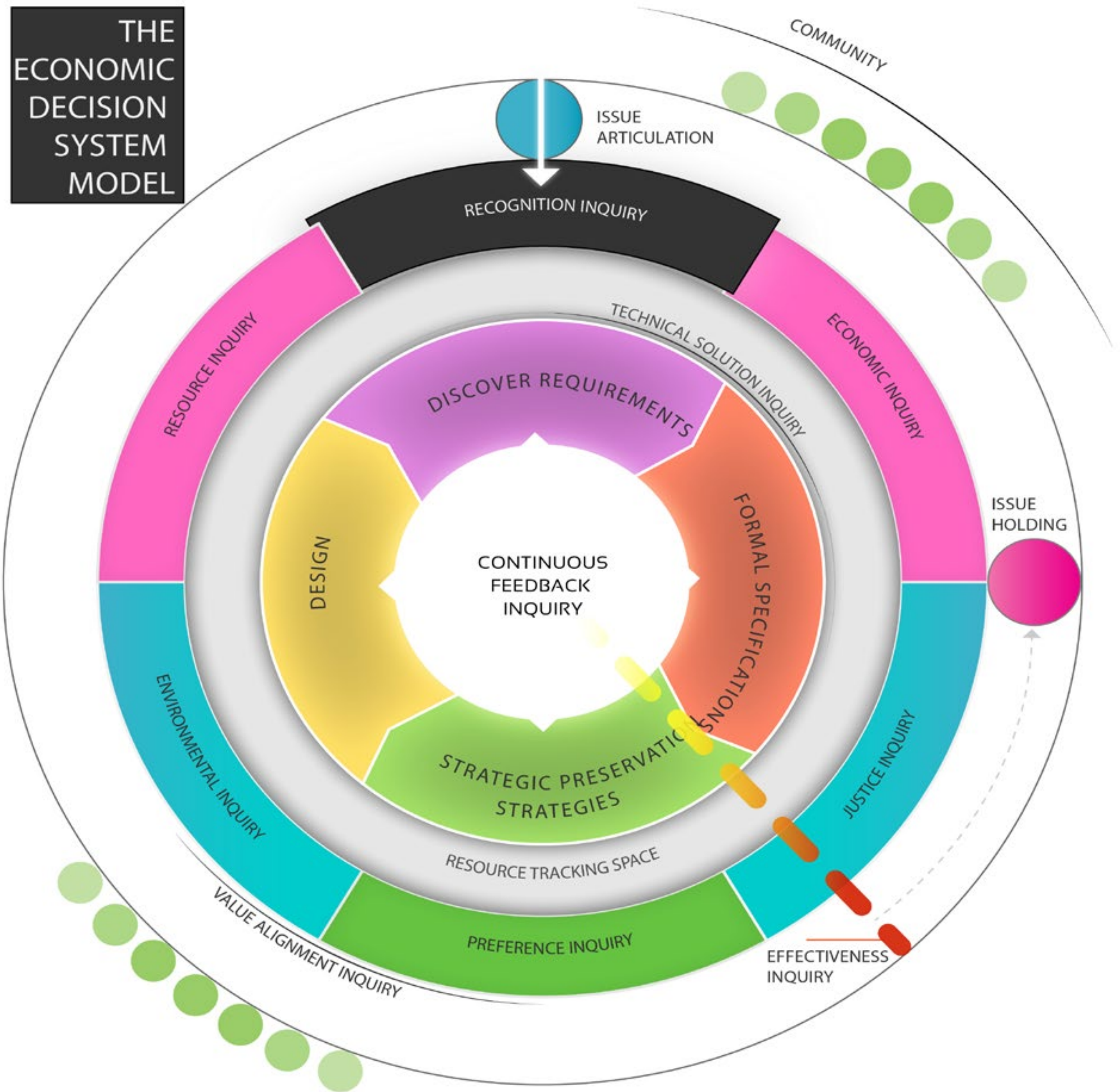
The selective construction of design decisioning tasks through a series of focusing relationships. The following conceptual relationships describe decisioning at the tasking level:

1. **Capacity:** The power to hold, receive or accommodate. Capacity concerns [the amount of] volume, as a measure. Capacity is about structure. Structure forms capacity and is in-formed by ability,

the repetition of which can affect structure (and hence, capacity). We can facilitate greater capacity by selecting for different abilities in our [iteratively decided] designs. Practically, capacity refers to the functional ability to do constructive work (i.e., the power to perform a task (or "action"). Capacity is the structural allowance for a construction task; and hence, it understands *why* the construction task is capable of being completed. Here, we ask, "Why do we want the structure we have?" In community, we want a structure for our selectively adaptivity and for access abundance.

2. **Work:** The timespace [contextual] relationship of what is being done. The specific type of work (or categorical task) to be done. Work is our understanding of *when* and *where* construction events occur in timespace.
3. **Ability:** 'Ability' represents, the quality of being able to do something, the availability of the information required to complete work, as well as, the presence of a skill [as the expression of a behavior]. In a sense, an "-ability" is the combination of a capacity and a function[al intention of direction] within that capacity. In behavioral terms, an "-ability" is the demonstrated performance to use knowledge and skills when needed. A 'skill' is a proficiency of

Figure 32. *The Decision System high-level conceptual integration model.*



an adaptively developed behavior pattern (e.g., throwing a ball). In an information system, tools are that which allow the powered performance of a construction task. Here, an -ability may be representational for describing *how* a task is to be carried out to meet a set of capacity and directional relationships.

4. **Strategy:** Temporal planning through the selection of tasks by approach. Strategies describe *what* the work (or task) is to be carried out, and relate it to an intentional direction, which is informed in some [real world] mannered context. From an observational perspective, a 'strategy' is the way an agent [behaviourally] responds to its surroundings and pursues its goals. A strategy is an approach, a manner to achieve an intention. In metaprocess modeling (in systems engineering) the connection of two goals with a strategy is called 'section'. A strategy is the mapped representation describing how a system conforms to goal models in the fact that it recognises the concept of a goal, but departs from those by introducing the concept of strategy to attain a goal. An 'approach' is the formation of a strategy; a methodology is the selection of a method; and a design is the whole model. The goal of a strategy, itself, is the definition of a common context according to which tasks are organized and information is transformed. A strategy accounts for uncertainty and orientation (or value) in navigating within the total environmental system. A strategy is a timed response to an environmental challenge. A strategy is a specific course of action to achieve an objective or objectives. Strategies are modeled and documented in a plan. A strategy is a broad, long term plan for achieving specific goals. A strategy involves the construction of tasks and the selection of projects. 'Planning' is the establishment of a predicted course of navigation (or task, action).
5. **Protocol:** The technically mathematical level of operation where a strategy is encoded to become an 'algorithmic protocol'. A protocol orients the iterative transformation of information.
6. A **capability** is the ability to achieve a desired effect under specified standards and conditions through combinations of ways and means to perform a set of tasks. A capability is a process that can be developed or improved. Adaptive structures are emergent in their "capabilities" because their structures are dynamic.
7. **Application:** The repeated performing of a specific task for a functional purpose using computational linguistics. In the design of a system, an 'application' is a task and resource list designed for a functional purpose.
8. **Interface:** A shared boundary across which two separable systems exchange information.
9. **Project:** The coordinated construction of a service application. There are: concluded projects; current projects; new projects; and holding projects.

Here, useful work requires meaning in the presence of an -ability to maintain an intentional goal space, which directs our behavior toward tasks, their completion, and our orientation to the completion of future tasks. Strategies become encoded at all levels through tasked modifications to a structure (an information system structure). Here, structures are created by the technical abilities of their constructors who apply task construction behavior in an environment. Wherein, constructors apply 'strategies' and design 'protocols' in their accounting for a valued orientation.

1.4 The feasibility and viability of a task

Feasibility and viability are processes in the common economic decisioning system. The logic of these "studies" [in part] determines the construction of the Community.

> **Feasible** |FEA.SI.BLE|
> *- adjective*
> *1. capable of being done, effected or accomplished : a feasible plan*
> *2. probable; likely : a feasible theory*
> *3. suitable: a road feasible for travel*
>
> *Note: Usually used in the context of do-ability, possibility.*
>
> **Viable** |VI.A.BLE|
> *- adjective*
> *1.capable of living*
> *2.practicable; workable: a viable alternative*
> *3.having the ability to grow, expand, develop, etc: a new and viable country.*
>
> *Note: Usually used in a financial or economic context.*

The solution inquiry system constructs systematic solutions that involve probable, likely structures for integration into the habitat service system as an existent structure (i.e., an engineered construction) that more greatly fulfill "issued" requirements.

Therein, a feasible solution is a solution that integrates at a technical level and meets all quantifiably issued requirements. When these solutions are tested for their technical feasibility, there is a 'feasibility assessment/study'. The common, parallel viability inquiries compare and analyse solution designs in their scientific relationship to the viability of the community. When solutions are studied and tested for their ability to maintain the community structure's viability, then there is a 'viability assessment/study'.

1.5 Information constructor theory

The basic principle of constructor theory is that all fundamental laws of nature are expressible entirely in terms of statements of which tasks (i.e. classes of physical transformations) are possible and which are impossible, and why. This is a new mode of explanation, intended to supersede the prevailing conception of fundamental physics which seeks to explain the world in terms of its state (describing everything that is there) and laws of motion (describing how the everything changes with time).

By regarding counter-factuals ('X is possible' or 'X is impossible') as first-class, exact statements, constructor theory brings all sorts of interesting fields, currently regarded as inherently approximative, potentially into fundamental physics. These include the theories of information, knowledge, thermodynamics, life, and of course the universal constructor. In constructor theory tasks are performed by constructors. Possible tasks are those which physics allows the presence of a constructor. A constructor is an object that can perform a task and retain the property to perform it again. Basically, it is everything that can do something and retain the property to do it again.

This theory says that the way we describe the world is in terms of transformation. In this transformation, there is something that is changed (a substrate) and something that changes it (a constructor). And, those are the two fundamental conceptual elements for the presence of creative physical processes. Here, we realize that information can provide instructions to coordinate the transformation of a substrate (which is itself, a task).

An instruction is information that is acting as a constructor. Of course, in the real world there are only approximations to the idea of constructors [because there is a continuum]. And, knowledge is one of the best approximations of a constructor as it gets preserved [because it is an abstract constructor]. DNA might be considered a constructor for it provides instructions to a cell [as to what to do] to build certain chemicals and so forth. When all the unnecessary details are identifiably abstracted away you are left with something that has to do with information that asks as a constructor and that is acted upon by the environment.

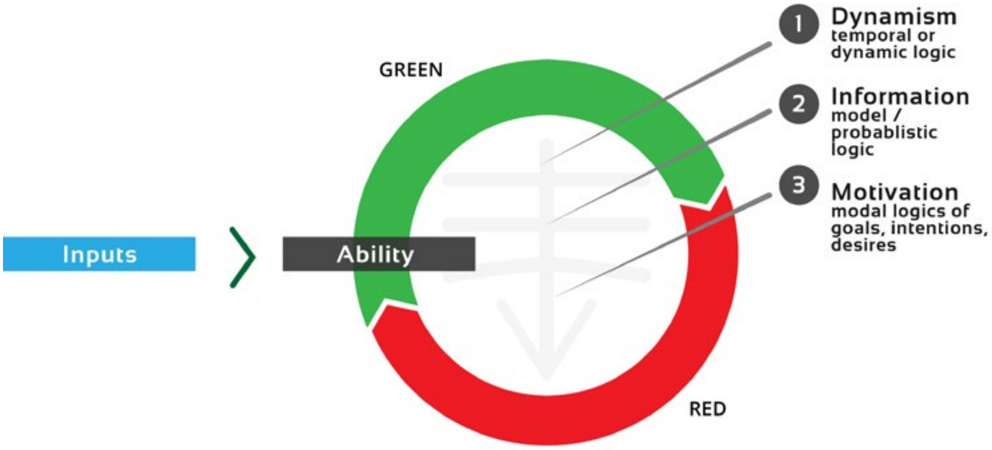
If a task, a transformation, is impossible, then there is a rule that makes it impossible. If there is no rule that makes it impossible, then it is possible. There is no third possibility. What does possible mean? In the overwhelming majority of cases, though some things are possible because they happen spontaneously, things that are possible are possible because the right knowledge embodied in the right physical object would make them happen. Since the dichotomy is between that which is forbidden by the laws of physics and that which is possible with the right knowledge, and there isn't any other possibility, this tells us that all evils are due to lack of knowledge. It claims that the whole of science is to be formulated in terms of the difference between transformations that are possible and those that are impossible, and there isn't a third possibility.

Also, 'task information criteria' describe short-term, locally measurable effects which relate directly to a [transformation] process.

> *"There's a notorious problem with defining information within physics, namely that on the one hand information is purely abstract, and the original theory of computation as developed by Alan Turing and others regarded computers and the information they manipulate purely abstractly as mathematical objects. Many mathematicians to this day don't realize that information is physical and that there is no such thing as an abstract computer. Only a physical object can compute things."*
> *- David Deutsch*

Figure 33. *Icon representing a 'threshold'. In the icon, the arrow is moving downward and upon the third horizontal line down it reaches a threshold, which is indicated by the third line's downwardly concave shape.*

Figure 34. *Threshold [cap]ability to "go" (green) or "no go" (red).*



2 Issue articulation inquiry

INSIGHT: *Questions provide the intention to focus. And, questions provide a focus for intention.*

This decisioning model is triggered by the articulation of an economic [design] 'issue', which normally includes a defined **need** with an accompanying set of **requirements** (or **objectives**) that must be attended to, to resolve the 'issue'. Issues are articulated (or "issued into") the *Issue Articulation Inquiry* sub-system by either an individual, a team of individuals, or a systems-based technical calculation sensor. The term, **issue**, as it is used in the context of this model is intended to mean: (1) the current unsatisfactory state of a system(s); (2) a potential problem or incident in the community; or (3) an economic inquiry within the community for restructuring and/or resources (transformation/transport). Technically, every 'issue' exists as a change request to the community and its systems, which have a continuing and iterative operational functionality. Herein, a specific instance of an issue may be understood in terms of its implied question(s) as well as the need (or want) that it fulfills.

Herein, it is important to note that when an issue [instance] is created and "issued" into the decision system, the creator does not create the issue as a question. The questions that concern the nature of the issue are implied in issue recognition and further processing, which involve a set of commonly formalized, value-oriented design inquiries as well as a retention of the past dynamics of the system.

This process of tracking the life and history of economic issues is known as **issue tracking**. The tracking of an issue extends throughout the life of the issue, and includes the issues **current status** (e.g., *ongoing*, degree *resolved*, and *assigned to*) as well as all additionally relevant data and information pertaining to the issue, and its inquiries. Issue tracking may also be said to involve the process of 'issue tracing'.

Although different issues may have slightly different questions implied, the questions of issue **prioritization** and **allocated assignment** are [near] universally applied. And, they are often the first questions asked of an issue. In the case of a fire, the first two implied questions are:

1. How should this issue be prioritized; and
2. How should this issue be assigned?
3. What resources are available or may be logistically arranged to become available to handle this particular emergency-issue?

These questions, however, presumes that the potential for a fire was planned and designed for.

In the case of an emergency, the priority is the emergency and resources are systematically accessed under emergency response protocols by those humans and systems that are responsible and sufficiently informed to respond to and recover from the emergency.

No significant processing of the issue occurs during the issue articulation phase - issue articulation is mostly the pre-structured routing of issues. Some issues are complex, others simple. Some issues will require significant initial data input, while others are triggered by a sensor and are automatic. The '**user**' (which may be an individual or automated system) entering the issue may or may not receive a request for more information from the input inquiry process (i.e., the issue articulation inquiry system) in order to ensure an accurate triage decision by the next system, the Recognition System. To the user, the issue recognition system appears as a subcomponent of a Collaborative Design Interface (CDI).

The Issue Articulation Inquiry system processes information on the following questions, which it displays globally through its global user [design] interface:

- What is needed?
- What information do we have?
- What information is missing?
- How are we going to get the information we need?
- What is the next step?

When issues are initially articulated they are associated with a Habitat subsystem and an operational process by the articulating entity. In other words, the initial articulation of an issue always comes with a particular habitat [**tagged/assigned**] set of associations. Herein, social and recreational issues are articulated with a Facility subsystem association. Life and Technology Support issues are articulated with their associated subsystem. This initial association of an issue within the structure of the Habitat system provides data for the issue's relational clarification and for an accurate triage decision [by identification of its particular localized operational process].

Demand for economic goods and services is represented through the Issue Articulation process and the later value decisioning process known as, Preference Inquiry.

NOTE: *Issue articulation necessarily includes issue detection. Issues can be detected dynamically/automatically via sensors, and also via surveys and assessments.*

Transparency in concern to the issuance of need(s) into the community's decision space will show [by degree and context] whether or not needs are being effectively and efficiently fulfilled.

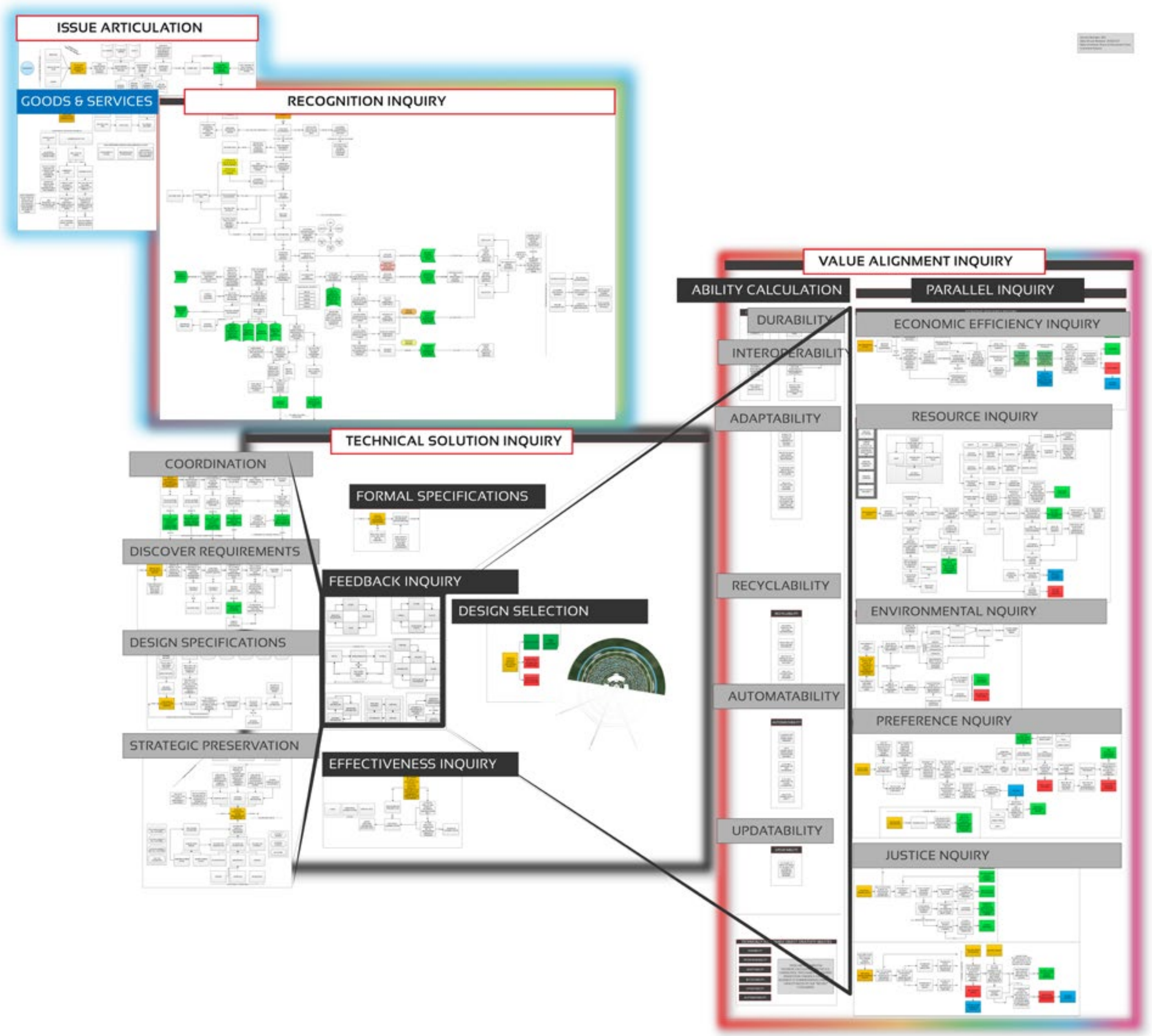
There are many issue tracking systems in existence and issue tracking is a field of [logistical information] study unto itself. Issue tracking is also sometimes known as: bug tracking, solution tracking, trouble tracking, and requirements tracking among having many other labels, including, information logistics (i.e., the flow of information). There exist a wide-variety of issue tracking systems on the commercial market.

There are some economic issues which may not immediately enter the value-orienting common decision space after pre-structured processing the issue inquiry system. For instance, if a fire were to break out, someone would not input, "how should this fire best be collectively handled?" This would be a non-sensible recipe for disaster. Instead, the community knows things about fires and it knows things about its structures, and so it might intentionally design its material habitat systems to trigger a sensor alarm, triggering an issue instance, leading to issue recognition and the activation of emergency services, which have pre-designed evidence-based protocols/practices. An evidence-based practice (EBP) approach is followed by emergency services world-wide. Also, we have the ability to install "smart" alarm systems to generate issue instances [when they detect the signature of a fire in the environment]. And over time, as we gain more knowledge about materials and fires, then we might be able to design our material architectural structures so that they are safely resistant to fires, which is itself an articulable design issue.

When we begin to ask people (our community) what they need and want, then we can begin to re-design our lives and our habitat to fulfill those demands [by individuals operating within a common social-technical-ecological-space]. Under the impact of a need we can begin shifting our [bio-physiological] structures to optimize our overall fulfillment [frequency].

> **INSIGHT:** *All demands are requests on the natural environment; therein, a command[ed demand] is an unfortunate form of request[ed demand].*

Figure 35. *This is the decisioning system inquiry supra-process for a community-type society. This is a decision system flow chart. Please refer to the project's website for the full size asset.*



3 Issue recognition inquiry

The *Issue Recognition* system functions to identify, further define and clarify, and triage issues. The primary input of the *Issue Recognition* System is the issue itself and all associated [meta]data. The *issue recognition* system may request additional information from the individual or system that articulated the issue; and, it may pull information from other domains (or systems) in the Real World Community information system to ensure an accurate triage decision. The primary function of this phase is to process articulated issues under the condition of **situation awareness** *(i.e., a knowledgeable context)* and arrive at a triage decision. In concern to project initiation, if resource requirements and production costs are known, then a 'project' can form around the resolution of an issue. Issue recognition represents the initialization of a requirements management/coordination space for the issue. Issues have to be interpreted in the context of the situation just like diagnostic tests have to interpreted in the context of the patient/situational information.

In order to appropriately triage an issue, the issue must be recognized. Issues contain **requirements** that must be met for their resolution, and these requirements play an important role in the Recognition Inquiry's triage decision. An issue's requirements are prototypically processed into one of the three primary operational process categories:

1. **Incident** response*
2. **Operations** and maintenance (M&O)
3. **Planning** preservation

**Emergency incidents are either initially associated with, or later directed into, the Incident Response 'operational process' category.*

Herein, tasking information drives and monitors these operational processes.

Significant processing of an issue may or may not occur during this phase. An emergency, for example, would not require significant processing, and would follow a path leading to the immediate activation of emergency services. Multiple issues on the ongoing design of a product submitted by separate individuals might require more processing as some issues may need merger and others deletion (due to duplication). Processing depends upon the particulars of the issue itself and the context (i.e., situation awareness) within which the issue was submitted. Situation awareness is required for the orientational accuracy of all decisions and actions -- all decisions happen within the context of a situational [set of circumstance dynamics].

The *issue recognition* system functions to:

1. To *identify* (i.e., recognize, verify and confirm) the issue: Does this newly inputted issue match with what we know of the characteristics of known issues? In what ways does it match to those issues that are currently in or have passed through the decision space? Is it a "New issue" (a verifiable issue that does not match with existing issues as acknowledge and accepted as valid)? Is it a "Issue merger" (merge with existing similar issue)? Is it an "Issue rejection/dismiss" (issue is a duplicate or user error, and will be rejected and new relevant information if available passed to the original).
2. To *recognize* the issue's most relevant Habitat systems association (the habitat support system) and priority (the operational process) via a series of routing rules relating to the current structuring of the Habitat.
3. To *clarify* the issue such that sufficient analytical understanding leads to an accurate triage categorization.
4. To *triage* issues along an urgency spectrum.
5. As a *recourse space* where flagged, modified and resubmitted issues are processed.

The *Issue Recognition* Inquiry process accounts for an issue's "situation awareness". There is a large body of research literature surrounding the study of situation awareness. **Situation awareness** is defined herein as the *collected perception* of elements in the *environment* within a volume of time and space, their *identification* and the *comprehension* of their [related] meaning, as well as the *projection* of their status in the near future (i.e., 'trending'). Situation awareness involves the gathering of knowledge and understanding about the context of an issue from the environment in order to more greatly and accurately inform a decisioning process.

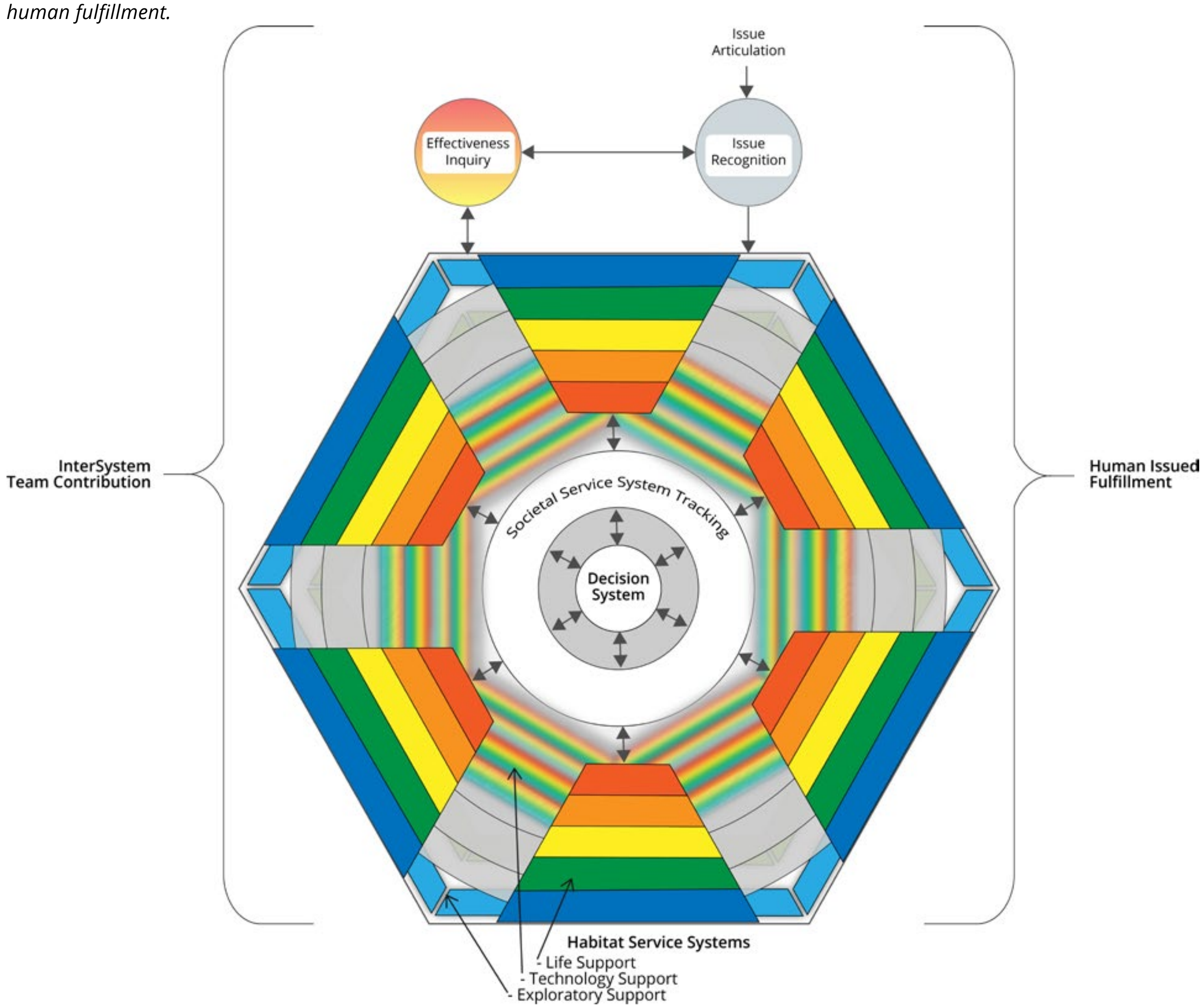
In the process of recognizing an issue, this inquiry phase associates the issue with relevant data from every other system and domain in order to accurately place the inquiry into the larger inquiry system (Read: the common value-orienting decisioning space). Situation awareness is always a fundamental requirement in order to take any form of 'informed action'. Every issue has a requirement for situation awareness while it is in the decision system, for this is an integrated system - a system-system.

3.1 Incident categorization

Prioritization relates the importance of the incident to the impact on the organization and the urgency, relative to the timing of the incident (that is, when the incident occurred).
Categorization is the process of arranging the incidents into classes or categories. In the incident coordination process, this provides us with the ability to track similar incidents related to the products and services provided to the organization.

When an incident is first categorized, it enables the analyst to run a search for knowledge in the form of incidents, problems, or known errors. When an incident can be categorized in only one way, the search against previous knowledge is more effective. If knowledge is not available, categorization provides the structure to begin gathering the information necessary to diagnose and categorize the new knowledge. Categorizing the incident speeds up the process and creates greater efficiency within the process flow. If an issue cannot be resolved, the next value-add of categorization is identifying the group(s) to which a given incident can be escalated. Once escalation groups have been tied to specific categories, the organization can begin eliminating errors in the escalation process. Finally, another benefit of effective categorization is the ability to produce meaningful reports and conduct trend analysis, which helps the organization take a more proactive approach to managing services. Event management also depends directly on incident categorization. Developing automation tools and features that support event filtering and correlation, which will help you identify incidents and select the appropriate control actions, is important to ensuring the success of a given process. Likewise, proactive problem management is nearly impossible to achieve without good categorization. If an analyst can log a single incident under five or six different categories, just imagine trying to run a master report that includes all of the incidents and reports related to a specific service, issue, or component. Such a report might identify some similarities between incidents and problems, but without the full picture we may not be able to conduct trend analysis. Categorization is based upon a hierarchical structure that has multiple levels of classification. The hierarchy is often described as a category/type/item (CTI) structure. Once the analyst picks a high-level category, he will next select a type, followed by an item. If this is done effectively, the category defines a subset

Figure 36. *Decision system integration into a societal-level [human] issue tracking system that generates, through contribution, a global team of habitat service system members who contribute to sustain a set of habitat service systems, which ultimately, sustain human fulfillment.*



of types and the selection of a type identifies a subset of items. This type of hierarchy simplifies the incident categorization, reduces error, and helps tie unique CTIs to their owners. At its core, then, categorization is like a set of buckets. Each bucket holds a bunch of incidents and these incidents are logically grouped according to a subset of characteristics. The first decision to make has to do with identifying the highest level of the hierarchy.

> **MAXIM:** *What we refuse to see is what can most hurt us, because we have no defense against it.*

3.2 Issue escalation

Critical issues are those that affect dates, budget, or quality of "must have" deliverables, if not addressed.
Escalation must be managed, documented, and timely. When an issue has been escalated, the escalator must continue to monitor the situation and report on the progress of the resolution.

The following escalation process will be used:

- 1st level escalation is notified in case of a critical issue if the issue cannot be resolved at the functional or project level. Otherwise, the situation will be handled and documented.
- 2nd level escalation will be notified, if the first level does not or cannot respond, or response is insufficiently handled and documented.
- 3rd level escalation will be used in emergencies only.

3.3 Systematically recognized and integrated needs

Every issue is assigned and prioritized. Human life support needs acquire a different prioritization than human social and recreational needs (or wants) and this is a commonly agreed upon and fundamental moral (or ethical) understanding. For example, while a human may *want* a car, he or she does not *need* a car. A car is not something required for survival or optimal maturation. However, a car may serve as a tool that helps an individual living today meet genuine needs. For instance, a car may help someone travel to see friends, meeting the need for connection. Or it may be used as transport to an office where money is made and subsequently spent at a distant business to meet the need for [at least] food and shelter. Thus, the car is part of a need-meeting strategy, but is not itself a need. And, from a systems perspective the need is not the car; instead, the need is for a technologically efficient and humanly effective transportation system within an integrated habitat service system which designs the fulfilled integration of all knowable needs [simultaneously in space and time]. Every car on a road is in fact part of a larger system, a transportation and distribution system, which is interrelated with a social and economic system [as well as a material architectural system].

Herein, the Community recognizes and measures those things that are essential to the sustainment of biological life and human well-being. These basic life supporting necessities include, but are not limited to: the need for uncontaminated food and water (and nutritional density in the case of food), the need to shelter and to clothe (environmental exposure), the need for energy, and the need for a restorative environment (e.g., sleep). These are not luxuries, they are not wants, and they are absolutely essential to the survival of an individual and a community.

We experience life supporting needs as different (or separate) from social and recreational needs (or wants), with the recognition that both are necessary for long-term individual and social well-being. Social and recreational goods and services allow for relaxation, re-creation, and personal and social development. Social and recreational needs are essentially an extension of "quality-of-life" [technological information] needs, sometimes known as 'wants'. Fundamentally, all [healthy] humans have desires beyond basic needs. If this were not true then there would be no self-driven inventors, designers, or artist.

Biologically healthy humans exist because their life support needs remain sufficiently met. Life support needs are identifiable and measurable, and nowhere is this more apparent than with those other species that we share a close connection: cats; dogs; horses; plants; and other many lifeforms. Clinical animal researchers are exceptionally well informed (due primarily to an accumulation of scientific studies) about what macro and micro level of nutrition these species need to stay alive and biologically healthy. In other words, in clinical animal research nutrient lists exist for various species and provide helpful data in animal models of disease and performance (e.g., race horses).

Living beings must live congruent to their biology at all times [qualified by hormesis] for optimal health and well-being. "Primitive societies" (i.e., indigenous peoples), though few still exist, were known to be highly aware of their resource requirements necessary to meet their absolute needs, because even slight alterations in the environment could reduce their probability of survival. These societies would logically have spent great effort identifying those foods (i.e., complex nutrient substances) and biologically-sustaining resources that were life-promoting, as well as those substances that were poisons; and, they would have designed their diet and lifestyle around their understandings.

The confusion of needs and wants is one of the most destructive conceptual forces in modern culture. It is part of the basic pattern that underlies addictions of all kinds. By continuing to focus energy on meeting a perceived need that doesn't exist (i.e., a pseudo-satisfier) or that is actually already met, ignoring natural limits, and simultaneously neglecting to meet other important needs, one creates and maintains imbalances and wounds, diseases and infections. Hence, it is important to clear away a lot of the programming around wants that limit us from sensing our real needs.

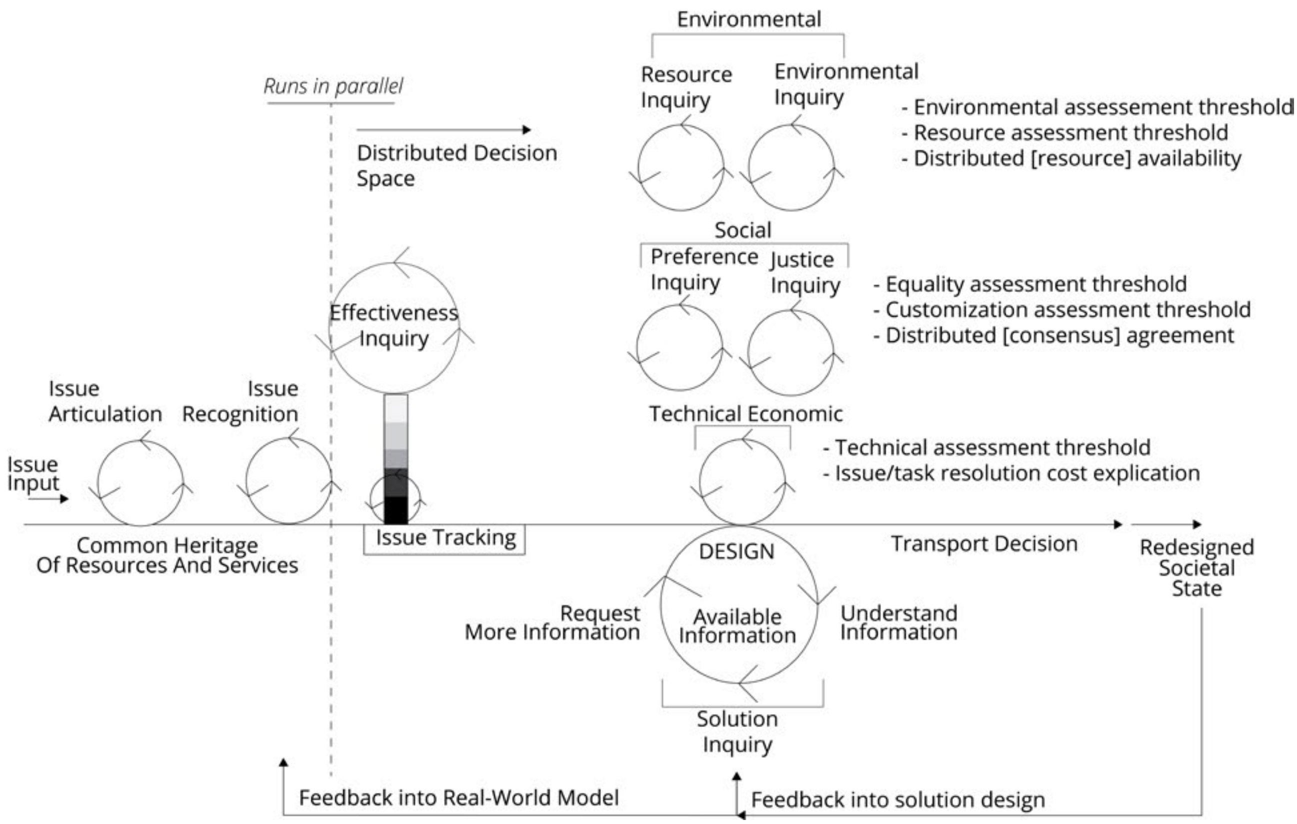
Human need (or 'life need') is that without which 'life capacity' is reduced. A need is something that is essential for life functioning. *Life capacity* is the experiential expression of your consciousness in the material probability space. Essentially, life capacity refers to someone's potential to experience, to perform (or effect[or]), to design, and to create in the real world. 'Need' is expressed here distinct from 'wants', which are uniquely related to the life experiences of the individual (i.e., the conditioning and cultural environment), but not directly related to the survival of the individual's embodied life. The fulfillment of some needs are essential for basic biological and psychological life survival, and when they go unfulfilled in a society, then biological and behavioral corrosion appears. Herein, biological corrosion refers to all states of disease, not just chronic states of diseases and non-communicable diseases.

From a systems perspective there exists a spectrum of life needs common to all human systems on the planet regardless of social identity (race, creed, religion, region, nation, tribe, or social class). These needs reference the empirical life-ground that is shared by every human being and may become known to some identifiable and measurable [emergent] degree. When it comes to needs, what is generally accepted today is that monetary economics and all its many market entities, and even the State, all represent the pinnacle form of social organization for bringing prosperity and well-being to the masses, for meeting needs. In order to claim that title from a systems perspective you have to account for the whole system in an integrated manner, and you must at least account for life capacity, human behavior, expressed and real needs, and environmental resources - none of which are effectively accounted for by a monetary economic system. In a market system all basic human needs are commodified by entities competing for [at least] market share ... even sleep (a basic human need) is a commodity (e.g., hotels).

Before acquiring an opinion on the subject of absolute human needs it would be wise to take a primitive survival course to more greatly experience the difference in a biological need versus a social or recreational need (i.e., wants). If "you" have lived your entire lifetime in domesticated early 21st century society then it may be more difficult for "you" to understand this empirical notion (i.e., the inferential difference between your experience and the experience of someone who understands this is great).

If "primitive societies" were sufficiently providing for their own needs, such that dis-ease was minimal or non-existent, then it should be no great stretch of the imagination to comprehend that with our modern

Figure 37. *The decisioning system inquiry processing model.*



understandings and technologies we can meet our life support needs and far exceed the wants of individuals in our community, and do so sustainably. It appears unnecessary then to prioritize life and technology support needs beyond that which we know are absolute for our healthy biological functioning (i.e., beyond 'incident response' status).

People will violate their own values to meet their needs. They will find a way out of survival, and it isn't always pretty. Remember this when judging another. In your own life, what triggers your needs so deeply that you will do the most monstrous things to have them met?

The differentiation between life needs and social & recreational needs is not intended to demean the cultural pleasures and creativity of expression that foster enjoyment in this life, but to ensure that there does not exist a distortion of values and priorities. In some distorted systems, "all animals are equal, but some are more equal than others [in the fulfillment of their needs]". Such a distortion will eventually lead to the "negative sustainability" of a community.

One life supporting need cannot be valued over the other (e.g., valuing shelter over food). They are all essential, and that is why they are classified as 'needs' versus 'wants'. As our knowledge and understanding of our primary four (+2) needs (shelter, water, energy and food + a restorative and recycled ecological environment) grow so too will the way in which they are met by the core support systems that we design to meet them.

There is no great dilemma in concern to the prioritization of needs themselves. Needs are prioritized over wants and the community maintains an emergent and empirical understanding of the threshold at which a need is no longer being met, causing aberrant biological and potentially psychological functioning, or environmental damage. Fundamentally, this can be summed up in the statement that our needs cannot be decoupled from nature (or, overlayed by pseudo-satisfaction), and that if they are (or were, as the case may be), then we would eventually lose an awareness of what those needs actually are. Maybe, this is something to ponder about the notion of "domestication".

> **QUESTION:** *Are the necessities in life being manufactured to sustain an economic system, or to sustain the healthy functioning of individuals within a healthy functioning society?*

3.4 The triage process

> **INSIGHT:** *Some needs are more "costly" to a society than others when resources are limited.*

'Triage' is a [medical] term referring to the process of prioritizing issues [patients] based on the severity of their condition so as to maximize benefit (help as many as possible) when resources are limited. Herein, **Issue triage** is the process of *sorting* and *categorizing* issues based upon their *urgency* and their *likelihood of impacting the stability and functioning of the Habitat system.* The process of triage is the process of prioritizing those issues that are of an urgent nature over those issues that are not urgent.

In order to understand the triage process the Habitat support system architecture must first be understood. In brief, the system architecture involves three principal service support systems (i.e., life; tech; & facility) that function to meet needs and wants, and to fulfill [life] purposes by providing goods and services to individuals in the community via a set of formally defined processes. That support structure is then integrally divided into a series of three operational processes that maintain the service systems' ongoing existence. The operational processes, in turn, reference an infrastructural system that maintains the material *components* and requisite *tasks (or "tasked technologies")* for the habitat service system.

During the triage process issues are sorted and categorized, which involves the process of prioritization, based upon their pre-defined (and planned) urgency to the community. **Urgency** distinguishes the impact of an issue relative to the operation of the Habitat's systems and the safety of life. Urgent issues are assigned to those systems and interdisciplinary teams that are responsible for the systems involved and have the knowledge, capabilities, and skill [expertise] to solve the issue in a timely and safe manner.

'Priority' refers to the concept of 'precedence'. Certain issues for a transparent, specified and strategically rational reason (or sufficiently inquired explanation) are given attention first -- 'urgent' status issues are given priority by the decision system. Issues are prioritized by factoring in a number of variables including but not limited to: the habitat system(s) to which the issue is assigned; the issues associated operational process; the issues requirements; and information about the issues situation awareness, which includes the availability of resources.

Some needs are more urgent to a community than others. For instance, when members of the community are malnourished, the cultivation of nutritional food (System: Life Support > Biological Nutrition) has more urgency than the production of golf clubs (System: Facility > Recreation). This empirically referential form of prioritization represents the first encoded layer of the value of 'justice' as the effective fulfillment of human need.

Costs come in many forms, such as the cost (or artificially imposed limitation) to: efficiency (a *technical constraint*); self-directed freedom and autonomy (*social constraint*); the cost to our environment (*resource constraint*). There is also the production cost to other goods and services (an *economic constraint*). Costs can indeed be independently measured, and rendered calculable in a common material habitat. And they can be used [by contextual degree] to facilitate a triage decision.

Here, resource-based economic calculations and logistical operations provides a guide amid the bewildering throng of economic possibilities. The resource cost to all access/use issues are calculated in parallel real-time, enabling a community to prioritize outcomes through a value encoded system (with a value-encoding mechanism/process).

Priority issues have the ability to impact system instability (though not immediate instability). Those individuals that work directly and are responsible for the stability of a system are best able to guide these issues to a satisfactory resolution. If a system becomes unstable it could lead to the destabilization of every system, which would ultimately impact our needs and our survival.

Some issues will resolve with no cost, minor costs, and others, major costs, to how other needs are met with the availability of resources. For instance, a critical issue in the life support system may have a major resource cost to the ongoing production of a research device for studying some unassociated phenomena. In this case, the critical issue receives priority allocation of required resources until such time as the system is functioning nominally once again, and then, resources are transferred to the original priority, the research device.

The *Issue Recognition* system recognizes seven **prioritization designation** (or **assignment**) categories for issues. These seven categories are organized into an **urgency spectrum**. Five of these seven categories represent degrees of urgency, and the other two are considered "non-urgent". Higher urgency issues are prioritized (i.e., given priority) over lower urgency issues. Planned criteria exist for all urgency assignments.

Higher urgency issues involve the risk to life as well as the unstable or malfunctioning states of a system. The unstable or malfunctioning state of the core systems (i.e., life support and technology support) and risks to life are given priority over facility system issues. Higher urgency issues generally involve multiple systems; it could be said that every issue involves a spectrum of systems.

The urgency spectrum also accounts for systems that require a continuous and ongoing supply of resources: the incident operational processing; maintenance operational processing; and strategic operational processing structures. These **operational processes** are part of the core of the habitat systems' infrastructure and exist to maintain a state of habitat homeostasis.

Every physical system exists in a world of changing conditions. To remain functional (or functioning), a physical system must keep the conditions inside of itself fairly constant. A system must have ways (e.g., mechanisms of action) to keep its internal conditions from changing to its detriment as its external environment changes. This ability of all living things to detect deviations and to maintain a constant internal environment is known as homeostasis. To maintain homeostasis, systems must make constant changes. This is why homeostasis is often referred to as maintaining a dynamic equilibrium [dynamic means "active" and equilibrium means "balanced"]. Homeostasis requires the active balancing of priorities.

> **NOTE:** *There is only a finite number of options concerning the use of inputs that would lead to their efficient allocation; whereas, there is an infinity of options that would result in those same inputs being mis-allocated.*

4 The parallel inquiry decision space

NOTE: *In order to exist in a state of sustainability and equitability, the allocation and distribution of common heritage resources cannot be influenced by personal bias or vested interest.*

This is a common economic decision space for issues that pertain to common heritage resources and common actions, and are not urgent in their situationally related awareness. This is a complex solution inquiry [dynamic] space for value-re-orienting the strategically iterative design of the habitat system. This decisioning space may also be referred to as a collaborative information processing space in a complex, common world. And finally, it is otherwise known as a parallel value-oriented economic decisioning process. It is important to recognize that it might be more accurate to call this socially "common" decisioning space a "distributed decisioning space". This decisioning space involves the strategic and iterative designed re-structuring of common [heritage] resources into a common dynamic of habitat-experience.

This common decisioning space is 'person-independent' in its structure. If a person independent structure is not maintained in the iterative re-design of a community, then power structures will begin to form, which lead to competition and instability within the community. The parallel process of open and active inquiry is a person-independent structure because it operates independent of a socially hierarchical power structure. It is also sometimes known as a 'lateral collaboration network' or an 'organized collaborative processing commons'.

Beliefs and opinions must be filtered and empirical evidence evaluated for its potential to provide an adequately optimized solution to an identified problem or issue. This is a decision space that requires 100%, complete transparency to everyone in the [informed] community, and it is "carried out" in a manner that is limited in opinion. Instead, it is informed by a common repository of information including a set of formalized and validated processes [for transforming the information-resources)].

This decisioning space 'processes' decisions that affect the entire symbiotic socio-economy of the community and everything in the habitat over time, and they must be resolved via commonly informed, formalized, and validated methods.

This common decisioning space accounts for [at least] the three interrelated concepts upon which a sustainable economic system is built (and represent 'constraints'): economic awareness; social awareness; and environmental awareness. These are commonly known as the "three pillars" of sustainability, and represent the three sub-conceptual elements of which the concept "sustainability" is composed:

- **Technical economic awareness** – How do our decisions impact the effective resolution of our needs and the efficient distribution of goods and services? How do economic decisions impact one another?
- **Social awareness** – How do our decisions impact our social community, including the equitable distribution of goods and services? How do our decisions impact our relationships with one another?
- **Environmental awareness** – How do our decisions impact the natural environment (& natural environmental services) from which we derive those resources that produce our goods and services and sustain our very lives? How do our decisions impact our Habitat system and the Real World Community Model environment? In a sense, economic and social awareness are also a part of the total [environmental] situation awareness [dynamic].

These three concepts involve variables that have an observable effect on the state(s) of the Habitat, our community, and ourselves as [emerging] individuals. Hence, in the decisioning space, each concept[ual relationship of] "awareness" has at least one associated inquiry (as an associated process, or decision mechanism). In this decision space (i.e., determinable probability space) these concepts are interconnected and rely on an exchange of information between one another [in a solution-oriented interrelationship] to inform an optimal decision [through parallel and serial processing of information in the system]. In other words, this common decision space represents a logical and systematic approach to deciding usefully at a community level.

It could be said, herein, that 'social value' is a value maintained by the whole of a society, equally exhibited and distributed. This community recognizes three core 'social values' for their interrelated ability to maintain a stable direction toward a higher potential. The three core values are: self-directed freedom; efficiency; and justice. Together, these values (which are detailed in the Social System specification) form the idea of a truly "civilized society". They must be accounted for when arriving at decisions that affect the state of a "civilized" society. Every civilization functions on the basis of a spectrum of self-directed freedom, efficiency, and justice. Appropriate attendance to these value conditions are necessary for the creation of a stable socio-economic system; which allows for the self-directed pursuit of our goals and purpose. If these value conditions are not sufficiently satisfied, then our ability to express our purpose freely is diminished. If every system does not gradually progress toward greater efficiency, greater facilitation of individuals' self-directed freedom, and greater material equality and transparency, and reduced conflict, then our purpose is diminished. Other values are relevant, but if these values are ignored, then the ultimate sacrifice is the stability of the community.

If value conditions (as "awareness's") are not accounted for in the arrival of economic decisions, then instead of moulding to our needs (i.e., intentional reinforcement), the economy will adopt a secondary characteristic and begin to influence and mould its own values [and structurally generate its own, potentially corrosive, behaviors]. In other words, if we do not direct and orient our economy (through our awareness's), then it is likely to begin directing and orienting us. If values encode specific modes of behavior in a society, then it would be unwise to allow (or to give away) ones direction to an outside economic entity. Hence, an "intentional community" continuously reconsiders its own designs.

> **INSIGHT:** *True "performance" is a synergy of optimized efficiency [with effective motion].*

4.1 Design thinking

Design thinking is a tool for intentionally constructing meaningful and useful environments. It is useful for constructing environments that have the [designed] abilities to meet our needs in an orientationally similar manner to our values and overall explicitly objective direction (i.e., to that which is meaningful). Here, a common decisioning space requires an explicitly designed thinking process[ing structure]. 'Design thinking,' as it is commonly known, is sub-composed [in part] of *requirements (tasks)* and *-abilities (the ability to do work in an directed manner; i.e., intentional constructors)*.

At a high-level, the common decisioning space process a set of requirements that are fed into a design[ed] system, which processes information (and otherwise, calculates) if the design has the total '-ability' to be brought into habitat serviced production. Herein, a designed solution (the output of the *Solution Inquiry* process) is fed through a set of design -ability 'inquiries'. Within the inquires lie protocols designed by the community of users to transform [information] resources in ways that are fulfilling to all participators in the community (i.e., with the -ability to orient toward fufillment). In community 'design thinking' there are three general information sets (or "valued awareness's"):

1. **Viability** (or ecological consideration)
2. **Desirability** (or humanological consideration with localization, modularization (i.e., modular customization), and aesthetics)
3. **Feasibility** (or technically possible)

Something that is selectively adaptive in [a designed] response to an environment is:

- Technically feasible - it actually works or functions in the real world.
- Ecologically viable - it is ecologically safe in its operation [and predictably unlikely to cause harm].
- Humanely/Socially desirable - it meets our frequency fulfillment needs. It fulfills our "issued" requirements.

4.2 The integrator and comparator

A.k.a., The inquiry set.

The decision comparator releases the solution into operational tasking at 99 %, and not 100%, because the integrator is still looking around that 1% uncertainty, for risks to the decision. Each sub-inquiry process has an integrating component and a comparing component in order to resolve an answer of greater certainty given that which is available. The system ranks solutions based on the alignment of the solution with a set of conditional objectives, which have been determined to most likely reduce uncertainty and generate desirable results.

5 Effectiveness inquiry

INSIGHT: A *healthy functioning society requires individual participants with a healthy functioning value system.*

After the issue has been recognized by the Issue Recognition Inquiry process, then Effectiveness Inquiry immediately comes into effect. Effectiveness is the degree to which goals (or objectives) are achieved. Thus, Effectiveness Inquiry refers to the process by which all issues are continuously assessed in terms of their ability to hinder at least one of the community's goals (or, corrosively impact the fulfillment human need). This inquiry process asks: Will further performance of tasks as requirements of this issue's resolution hinder the fulfillment of at least one of the community's primary goals. Also, how will the continuation of effort toward this issue impact our social direction: our purpose, our goals, and our needs?

Effectiveness inquiry asks:

- What is the threshold of risk, as impact and probability?
- Is the system effective for the task [of preserving human well-being and sustaining human fulfillment]?
- What evidence would be sufficient enough to stop the continuance of a project?

Effectiveness Inquiry represents a continuous process of inquiry throughout the life of every issue in the common decision space. If at any point in time the issue's tasking resolution meets this 'effectiveness threshold' by the answering of these questions in the affirmative by either the community, a technically automated system, or a technical interdisciplinary systems team (in the form of threshold agreement), then continued action on the issue will cease. 'Threshold agreement' demonstrates (or evidences) that those with the greatest responsibility for (i.e., systems' teams), or users of (i.e., the community), the systems that maintain the community's existence have the current transparent evaluative risk appraisal that continued action on the issue is likely to damage the effectiveness of community systems in fulfilling the community's purpose; for, at the highest-level the community is held together by a purpose, which is in turn identified by a set of rational and relational goals, objectives and tasks. In a sense, everyone in the community is responsible for continuously assessing the risks that issues pose. In particular though, the lead interdisciplinary team of a particular sub-system is tasked with the continual assessment of the risk impact and risk probability associated with an issue.

Effectiveness Inquiry involves three primary dynamic inputs:

1. **Technical effectiveness** - systems are encoded with safety buffers that "table" issues (i.e., put on hold) that have the potential of damaging their technical system. Some automated systems can change the status of their own continued operation based on the programmatic processing of sensed feedback from an environment.
   - Is the system still technically feasible?
2. **Supra-system interdisciplinary team effectiveness** - threshold agreement amongst a specifically assigned team can put an issue on hold.
   - Is the system still viable?
3. **The Community** - a threshold agreement can put an issue on hold.
   - Is the system still desirable?

If any one of these three continuously inquiring systems identifies a threshold of risk, then the issue enters into a holding pattern (i.e., "put on hold") outside of the decision system. In other words, it is assigned to urgency : prioritization > deferred. Issues within a holding pattern may only exit the holding pattern via another threshold agreement by either the interdisciplinary team or by the community. This secondary threshold agreement will determine whether the issue is to be **closed**, **maintained** in the holding pattern, or **re-instated** into the economic system.

The process of Effectiveness Inquiry is known as "negative orientation". Those most familiar with the habitat system and expert areas that will be involved in future steps with the issue are also those most likely to recognize when actions will orient a the system against itself, against the community's purpose and goals. An issue that has a "negative orientation" for one subsystem may not have such an orientation for another subsystem, or the supra-system. In fact, it may be necessary for another systems continuation. This is particularly true in times of malfunctioning systems, and under adverse environmental conditions.

A community could even maintain a threshold agreement in the form of protocol that "pattern holds" issues which are known to put the community at risk.

A threshold agreement could come in the form of a vote with a threshold of 80% or 90% shift the pattern holding status of an issue. A one, two or three stage process could even exist. The interdisciplinary team leaders could achieve agreement, and then the community itself must achieve a threshold of agreement to put the issue on hold, or to re-instantiate an issue. The central variable, however, is their approach to social organization and the transparency of the information systems they use.

Please note that there exists the possibility that a community's orientation could be taken advantage for personal gain under any of the following conditions, which generally all encode concurrently when any one of them is encoded:

1. **Transparency** - Less than 100%, complete transparency of the system.
2. **Force** - An authoritarian, socially hierarchical organizational structure.
3. **Competition** - Where differential advantage exists (and conscience is reduced as a normal part of interpersonal relationships).

It is unknown as to whether or not this process of effectiveness inquiry could ever be mechanized to such a degree that it becomes fully automated. At this moment in time, it does seem like humankind would always have to be involved to some variable degree in the in this inquiry process to ensure the highest level of socially "negative oriented" feedback.

This inquiry process is designed to utilize the expertise of interdisciplinary teams in an attempt to negate the 'fallacy of composition' - the illusion that what is true for each part of a whole must be true for the whole. It is an error that overlooks the interrelationships between the different parts of a whole. From a systems perspective a complete understanding of a system cannot be derived from its reduced parts, it is only achieved by a perception of the whole system (Read: holism) to which all those parts belong. A practical approach to the development and maintenance of real world systems involves the application of interdisciplinary team effort.

Here, *Effectiveness Inquiry* necessitates the involvement of the interdisciplinary team(s) most closely involved with the issue, as well as the overall orientation of the habitat's systems (i.e., the systems for which they are accountable).

Effectiveness Inquiry functions to:

1. **To put 'on hold' continued action** toward the resolution of an issue that has met a threshold of likelihood to endanger the fulfillment of at least one of the community's primary goals. Also, the technical systems themselves can be designed to put 'on hold' issues that would knowingly damage their systems. And finally, the community of users and accessors put on hold continued actions that are likely to harm themselves.

- **To reinstate or close issues** previously placed 'on hold' by a threshold agreement from some combination of the three sources.

In a sense, the three primary issuance dynamics into this inquiry process (the technical systems themselves; the interdisciplinary team(s); and the community) have a relationship to the urgency spectrum. Likely, it will always remain the case that some issues must be urgently removed from, and others, urgently re-instated into, common [decisioning] circulation. Remember here that in material space-time there is something known as 'localization' (i.e., there is spatial proximity). In a real world system, those safety mechanisms that are closest to the point of a failure or collapse have the technical potential (by contextual degree) in responding to the issue the fastest. Hence, something that has the potential to become a highly urgent issue very quickly, such as a fire, might want to be designed for in the construction of the habitat's infrastructure. For example, if there is a fire in an environment with some form of concentrated-combustible gas, then the a sensor would be present to automatically shut off and vacate gas from that approximate area [of the habitat service system]. Note that decisions could be partially said to rely on [technical] sensory instruments that are 'scanned' at regular intervals.

Please note that no belief in authority is required to maintain this negative-orientation threshold-check. Authority can be defined in the context of force, but it can also be defined in the context of knowledge "expertise", which is something of a misnomer. These interdisciplinary team experts have demonstrated expertise on the systems involved in ensuring that everyone's life and technology support systems are continuously met. No "rights" or "privileges" are being given or granted to this team of individuals. And, no 'access' is being granted to them that every other community member does not have the potential of developing. Anyone can become an interdisciplinary team member and participate. Further, all interdisciplinary team members use a common repository of information, and a commonly formalized approach to transparently inform their threshold decisions. And, everyone in the community has access to these same information sources. Herein, the term "expert" isn't necessarily accurate when there is always something new to learn and the "expert" knowledge an skills are potentially available to everyone.

Effectiveness Inquiry and the interdisciplinary team structure in general, grants no more freedom to anyone than anyone else in terms of access to needs, goods or services. Instead, this inquiry's sole purpose is to bring into greater inspection and clarification the continuation of issues that are likely to damage the systems of the habitat that provide for everyone's fulfillment. The interdisciplinary teams are not granted any more freedom [in this fulfillment] than anyone else. Essentially, no one, no system, and no process exists to grant any such additional freedoms.

Effectiveness Inquiry is not the process of forcing or coercing or marketing or exchanging an issue through the socio-economic system. It is neither the market nor the State. In fact, it is quite the opposite of both. As an inquiry process it attempts to represent reflective thought about an issue at a systems level (the systems themselves, the teams and the community). Everyone has the opportunity to looks at an issue in the decision space and says, "this issue needs greater clarification". We need more information about this issue before proceeding any further. And, the entire process why which this occurs is transparent and formalized.

Here, interdisciplinary teams are [in part] responsible for (i.e., have accountable tasks relating to) formally clarifying and assessing issues so that their *tasks*, *resources*, and *risks* are more visible to the whole community. And, they do this within an open, interdisciplinary habitat system. In part, interdisciplinary teams ask, "What is the possible effect of applying effort to this issue and its accompanying tasks? Will the effort damage the habitat and our community? To what degree will our goal(s) and purpose be hindered?" If a threshold of consensus is achieved, then essentially the team members are stating, "let us not continue (or continue) the pursuit of this issue at this moment in time, and we will re-address it when we have more information."

> *"Engineers should never be allowed to make statements about safety or disease in a human being." - Prof. Trevor Marshall, engineer, published researcher and member of the Institute of Electrical and Electronics Engineers (IEEE)*

5.1 Resources space

> **NOTE:** *Reasons must be present, even if objections are not.*

Once an issue is the issue holding space, then an effectiveness 'recourse space' opens to allow for the issuer to effectively seek the re-introduction of the issue into the common issue solution circulation by resolving the issues internals problems that have caused it to be exfiltrated from said circulation. Fundamentally, when there is disagreement, a better approach [than using coercive force] is to listen to what everyone in the community is saying and then try to incorporate objections as systems tests such that the system has to demonstrate (or "prove") that it is better than the current system.

> **INSIGHT:** *The most dangerous phrase in any engineering context is, "We've always done it this way."*

5.2 Uncertainty space

In an uncertain environment, as the real world is, every decision involves uncertainty greater than 1%, because an accepted or "go" decision is taken at 99%, and that 1% is our continuous search for inaccuracy.

6 The solution inquiry

> *"If we can really understand the problem, the answer will come out of it, because the answer is not separate from the problem."*
> *- Jiddu Krishnamurti*

The solution inquiry process makes the proposed solution explicit through systems design engineering. The *Solution Inquiry* process exists to design and otherwise engineer selectively adaptive solutions to needs and issues that have opened a 'decision space' in the common decision system. The Solution Inquiry process may be otherwise known as "the engineering problem". Essentially, this inquiry process applies systems design principles and engineering techniques toward the re-solving of technical problems embedded within a context of human need and individual fulfillment in a unified and integrated habitat service system, a "material[ized] community". The *Solution Inquiry* process could also be considered a *technical inquiry* process: as a system of "awareness", the *Solution Inquiry* process formalizes the proposed technical design-solution for an issue and accepts technical "acceptability" feedback (as an input) from the other common inquiry process, which it uses to adjust its formal design [specifications]. Through the conception of a 'design-solution' humans extend their consciousness into the world and make the world different.

The solution inquiry process is a participative design process. In other words, we design the community participatively. Together, we build up the best idea (i.e., the true market of ideas).

It is here that we share our solutions and formally collaborate toward selectively designing newly meaningful structures with a higher [formalized] potential of fulfillment. In a sense, every issue is an inquiry into the community for fulfilling solutions.

The output (or "product resource") of the *Solution Inquiry* process is a series of technically calculated as feasible, desirable, and viable [micro-calculated] design specifications for the next iterative structural design of the total habitat service system, which includes the designed re-allocation of all known resources. These systems-based, engineered solutions might also be known as 'technical system design specifications', or 'technical engineering solutions', and they are the selective output of this inquiry process.

These specifications are then enacted upon by the participative community, including interdisciplinary teams and modular (/reprogrammable/reconfigurable) habitat service systems.

> **Specification**
> *(noun)*
> *1. An act of describing or identifying something precisely or of stating a precise requirement.*
> *2. A detailed description of the design and materials and other resources used to make something.*

The term **specification** may be sub-divided by the terms *requirement* and *design*. In general usage, a 'requirement' is an order, or demand, or imperative, and a 'design' is an intentionally planned-out systematic structure with at least one usage function.

- A **requirement** could also represent a straightforward intention in the fulfillment of a need, or a technical objective. In an engineering context, requirements exist for the design of anything which is to be engineered. A *systems requirement*, for example, is a characteristic of a system that any system solution is required to possess. When a requirement has been identified with language, it becomes a *specified requirement*. Here, the term *design requirement* might also be used. When a set of specified requirements on a system is brought together, then we call this the *requirements specification** for that system (Read: a 'system requirements specification').
- **Design** refers to a description of the solution to a problem or motive issue with a set of causative variables in a determinable probability space. A design is, in part, the functionally required operation for a solution. When a specific record is made of a design, this is known as a *design specification** (or *blueprint*), which is itself a functional information model. A design specification identifies how the design does what it does and what resources it needs to do what it does. Here, design can occur throughout the spectrum of freedom that is a community. Some design specifications are written in a more discursive manner, like the one you are reading right now. 'Designs' are sub-composed of *tasks* that must be completed and *resources* that must be available to construct the whole system's design. 'Requirements' generate the space for conceptual through to material design. Technical [information] designs are representative of information that may be both conceptually related and also must be capable of being technically constructed and tested in the material world, which feeds back information to us about all designs.

In some industry sectors, such as medical, defence, and aerospace the word "specification" is normally used to mean 'requirements specification' (see first bullet above). In other industry sectors, for example, in the construction industry, the word "specification" is normally used to mean 'design specification' (see second bullet above). To avoid confusion and error, it is best to be explicit – that is, to refer to 'requirements specification' or 'design specification' as applicable, both of which are involved in every solution to every issue that passes through this inquiry space.

In community, individuals seek designs that harmonize their well-being with the well-being of others and of the planetary ecology, as a **design requirement**. Design cannot just involve the people or the planet; such a dualistic notion of well-being will not lead to well-being. Instead, designs must recognize the scaling of need fulfillment from the individual, to the social and the larger ecology.

The *Solution Inquiry* asks [in part] the following questions:

- What is the design / engineering problem?
- What is required of the issue and of the solution?
- What is technically possible?
- What can we do with the resources that we have?
- What designs are previously available?
- What newly created designs are becoming available?
- How does the solution technically align with our chosen value orientation?
- What orientational re-composition is this design actually structuring into our service fulfillment systems?
- How does the solution technically integrate into the pre-existing habitat structure?
- What does the solution do and what kind of problems does it solve?
- What difficulties are likely to appear from a particular solution's integration.
- What are the technically feasible solutions: how are they composed; why are they composed; what is the validity, desirability, and feasibility of their composition? What are the solutions total orientational abilities?
- What further information do we need to solve this problem?

This inquiry process involves the very basic steps of a solution-orientation:

1. **Acknowledge** the issued requirement-problem.
2. **Study** what causes the problem. Investigate the current information-designed landscape and its relationship(s) to the problem.
3. **Apply** some degree of analysis-synthesis while acquiring more information as needed.
4. **Construct** a potential solution with the information available.
5. **Run** the solution through a common threshold inquiry system to determine its total 'solution potential' (i.e., orientational ability in an intentionally designed direction; "go" transport/ transform ability).
6. **Test** solution and acquire feedback.
7. And, if the problem wasn't solved, then repeat the process until it is solved (i.e., it is iterative and

adaptive).

Iterative design is the repetition of a process or system with gradual changes, improvements, and optimizations. Solution inquiry is a dynamically adaptive process, and hence, its repetition (iteration) evolves the total information space, which makes future issues easier to resolve. Remember, this is a systems approach. Here is an eternal truth about projects: you always see, understand, and learn more about what you're trying to accomplish as you go along. Often these new learnings result in important new ideas about how the project should turn out. Our designs will evolve as we learn more.

Among the most important questions to ask about a solution itself, include:

1. What is the solution?
2. What abilities are required for the solution to exist?
3. What resources are required for the solution's implementation, and are those resources available or accessible?
4. When must, and when will, the solution come into being?
5. Why is the selected solution better than the alternatives?

The *Solution Inquiry* process necessitates functional design. Herein, 'design' is a creative activity that translates a 'requirements specification' at the functional level into a set of attribute values of concrete things that function together as a whole systems 'design specification'.

The *Solution Inquiry* process is partially a systems engineering process, which involves the application of a systems engineering methodology. Engineers ask questions. They are not led by opinion. Engineers seek functional aesthetics, not an audience. Engineers select tools based upon their most current, and emergent, understanding of the total problem space. The term **systems engineering methodology** is defined as the selection of systems-based methods for the engineering of technical solutions.

Systems engineering is an interdisciplinary field of engineering focusing on how complex engineering projects should be designed, integrated, operated, and modified over their life cycles. It is a holistic and interdisciplinary approach to arriving at creative designs under the conditions of systems dynamics and knowledge complexity. The term 'creative' is defined herein as the unique arrangement of known variables so as to optimize the functional orientation of the resolved system toward one of greatest fulfillment. Systems engineering involves the processes of solution analysis, design synthesis, knowledge discovery, technology development, service integration implementation, and system de-cycling.

Whole-systems engineering involves the optimization of an entire system for multiple benefits, not isolated components for single benefits. As a result, more efficient systems maintain fewer costs by integrating helpful interactions between components. Efficient design is about more than designing clever, highly efficient components. In nature, individual species and organisms create a lot of waste, and hence might be considered inefficient. But integrated ecosystems are highly efficient because outputs of some components are inputs to others, reducing total net waste to zero (each organism's wastes are another's food). Applying [analogous] systems integration in an 'engineering design space' allows for the application of highly efficient solutions. An important engineering question is, "Is the waste (or pollution) necessary given what we know?"

When a community compares all of its possible technical variables and conceptual strategies against the criteria of cost, performance, and environmental and social impact (fufillment and damage), then it has a relational information system on its hands, which may be used to facilitate the arrival at intelligent design decisions (i.e., solution specifications) about best (or optimal) solutions.

Please do not impulsively dismiss the involvement of systems engineering or the somewhat technical description of this inquiry process. If the reader does not have an engineering background, then it would still be wise to recognize that what is described here is the methodology by which humans have developed the vast majority of their modern technologies. In academic schooling, an education in systems engineering is often seen as an extension to regular engineering courses, reflecting the "attitude" that engineering students need a foundational background in one of the traditional engineering disciplines (e.g. mechanical engineering, industrial engineering, computer engineering, electrical engineering) plus practical, real-world experience in order to be effective as systems engineers.

Systems engineering requires not only analysis, but synthesis. Typically, systems engineering is offered at the graduate level in combination with interdisciplinary study. Undergraduate university programs in systems engineering are rare, which speaks to several points. First, systems engineering isn't considered sufficiently valuable to the current, modern economic system to teach to everyone. And second, that it is a topic that requires a large degree of subject matter expertise between the systems under investigation. Essentially, it requires a particular thinking process, which is not taught at a common level in schooling.

Systems engineering requires a thinking process that can account for and adapt to the recognition of patterns within a dynamically iterative environment. It is important to note here that there are structures in society that reduce our ability to synthesize patterns from information (i.e., to think systematically). In early 21st century society, two common structures that reduce systematic thinking are: extrinsic motivation and schooling, which may be otherwise known as "thinking strictures".

Systems engineering has allowed for the development of complex modern technologies, such as smart phones (and their accompanying infrastructure), mass rapid transport systems, and robust data processing technology. This decisioning systems model uses systems engineering for redesigning the integrated fulfillment systems of the community's habitat. Systems engineering can be used to build a small home or it can build an entire community; it can be used to build a phone or a weapon.

Systems engineering is, in many ways, a fractal and evolving process through which ever more knowledge is acquired and technology designed in the generation of a more [technologically] thought responsive environment.

The *Solution Inquiry* process is purely technical, devoid of any human opinion or bias (and, if such bias does appear, the process itself is designed to make it visible, accountable, and acknowledge. A structure cannot safely or efficiently be built on the basis of opinion, secrecy, or the chaotic mixing of agendas. Engineering is not the science of opinions. Material architectural structures are not comprehensible through opinion. Holding an opinion is like stopping at a rest stop and not the destination. It is like building a partial system and then claiming that the rest of the system is superfluous. Biases, cognitive and otherwise, have no place in the design of engineering solutions. And, their accidental integration is highly likely to cause safety-instability issues in real world system; which, by the way, become equivalent to "programs" that just run continuously in the background of our lives.

Opinion has no place in engineering design where optimization of function occurs as more coherent information becomes available [to an intentional task constructor].

Systems engineers understand to a great degree that there is no best anything; there is only the best up until now. With advances in our knowledge and creative abilities our systems may be designed to respond and adapt to our needs and our situations in a more freeing and fulfilling manner. A community can only design the best production service that it knows of up until this moment in time. There are no utopias, no final frontiers.

Essentially, the *Solution Inquiry* process is a space of refined cooperation and participation in synthesizing, testing, and integrating new designs.

> **NOTE:** *When one component is removed from a complete system, suddenly an engineer cannot trust the whole system.*

6.1 Solution optimization requires

Solution optimization and selection involves [at least] the following requirements:

1. Acquire [all] standards.
2. Acquire [all] demand data.
3. Acquire [all] resource data.
4. Acquire [all] current habitat data.
5. Acquire [all] technology data.
6. Acquire [all] planning inquiry and statistical calculation data.
7. Acquire [a] solution.

6.2 Design and production [control] strategies

> *"The extent to which you have a design style is the extent to which you have not solved the design problem." [In other words, by focusing on the need, a designer becomes capable of solving the actual design problem; design is a process and not a style.]*
> *- Charles Eames*

Three p**roduction strategies** are involved in the requirements specifications of all engineering solutions that pass through this inquiry. Each strategy represents a necessary element in the process of sustaining "strategic" access. A 'strategy' is a description of when and how a described *objective* (or *task*) will be completed. In community, we apply strategies to the design of engineering solutions as a means of preserving our natural habitat, which provides resources and services for the community's very continuity (i.e., it is a resource accounting system). Strategies are "vehicles" for moving information between the conceptualized problem space and the instantiation of a solution design space [via a layered modeling information set].

Together, these strategies represent a community survival mechanism. The three strategies are:

1. **Strategic preservation** - maximize the preservation of our resources.
2. **Strategic safety** - minimize the damage to our environment.
3. **Strategic efficiency** - maximize the efficient spatial and temporal design (i.e., each new/iterate design) of goods, services, and systems.

Together, these strategies are encoded into the three operational processes of the Habitat's subsystems. The Habitat systems maintain their strategic preservation by planning for the knowable resource consumption by needed goods, services, and systems. This planning process is known as *Strategic Planning and Preservation.* All systematic planning occurs in the context of the integration of new knowledge and understanding into the future design of the Habitat's systems; wherein newly coherent information is encoded into the systems that support in the service of individual fulfillment. Planning provides a determinable decision space for the maximum preservation of resources. The planning process is inter-coordinated with the *Maintenance and Operations* operational process, which seeks systems with longer usability and less maintenance. Strategic safety concerns the *Incident Response* operational process, which encodes the recognition that damage to systems must be identified, minimized, and recovered from for fulfillment to remain sustained. Strategic efficiency involves a common decision space for commonly (or collectively) arriving at new and increasingly efficient and sustainable solutions to common issues. Efficient systems talk, share, communicate, and cooperate. The community is one single, efficient system sharing a similar approach to life.

Every application of systems engineering at the scale of in production services involves three principally strategic perspectives:

1. Designing a functionally working and desirable system that will preserve its functioning as a useful tool. How do we design systems that are preservational in formal operation? This perspective might be equated with the notion of 'strategic preservation' and 'eco-logical viability'.
2. Designing-in 'prevention features' and safety mechanisms to prevent the thing from failing and/or injuring (even during normal use). How can we design this tool so that it is unlikely to fail and to injure? This perspective might be equated with the notion of 'strategic safety' and 'human desirability'.
3. Account for the effort expenditure required to maintain the operation and maintenance of the integrated structural system. How might we design this tool so that it is efficient in its total service operation, including replacement, interoperation, and its automation/manual potential? This perspective might be equated with 'strategic efficiency' and 'technical feasibility'.

In order to maintain this three tiered approach, there are three associated design protocols that may be applied:

1. **Strategic preservation**
    - *Protocol & Requirement:* Goods and services are designed to last, to remain effectively integrated, and to recycle optimally; designs have a [maximum] 'lifespan'. The maximization of the preservation of our resources occurs under the coordinated and planned condition of using a minimum amount of material for effective service design in a life-need space (longer usability & less maintenance). Good engineering uses the minimum amount of material for the maximum amount of strength [as an 'organism' must; biomimicry - how does nature solve this? When you don't know what to do, mimic nature]. Every good produced must be designed to last as long as strategically desired (i.e., maximum durability). The more things break down, the more resources a community is going to need to replace them and the more waste produced. A regenerative system is a zero "waste" system. Biomimicry is the essence of blending our technologies with our emergent understands of nature.

    If you know where you are going (e.g., function[al direction]), then *efficiency* and *aesthetics* are your improvement opportunities.

2. **Strategic safety**
    - *Protocol & Requirement:* Goods are designed to decompose in a timely manner or re-cycle (minimize pollution), and not present toxicological threats. A community is constantly on the lookout to minimize the damage to itself and its environmental habitat by designing increasingly safe-able systems. For instance, the design of a personal "home" dwelling on top of the water would be designed to be "nearly" unsinkable. A strategically safe orientation involves the application of a cradle-to-cradle design strategy (e.g., a strategic recycling conduciveness calculation), or as near to it as possible. When goods do break down or are no longer usable (for whatever reason) they must be recyclable to the greatest technological extent possible, or they must be decomposed within a timely manner. The design of service production systems must account for this directly, and at their earliest stages. Effectively, this requirement is necessary to balance "negative retro-actions", or environmentally damaging effects, that certain resources or their applications invariably have. Cradle-to-cradle design would ensure that all matter remains in the metabolism of the planet - all material is designed to be recycled in some form.

    Safety as an afterthought is not safe. The statement, "We will test [for safety] if we suspect a problem" is not a sufficiently safe [strategic] solution. For a system "to be safe", it must be designed to be safe.

    It is important to remember the value of the '**precautionary principle**' when discussing strategic safety. The precautionary protocol (or "precautionary principle"/"cautionary principle") states that there exists the onus of showing that a chemical or other structure is not harmful prior to its introduction into the habitat service system. This protocol is a form of strategic safety. Chemical substances, in particular, can affect our mind-body; they can affect our perception, our cognition, and our life experience, and that is what makes their introduction into the community (and ecology) is an intellectual freedom issue which works both ways - with 'nutrition' (that provides the strategic potential to facilitate life experience) and 'pharmaceutical drugs' (that provide the potential to strategically reduce life experience). It is unwise to ignore [potential] toxicants in the environment; they affect our living systems. Toxins affect our brains, and hence, our behaviors (and potentially even our expressed personality). Fundamentally, when the device that you are using to assess your behavior (i.e., your brain) is not working [or is in-toxic-ated], then you cannot accurately assess your behavior, and hence, cannot accurately re-orient, and may possibly be more highly reactionary.

3. **Strategic efficiency**
    - *Protocols & Requirement:* Goods that evolve rapidly are designed to be updatable and modular. Quickly evolving technologies, such as electronics, which are subject to the fastest rates of technological obsolescence would be designed as much as possible to foreshadow and accommodate physical updates. The last thing we want to do as a community is throw away an entire computing system because it has one broken part or one part is outdated. So, components are designed to be easily updated, part-by-part, standardized, modular, compatible, and universally interchangeable, foreshadowed by the current trend of technological change. Essentially, this involves efficiency in how we iteratively modify our environment. Technological automation is a form of efficiency applied herein to free humankind from banal labor that we no longer find desirable.

The mechanisms of strategic preservation, strategic safety, and strategic efficiency are purely technical considerations devoid of human opinion or bias. Their protocols and requirements represent commonly informed constraints structured by the core components of a relational value system, and applied to the design of all solutions so that the next iterative state of the habitat remains in alignment with the community's direction and purpose. Habitat service structures (which are designed to be responsive) are not based on preference, but on material and engineering sciences to create the most desirable quality structure technically feasible though the encoding of strategies by means of protocols. In a sense, these protocols feature our community's comprehensive capability to sustain [a threshold of] fulfillment.

CLARIFICATION: *Protocols filter design decisions. In specific, design decisions herein are filtered through a series of sustainability and efficiency design protocols that relate to not only the state of the natural world, but also the total habitat service system (as far as what is compatible).*

Protocols clarify how information is encoded and translationally define what is most important in the decisioning process. To remain in harmony with an abundance promoting ecological state there must exist, within the protocols, an awareness of wholeness that recognizes and respects all the different parts of an individual's life [in a community and in an ecology = community + environment]. And still, protocols must allow for or facilitate adaptation and creative exploration (i.e., freedom). Protocols represent binding technical decisioning rules against potentially destructive consequences and interventions - they represent an informed and wise self-orientation.

Metaphysically speaking, consciousness intentionally orients itself in the direction of its chosen values. If something is valued by an entity, then that entity is likely to orient itself so that its decisions achieve its desired value condition, or at the least, greater approximations of the valued state. Logically, therefore, value must be consciously and transparently encoded into the service systems of a community by participating individuals; and to do this intelligently it must be formalized into a set of explicit engineering [transport] protocols. Importantly, these systems generate and reinforce value conditions, and hence, it is unwise to unconsciously create and use, and occult, designs service systems; doing so will tear apart a community through the generation of seemingly unresolvable conflict. Formalized protocols make value-oriented systems-level decisioning explicit to the community.

In the encoding of a social value system into the solutions that compose the technological structure of the habitat there exist three principle and systematically desirable conditions:

- Maximize conditions representing alignment with our purpose and goals and values. This condition accounts for direction and orientation. There exists a map in the territory.
- Maximize conditions representing the generation of a state of greater coherency in our value system (in its frequency of meeting needs). A value system must be integrated into a total information system if it is to remain in alignment with the discovery and verification of new information.
- Minimize all conditions which may structurally generate conflict and contradiction in our approach. These are conditions that do not represent an alignment with our highest potential state of fulfillment.

When these conditions are maintained in the production of goods and service systems, then they could be said to meet their intended social requirements for common use and access. Here, the term integrity engineering is applied to describe the processes of 'quality assurance' and 'functional verification' of need fulfillment [through feedback]. The three bulleted conditions listed above are represented in the engineering process as three conceptual forms of integrity: material integrity (e.g., maximum product lifespan); structural and functional integrity (e.g., functional safety and safety by design); and habitat integrity (e.g., ecological equilibrium modulation). A usefully designed economy accounts for more than just the quantity of demand of a product or service, but the integrity and orientation of the service system as a whole in a larger and responsive environmental system.

> **INSIGHT:** *By comparing material designs, failures can be more easily predicted.*

6.3 The structured systems analysis and design method (the SSADM)

This *Solution Inquiry* process follows an [agile] structured systems analysis and design methodology (aSSADM). It is a systems engineering methodology and involves systems-based processes structured in such a way as to produce well-documented, accurate design outputs. It uses a formal, methodical approach toward the analysis and the design of solutions as components of systems (real world community > habitat system > habitat subsystems).

The SSADM herein follows a modified waterfall life-cycle model starting with a requirements analysis, leading to a [comprehensive] technical feasibility study (is it technically possible), and progressing through to the physical design stage of development, while accounting for qualifying requirements, protocols, tasks, and resources. One of the main features of SSADM is the intensive user involvement in the requirements analysis stage. Every good and service is designed in transparency to the entire community and the community can improve the design by discovering more about the natural environment and combining known elements in uniquely creative ways.

Engineering designs involve layers of functional diagrammatic representation. The product of a structured method is a technical design specification that can be engineered into the habitat through the re-organization of resources.

The most efficient form of action under a systems-based approach is that of the project-based approach (i.e., team-based approach). The SSADM breaks up issues into their composite projects, stages, modules, steps and tasks – as every well-applied systems/team/project approach does. A 'project' is just a collection of tasks that a team is applying effort toward with the intention of fulfilling a larger and more integrated purpose.

Remember, a system involves at least: inputs > processes > outputs. The systems and individuals involved in the design of solutions arrived at via the *Solution Inquiry* processes derive their input from a common and verifiably founded repository of data, knowledge, and values. Systems design, therefore, is the general process of defining the architecture, components, modules, interfaces, and so forth, of a system [to satisfy specified requirements using an explicit repository of information as input].

> **NOTE:** *The Solution Inquiry processes could impact the time-frame prioritization of an issue's resolution if it requires significant design time.*

6.4 Generative design

A.k.a., Algorithmic design.

Herein, the computer, as an information processing system for calculation and optimization, becomes part of the design process (with the human designer and/or user). Computers can run hundreds, millions and billions of calculations that facilitate the engineered optimization of physical objects and systems. For example, a heat exchanger may be designed by the computer (Read: machine algorithm) - the designer inputs the following data elements: here is the space I want it to occupy, here is the volume, here is the thermodynamic requirements, here are the materials, and here are the technologies (Read: material production configurations) that meet those requirements. And, the computer runs a series of calculations including predetermined engineering formula and the new data inputs, and therein, it works to optimize (to its programmed potential). The result is then tested. Given appropriate engineering rules, it is possible to produce a system, given what is knwon, that is nearly optimal in terms of its engineering characteristics (and aesthetic).

6.5 Generic design information

Engineers apply scientific and technological information in designing services, structures, and systems (i.e., structural service systems). Herein, when an engineer creates a design specification, it has the following generic metadata:

- **The System Requirements Specification (SRS)** is a specific record of the required characteristics (functional & aesthetic) of a system. It is the characteristics that any solution is required to possess. Usually, it also includes any goals.
- **The Operational Concept Description (OCD)** is a system-centric description with respect to:
  - The intended users of the system (human and/or elements of technology)
  - The intended uses of the system
  - How it is intended that the system be used
  - The conditions, external to the system, within which it is intended that the system be used.

- **The Architectural Design Description** (ADD; e.g. SSDD, CONOPS, IEEE 1471 design description, etc.) refers to the identification of the elements of the solution, together with the key characteristics of each element and the concept of interoperation of the elements to satisfy requirements.

6.6 *System engineering life-space cycles*

To optimize for "environmental performance", impacts (as affects and effects) must be considered through the entire life-cycle of a good, service, or system. Here, analytical processes measure these impacts to the best of their abilities. And, we formally determine their threshold of acceptability.

The most thorough way of assessing environmental performance factors (including an alignment with a social value set) is through the process of **life-space cycle assessment**. All iterating systems have a life-space cycle (also sometimes known as a "life-cycle"). The results of a life-cycle assessment may be compared against a benchmark, potentially a *safety benchmark*. The objective of a life-space cycle assessments is not only to identify technical feasibility, but also to identify where environmental impacts originate from and make them explicit in such a way that individuals are capable of prioritizing and setting metrics around them.

The systems engineering [inquiry] life-cycle involves the following parallel conceptual processes:

- Discover the need for new information;
- Discover the new information;
- Understand and integrate the information; and then
- Arrive at an informed and systems-based technical solution re-orientation (through novel, creative information) to the need that generated the inquiry for new information.

NOTE: *In art, people often see what they want to see; in engineering precision creates operational technologies. Stated in an alternative way: in art, 'abstraction' facilitates subjective perception, and in engineering, 'specification' facilitates useful functioning.*

6.6.1 Brief technical overview of systems engineering

NOTE: *In systems engineering, if it cannot be identified through an integrated visual interrelationship, then it is not understood.*

Systems engineering is an interdisciplinary field of engineering focusing on how complex engineering systems and projects can be designed and structured over their life cycles. Systems engineering involves the analysis of users' needs, the identification of required functionality, the explication (or "documentation") of requirements, then proceeding with design synthesis and system validation, all the while considering the context and root of the issue in which the problem has arisen. Essentially, systems engineering concerns the planning, analyzing, organizing, and integrating the capabilities of a mix of existing and new systems into a capability greater than the sum of the capabilities of the constituent parts. Systems engineering involves the process of designing "in-motion" systems (i.e., dynamic systems). System development often requires contribution from diverse technical disciplines. And, the result is one highly integrated information-physical design. By providing a systems (holistic) view of the development effort, systems engineering facilitates the aggregation of all technical contributors into a unified team effort, forming a structured development process that proceeds from concept to production to operation and to updating, and in some cases, to termination and to recycling.

Visualization and structural models play a principal role in systems engineering, and in the communication of experience in general. A 'model' may be defined herein in several ways, including:

- An abstraction of reality designed to answer specific questions about the real world; or
- An imitation, analogue, or representation of a real world process or structure; or
- A conceptual, mathematical, or physical tool for organizing the arrival of a decision.

Systems engineering involves the use of tools and methods to better comprehend and manage complexity in systems. These tools and methods lead to information that is not open to interpretation or speculation, and can be used in engineering material systems. Engineering inquiries have right and wrong answers, and there isn't any "wiggle room" for interpretation. "True enough" isn't "good enough" in the any sciences, let alone engineering sciences. Material structures must be built with intention and accuracy otherwise they put the community of their users at risk.

Some examples of these tools, techniques and models are:

- System modelling and diagramming,
- Simulation modelling (i.e. modelling and simulation),
- Systems architecture design,
- Optimization design,
- System dynamics design,
- Systems analysis,
- Statistical analysis,
- Reliability analysis,
- Probability analysis,
- Technical, operational, and systems specifications (and views) for visual, blueprinted representation.

Solution Inquiry is a *structured systems* process because projects are structured into small, well-defined activities wherein the sequence and interaction of these activities is specified, and because diagrammatic and other modelling techniques give a more precise [structured] definition that is understandable by the whole community.

The three most important tools in a systematic structured solution-orientation are:

- **Logical data modelling:** This involves the process of identifying, modelling and documenting data as a part of the gathering of system requirements. The data are classified further into entities and relationships.
- **Data flow modelling:** This involves tracking the data flow in an information system. It clearly analyzes the processes, data stores, external entities, and the movement of data.
- **Entity behavior modelling:** This involves identifying and documenting the events influencing each entity and the sequence in which these events happen.

Some of the important techniques and models include:

- Logical Data Models
- Data Flow Models
- Requirements Definition
- Function Definition
- Specification Prototyping
- Relational Data Analysis
- Entity/Event Modelling (Entity Life Histories and Effect Correspondence Diagrams)
- Technical Options
- Dialogue Design
- Update and Enquiry Process Models
- Physical Data Design
- Physical Process Specification
- Physical Design Control
- Gantt charts
- Critical path analysis provides a method of systematizing our knowledge so that the effect of decisions of order of action can be seen.

Common diagrams include:

- Activity & state diagrams
- Class diagrams
- Sequence diagrams
- Service diagrams
- Operational concept and connectivity diagrams
- Organizational relationship diagrams
- Formulaic and matrix representations of data.

In a sufficiently technologically advanced and scaled community, computers may be utilized to:

- Collect, process, and organize information
- Produce documentation
- Enable rapid amendment of diagrams and other structured information models
- Check consistency and completeness
- Automate activities that humans have no desire to do.

Systems engineering is a structured process requiring complete documentation and definition of all system requirements. Structured methods have the following characteristics that impact requirements specifications and systems design:

- Structure a project into small, well-defined activities and objectives
- Specify the sequence and interaction of these activities
- Use diagrammatic and other modeling techniques:
- Give a precise (structured) definition to all information concepts
- Are understandable by the community

The general stages of a structured systems engineering process include:

- Determining feasibility
- Investigating the current environment
- Determining systems options
- Defining requirements
- Determining technical system options
- Creating the logical design specification
- Creating the physical design specification
- Each of these stages applies certain techniques and a sequence of analysis. They include conventions and procedures for recording and interpreting the information with the help of diagrams and language.

The components of the structured solution process include:

- Structures define the frameworks of activities, steps and stages and their inputs and outputs.
- Techniques define how the activities are performed.
- Documentation defines how the products of the activities, steps and stages are presented.
- Inputs and outputs identify the information egress and ingress.
- Processes define the integrated flow of information in the system. Some processes operate at the systems level and other operate at sub-levels.

The logical system specification:

- Broad specification from systems analysis
- Technical solutions to the requirements are evaluated
- Detailed logical (non-technical) design developed which shows clearly how the new system will operate within the total system; how it will integrate
- Narrative and system models are used

Physical design:

- Logical design converted to a physical (material) one.
- The arrangement of engineered structures into a blueprint

Also, system disruptions must be planned for when designing an engineered system. The general process known as 'systems continuity' may also be known as disaster recovery, fail-safe recovery, system redundancy, and service continuity. An intelligently designed habitat service infrastructure would maintain distributed failsafe and the [buffered] redundancy of systems to ensure system continuity in the case of a planned or unplanned incident. Distributed centralization processes minimize the spread of damage in the case of an incident to a service system.

> **APHORISM:** *Resiliency calms economic panic. Coordination calms social panic. Empowerment calms individual panic. Awareness calms egoic panic.*

6.6.2 Defect and flaw improvement

Defect remove efficiency (DRE) can be calculated and can used at both the project and process level:

- DRE = E / (E + D), [E = Error, D = Defect]
- Or, DREi = Ei / (Ei + Ei+1), [for ith activity]
- Optimize by achieving a DREi that approaches 1

Defect removal efficiency

- DRE = E I(E+D)
- Where, E is the number of errors found before delivery of the system to the end user. These are errors because they are before delivery.
- Where, D is the number of defects found after delivery. These are defects because they are after delivery.

Flaw improvement processes generally include:

- Error - a flaw in an [engineering] work product that is uncovered before the system is delivered to the end-user.
- Defect - a flaw that is uncovered after deliver to the end-user.

7 The economic efficiency inquiry

The *Economic Efficiency Inquiry* process identifies the *current design specification's* technically "*economic*" **feasibility** via a calculated threshold. The efficiency inquiry exists to calculate the most efficient and sustainable means by which to meet the spectrum of human needs, while accounting for resources (i.e., *resource accounting*), effort, and the environment. The *Economic Efficiency Inquiry* functions to:

1. Calculate the total cost of an issues resolution as its total measurable effect in reducing resource access for other needs due to the new allocation of resources and taskful effort. What is the resource cost intra- and inter-solution? What are the resource costs between different solutions to the same issue (i.e., "intra-solution")? And, what are the resource costs between solutions to different issues (i.e., "inter-solution").
2. Assess the real world costs of an issues resolution to identify those solution designs that meet (or do not meet) a strategic economic feasibility threshold, which involves at least the variables of: ecological carrying capacity; habitat damage; regeneration and consumption rates; and behavioral changes due to the modification of [structural] systems dynamics.

Here, we desire to know how greatly our so-called "economy" actually economizes our lifegrounded resources by calculating their most efficient and abundant usage.

7.1 Real world costs

The real world cost of an issue is assessed in terms of both its resource requirements and structurally designed solution. By calculating the total cost of an issue's resolution as its impact on economic inputs and outputs (e.g., true cost economics), then this inquiry process presents the community with an economic adaptation mechanism that objectively and cohesively visualizes all possible alternative options for the allocation of resources toward the resolution of an economic issue. And, that information can be processed to select for a solution that indicates the highest community optimization and preservation based on an informed and formalized feasibility threshold. Herein, *optimization* refers to the selection of a solution that has the lowest resource cost to other needed and formally prioritized goods and services. And, *preservation* refers to the maintained fulfillment of the community by maintaining strategic access to resources by assessing the real world to account for true (or "truthful") costs.

A truly sustainable economy maintains an economic model that accounts for the environmental impact of its actions (i.e., negative externalities and environmental decision constraints). A society's economic impact on the environment cannot be neglected if the community seeks its own preservation, its survival. To neglect the impact one's actions have on the environment is to act without an orientation toward fulfillment, to act with negligence. The costs of an economic action on the environment are scientifically discoverable and critically knowable. For a sustainable community to exist there is an absolute requirement to make all environmental costs known. If the "true costs" of an economic action are known and accounted for, then economic practices become transparently classifiable as *sustainable* or *unsustainable* [given capacity and resource availability]. Under such a system many modern economic practices would be seen for what they are, negligent, due to their high environmental impact costs. The factual concept of a "true cost", if applied holistically, would make some economic practices perceptible for what they really are -- a socio-economic dis-alignment with the fulfillment of human need.

Real world costs represent external constraints on the resolution of issues. Real constraints include but are not limited to: the carrying capacity of the environment (or a particular system); environmental pollution (cumulative & synergistic); and the rates of consumption and resource regeneration. Any modern, technological economic system that does not account for real world costs is highly likely to cause severe damage to its habitat because modern technologies require the handling and use of organotoxic compounds, which are unlikely to be effectively accounted for in the market [as they are considered "externalities"]. Externalities - some exchanges have a spillover effect where they damage the environment and relationships there. Market-based systems primary treat reality (i.e., the air, water, soil and other life upon which humans depend), not as primary, as it needs to be for survival and thriving, but instead, it is treated as an externalized resources for individual [consumer] benefit and a place for waste. Which is a view that is unsustainable by its very definition. Early 21st century society's technologies produce pollution - environmentally damaging substances and by-products. If environmental costs are not accounted for by an economic system, then those who participate in such a system should expect their actions to cause persistent and sustained damage to their environment.

7.2 Structural capacity

A.k.a., Carrying capacity.

Most ecosystems (as well as commons) have a [structural] **carrying capacity**, a limit on their use beyond which the commons itself will begin to suffer decline. A forest where "commoners" gather wood will replenish itself so long as the commoners never exceed the forest's carrying capacity. The moment they do, the probability becomes that resource loss will [after a dynamically set, variable amount of time] render the non-existent of any forest in that time-space.

The concept that a given finite environment has a 'carrying capacity' is a verifiably factual understanding; carrying capacity is an empirical concept which relates the needs of a group of organisms to their environment, which may also have a set of needs. If, for instance, a group of people exceed the carrying capacity of a bridge, then they risk not having a structure [safely] under their feet. The bridge, as part of the groups spatial environment, has a weighted 'carrying capacity'; and, humans have a need for a [sufficiently] stable platform under their feet when they traverse a height.

The carrying capacity of a community's socio-economic system is dynamic. It is dynamic, in part, because it exists within a natural environment, and also, because the system depends upon its material design, which is dynamically informed by the community's iterative design. Natural processes may be used to produce surplus (e.g., permaculture) and the designed application of technology might extend carrying capacities (e.g., multilevel flooring).

As a factor in the real world cost of production and a characteristic element of every preservation strategy, the technical economic efficiency inquiry must necessarily include the *carrying capacity* of the known environment as one of its inputs. This includes (1) the carrying capacity of the community's systems as well as (2) the natural environment's carrying capacity. A carrying capacity is the maximum population size an ecosystem or structure can support. Both man-made structures and natural environments have carrying capacities - every dynamic system maintains a carrying capacity.

An inquiry into the carrying capacity of a living system asks, "With the information known, how many organisms can a particular ecosystem [or planet] support strategically [over time] without suffering severe or irreparable damage?" The answer to such a question constitutes the system's carrying capacity [in context]. Since physical structures and ecosystems are finite in their size and resources, each has an upper limit to the population that it can support. In other words, each eco-system has an upper limit to its ability to provide food, resources, maintain itself, resist damage, maintain safety, and provide the assorted ecological services that allow a given population to live and exist somewhere in sometime.

Herein, 'population pressure' is defined as the ratio between population density and the density of available resources (i.e., the resource capacity of an environment). An increase in population pressure is a circumstance that makes it harder for organisms to survive, which may be self-caused, such as high population growth, or environmentally induced, such as through a draught.

Garrett Hardin likens carrying capacity to an "engineer's ... estimate of the carrying capacity of a bridge." (Hardin, 1986) Biologists (and systems engineers in general) often use the term **thresholds** to refer to limits that, when exceeded, constitute critical boundaries within a system. As Soule observes, "Many, if not all, ecological processes have thresholds ..." In the same paper, Soule reminds us that "genetic and demographic processes" also have thresholds. (Soule, 1985)

The carrying capacity of an ecosystem is derived from a formula involving a variety of physical-ecological (environmental) variables. The variable set includes, but is not limited to environmental media (e.g., water, soil, air, energy and physical size) and the periodicity of resource regeneration. Such a calculation involves the tracking of systems change, and the regeneration of resources, over time. Tracking of resources is necessary for a system to remain in a state of dynamic equilibrium (or 'threshold effect') so that resources are available as desired (i.e., for access abundance). If a community uses up trees in their habitat faster than they grow back, then the community has a serious life-support problem emerging, for such an action is unsustainable and reaches beyond the carrying capacity of the habitat. Herein, transparency and resource tracking facilitate the ability to optimize an economic fulfillment system.

The physical-ecological information set comprises all fixed and flexible components of the natural and human-designed environments, including the habitat service system infrastructure. The *fixed* components refer to the capacity of natural systems expressed occasionally as *ecological capacity*, *assimilative capacity,* etc. They cannot be manipulated easily by human action and to the extent these limits can be estimated they should be carefully observed and respected as such. The *flexible* components refer primarily to our designed 'service support' systems (and their characteristics) like water supply, sewerage, electricity, transportation, social amenities, and other services. The capacity limits of these systems are improved through greater knowledge and understanding, and technical production efficiency.

In other words, carrying capacity exists, and a carrying capacity can be synthetically extended through increases in the efficiency and effectiveness of technological integration.

Please note that the carrying capacity calculation requires the continuous surveying, monitoring, and tracking of physical resources (i.e., it requires *Resource Inquiry*). In a 'global access system' all resources are tracked in a transparent manner such that every individual in the community has an awareness of the availability of a resource and acutely understands the implications of its re-allocation (or "consumption").

The structure of a system limits its capacity. There is only so much that can be done to increase capacity, beyond that the structure must be re-designed. Wherein, when function is lost, so is capacity.

There are three distinct levels of optimization:

1. Optimization within the structures (or system management.
2. Optimization of the systems structures (or system design).

3. Optimization of the context structures (or global system design).

Regulating the process of generating fulfilling goods and services is the process of 'systems coordination' as the organized rearranging and replacing of tools and components, which is necessary for all forms of optimization Herein, the integration of a system among a community of individuals for commonly optimized access is known as 'global system design'.

> **NOTE:** *In a sustainable economic design model, the rates of natural regeneration must be accounted for.*

7.2.1 Inquiry space resolution

> **NOTE:** *An infinite-grow paradigm [on a finite planet] is unsustainable.*

This inquiry space is designed to calculate the **technical feasibility** of a solution via an inquiry and a "triggering" threshold. Herein, the *Economic Efficiency Inquiry* assesses the designed solutions for their placement along a technical optimization and preservation spectrum. The spectrum maintains a formally set, qualified and calculable, triggering threshold. When this threshold is reached, then the issue as it is presently solved for (by inquiry into the current design specification) does not "pass" this inquiry process, and therefore, requires a structural or material redesigned with different resources or fewer real world costs. This inquiry process asks if the proposed solution is technically feasible:

- The solution doesn't significantly impact the resource requirements of other priority issues.
- The solution is "structurally sound" given what we know of the system and its material's composition.

For humans, exceeding the carrying capacity of their environment is likely to lead to environmental challenges as well as a wide-variety of social and behavioral problems that fundamentally do not support an evolution toward a higher potential form of life enriching experience. Hence, resources can only be used at a rate that they can be adequately renewed. The sustainable management of a community's resources is integral to the survival of the community, and their equitable allocation is integral to social stability. Resource regeneration must never dip below what is sufficient for each system, particularly the core systems, if the community is to sustain a state of dynamic equilibrium, and maintain a common level of basic-fulfillment.

The *Economic Efficiency Inquiry* is essentially a preservation strategy that is logical founded upon the empirical processes of biological preservation and technical [structural] efficiency, which can only define true human sustainability; leading to a greater potential for access abundance and material freedom in our designs. And, a reminder, that material freedom (i.e., a more thought responsive environment) comes with a different value set.

7.2.2 Human resource accounting

> **INSIGHT:** *The market system encodes the idea of "human resources" through the creation of a property-based system involving [self-]ownership and competitive market labor conditions. They wouldn't be called "human resources" if they weren't meant to be strip-mined.*

A value is an orientation of the 'self'. Herein, it should be obvious given the purpose and value system of the Community, though must still be stated, that this system does not see humans as a physical resource -- there is no such thing as a "human resource". In community, humans are not the controllable and manipulable resources of other humans, or any other social controller. In common understanding, 'resources' are utilized by an entity that is not the resource - an entity that has material control over the resource. A 'resource', as a concept, exists because of its utility and controllability by something (a system) that has more creative ability than the resource itself. Under this economic system there does not exist any entity that utilizes humans as its resource and no individual or group has control or power over any other. Here, no human can be considered a "human resource" to any other human or authority figure. Instead, the entire system exists to support humankind in its development (and fulfillment), and it does not exist to benefit one group (or "class") of humans over another. A community is not a system for harvesting "human resources" for the agenda of the few.

In some societies everything has a price tag and can be commodified, including human beings. Often in these societies the lives of individuals are commodified (e.g., timed wages) and their experiences are bossed, governed, and managed (e.g., businesses and the State) by those with more power [in that system]. In such societies there is always the potential threat that one could lose everything. And therefore, there is an ongoing structural incentive to accumulate and consume in order to put a buffer between ones present lifestyle and what the person would consider a lower lifestyle. This structural incentive makes resource accounting difficult.

The "governing" (or otherwise "directing") of human behavior in a socio-economic system involves what is known as "human management". Human management is a structured method of social control that involves among other things the principle characteristic of "accomplishing work through others" (as opposed to doing the work oneself). Human management is the paradigm of "human resources" and "wage slaves". It is hierarchical, bureaucratic and dictatorial, repetitious and duplicitous, competitive and occulted. It is something that the British Television shows "Yes minister" and "Yes Prime Minister" highlight all too well, which are highly recommended television shows to watch for a good comedic look at the gestalt of all political systems. In the real world w are not accountable to some outside power deified authority that monopolizes the use of force or deceit to direct our actions. We are free when we arrive at decisions through the freedom of our own directional consciousness.

There are really just two main types of decision-processing in life: technical ones and social ones. In community, there is no computer system to tell "you" where to go eat dinner or whom to eat with. The system is not designed to direct human behavior; instead, it is designed to inform our technical decisions. Herein, the technical decision processes are largely formalized and automated. They resemble the processes that automate the structured organization of human energy-grid needs, such as balancing the multi-level electricity grid (of sorts), ensuring no power is wasted, and that any power surges or overflow are properly stored for future use, and that any power deficiencies are routed properly so no one ever notices and continues on with their life. People don't need to do that, computers can.

> **NOTE:** *the Community system being described herein is not designed in any way to direct human behavior; however, it may facilitate the emergence of universally preferable and fulfilling behaviors through fed-back and inquired into structural re-modification. But, it does not mandate, force, or otherwise coerce the expression of said behaviors; it is a 'participative design model'.*

7.2.3 The monetary market interconnection

> **NOTE:** *We have to use money in a monetary system to get to a system where we don't have to use any money, globally.*

If we are using materials that we are not making ourselves, and those materials come from a monetary market, then the community will require a revenue stream with which to remain stable in its [structurally] economic usage of those resources [from a system that disallows access without exchange]. A system that is developing toward regenerative sustainability, but still requires resources from a market economy might be known as a 'hybrid-community' - a community that is becoming more resilient and sustainable, but at the current time, requires resources from an external [authority-driven] system.

A community that requires external exchange of resources might seek to develop an abundance of something which they use and for which there is at least some externally-exchangeable market into which they may exchange their abundance. In community, the notion of "abundance" implies the ability to help others. Herein, we realize that business is a fundamentally unsustainable trajectory, but while it exists as a governor to the access of needed resources then it too will require designed planning as a subsystem of the Real World Community information system. In other words, the "vehicle" for resource exchange between the community and the monetary market will have to be "business plan"; because, a business plan is a directional composition for a business entity and it inherently utilizes market jargon. A "business plan" is a necessary tool for the Community in communication with the market to which there is some resource-interface. Note that a "geopolitical planning assessment" is also necessary for placement of the community within an authoritative State jurisdiction.

Fundamentally, while operating within a financial [instrument] system the community needs to have a financial model with which to effectively remain stable and operate [its own instruments, which are optimized for sustainability]. Hence, issues that utilize a resource with a financial cost must be calculated through a **financial [instrument] inquiry** process to determine the availability (or potential availability) of the resource by market exchange, which is an arbitrating limiter on access to the resource.

8 Resource inquiry

NOTE: *A failure to plan for resource use can be oppressive, if not fatal to individuals and the planet.*

Resource Inquiry represents the continuous process of accounting for [the qualities of] common heritage resources (and materials) by surveying the habitat for all their existence in real-time (when possible). This general process is known as **resource accounting** and it is an inquiry into the resources themselves: their qualities; their location (and proximity to need); and their strategic availability. There exists an [systems] environment of resources that may be accounted for. This inquiry involves a system of teams and information sensors (detectors and instruments) with the purpose of monitoring and tracking the location, consumption and regeneration rates, and the trending availability of resources. Resources are a physical referent and a calculable source of information (e.g., a community can calculate the most abundant mineral with the greatest conductivity for a particular engineering purpose). The qualities of resources must be defined if they are to be accounted for accurately in our information system. During the resource inquiry process 'resource surveys' lead to 'resource inventories' that represent the available resources for fulfillment of the community's needs. The resource inquiry process determines the **availability** of a resource through a continuous global-community surveying of resources. Resources are transformed and transported.

If resources are to be applied toward the *efficient* and *responsible* (i.e., sustainable) lifecycle of goods and services, then an accurate accounting of resources is a requirement. If the community does not know what resources it has, then how can the community take commonly agreed upon action? How will it achieve Strategic Access to goods and services? Only after a community has an *accurate account* of resources and information pools, then it can begin arriving at *accurate* economic decisions (i.e., this is a basis of a resource-based economy). Hence, decision alternatives (and actions) become available only when their corresponding resources are known and available. In other words, tasks become viable when their required resources are available.

This is an inquiry into the **resource availability** of a solution's resource requirements. Here, the rates of resource usage and regeneration are tracked and trended to remain in a state of dynamic equilibrium with our environment. If resources are consumed faster than they are regenerated, then the system is functionally unsustainable. A sustainable community must know, at least:

1. What resources are required?
2. What are the substitutable resources?
3. What resources are available?
4. What resources will be available?
5. When will resources be available?
6. What are the qualities of the resources?

Nature, the Earth, is a finite and increasingly knowable sum. Unless we conserve the planet there isn't going to be any "the economy". Nature provides all kinds of services that are essential to the planet and to our survival. These services and their total relationship in an ecological system must be accounted for in any valid economic system. Such services are not "externalities", they are "essentialities".

Resources and their usage when handled improperly by a civilization can culminate in some large problems despite technological advancement. In community we do not structure the flow of our material resources into "waste dumps" and "trash tips". Once again it must be said that, a system is what it does, not what we want it to do. If a system produces an accumulation of waste, then it is doing so through a [constructed] design.

We exist in some form of symbiotic relationship with our natural environment. This is an essential understanding for a community of humans driven toward a more meaningful purpose, their betterment. We exist in an interrelationship with the many [symbiotic organisms that inhabit Earth] from which our community is derived through availability and access to resources.

The *Resource Inquiry* system functions to:

- Account for common heritage resource by recognizing their Habitat System's allocation, their access designation, and their location. Where is the resource located?
- Identify what effort of expenditure will be required to transport the resource to where it is required? This question involves the field of study and inquiry known as [energy] 'logistics'.
- Identify the [comparative] qualities of each resources?
- Identify whether a particular resource meets the qualities required of it by the solution design?
- Identify the 'condition' of the resource? This may require a resource analysis to determines its conditions.
- Identify the regeneration periodicity and rate of consumption, which are both necessary in the calculation of dynamic equilibrium. This information provides trending data and informs predictability.
- Identify whether the resource is available or unavailable and when it will become available and with what degree of certainty.
- Identify when the resource will become available.
- Identify where the resource will become available.
- Identify alternative resources with similar or improved qualities.

- Identify the continued operational resource cost required by the currently operational solution?
- Identify the 'steady state' or 'dynamic equilibrium' where the environmental conditions of needed resources are held more or less constant by negative feedback systems operating within the ecosystem. A state of dynamic equilibrium may be optimally maintained through real-time electronic feedback [sensory] instruments used to monitor the priority of urgently needed resources.

In the Community, all common heritage resources are logged, tracked and accounted for via the **resource accounting system**. The Resource Accounting System includes, but is not limited to, the activities of classification (e.g., attributes & qualities), location, designation, regeneration and consumption rates, and availability data. The Resource Accounting System monitors the trending of resources. Here, it is recognized that systems that require fewer resources for the same level (or quality) of output are increasing in their efficiency [in context].

Resource regeneration must never dip below what is sufficient for each Habitat system to maintain a state of dynamic equilibrium. Not doing so puts the very survival of our community at risk.

> **NOTE:** *Once humanity began to interact on a global scale, then the entire global ecology necessarily comes into focus. And, once humanity begins to share on a global scale, then the entire global community necessarily comes into focus.*

8.1 Resource designation classifications

> **NOTE:** *Issues with unavailable resources must be re-designed or they will have to wait until the resource becomes available.*

There exist six resource availability designations (or designated classifications):

1. Unallocated and available
2. Allocated and available
3. Allocated and unavailable
4. Periodically available
5. Unavailable - acquirable externally
6. Unavailable - under discover & development

Energy isn't only a behavioral issue, such as choosing to turn a light switch on/off or have a sensor turn it on and off; but enormous amounts of energy are predestined by the very design of the communities and cities themselves.

Resources may be classified per a factor of their renewability quality:

1. Non-renewable resources (regeneration)
2. Renewable resources (regeneration)
3. Resource transformation as chemical and biological energy transformers (e.g., from food to fertilizer)

Resource may be classified according to their availability level:

1. Level of Availability - High abundance
2. Level of Availability - Low abundance
3. Level of Availability - Depleted

8.2 Resource quality

> **NOTE:** *Once a society builds past its causative environmental limits, then collapse becomes inevitable.*

There are at least four factors that facilitate a determination of the quality of a resource. These factors represent categorical information and form the acronym 'SANE'. When we "bring in" a resource into our habitat service system we can evaluate it more accurately in terms of its following identifications:

1. **Saturation:** (1) How quickly the resource's integration will fulfill the required need. And, (2) The predicted 'lifespan' of the resource; how long the resource is capable of fulfilling its functional purpose (i.e., remaining in the system in its intended function) before needing to be replaced, re-cycled and de-composed.
2. **Signaling [Aggression]:** How well the resources integration signals healthy functioning [capacity] and minimizes conflict, aggression, and dis-ease in ourselves and the ecological environment. For example, putting lead in paint has the signaling impact of producing poorer quality functioning in those humans exposed to it, which may lead to a lower intellectual ability to coordinate decisive action, and thus, possibly increase social conflict. Also, for instance, foods that cause brain inflammation are more likely to result in the expression of physical aggression by the "inflamed" [neurophysiology of the] individual.
3. **Nutriment:** How many essential requirements (or needs) the resource is capable of fulfilling.
4. **Efficiency:** (1) The efficiency by which the resource can be regenerated, recycled, and decomposed. And, (2) how efficiently the resource moves through its service lifespan and is not converted into a "toxic" and unusable resource (i.e., "waste" product).

It may be of interest to note here that these four categorical factors for resource evaluation were taken and modified from the SANE acronym for calorie evaluation described in a book by Johnathan Bailor (2015) entitled, "The Calorie Myth: How to Eat More, Exercise Less, Lose Weight, and Live Better". Bailor devised the acronym SANE to represent the four factors of calorie quality. Therein,

- S = satiety: how quickly a calorie satisfies you and for how long.
- A = aggression: how quickly and severely a food causes your blood sugar to rise.
- N = nutrition: the nutritional quality of the calorie, quality trumping quality.
- E = efficiency: how efficiently the body processes the calorie.

8.3 Resource scarcity

> **INSIGHT:** *In any general service, and in health in particular, if you don't meet or exceed critical [micro]nutrient sufficiency there will exist a lessening or worsening of function.*

'Resource scarcity' exists when a resource is simultaneously unavailable and part of the design specification of an unresolved issue. Some resource scarcity issues are of an urgent nature, such as life support incidents, and others are of a non-urgent nature.

Instances of resource scarcity may be resolved in the following ways:

1. The design changes to use less of a resource or not use the resource at all.
2. The resource becomes available.
3. A novel resource becomes available.
4. Another resource is substituted for the initially required resource. Here, substitutability refers to substituting one set of resources for another.
5. The design/service becomes unavailable due to an inability to acquire the resource or acquire a sufficient amount of the resource.

In community, if a particular resource is becoming scarce, then the system will alert the materials scientists (teams), and those in the larger community who have selected to receive said alerts, of the trending resource scarcity, and an alternative material solution will require development. If there isn't enough of a given resource; then there is an incentive (a motivation) to find an alternative so that the desired system can continue to do what we want it to do. Resource shortage (or scarcity) provides a motivating incentive to those to whom the resource scarcity imposes a possible artificial limit. In particular, resource scarcities to the 'continuous loop' services of the life and technology support system represents a threat to the survival of the community, and are a priority.

If resource scarcity exists then the technical process of 'resource development' exists. **Resource development** is the process of developing alternative resources through the interdisciplinary field of 'material sciences'. Resource development involves the development (or creative innovation) of novel resources to overcome resource scarcity issues. An emergency might require immediate development of a novel resource, and therein, the incident response operational process organizes an interdisciplinary team from the service systems to solve the problem.

Remember that the Decision System involves 'resource accounting' in the design of the habitat's service systems. By doing so, the generated (or engineered) state of resource scarcity is minimized or nullified. What remains is what is technically possible.

We know what resource inputs the service systems need to continue their operation [by degree] because we designed them.

Please note that this economic model gives priority allocation to urgently needed resources: those resources that are needed for the sustained production of life support needs, and the stability and maintenance (i.e., inner loop), of the community's technological systems. This requirement for a sustained loop of resources to maintain the 'operational continuity' of notably prioritized systems is known as **inner loop prioritization**. Resources that are needed for the continuous functioning of an urgent system receive what is known as 'inner loop prioritization'. This prioritization is strategically designed for by the *Strategic Preservation Planning* operational process. And, the inner loop movement of resources is carried out by the *Maintenance and Operation* operational process. Inner loop prioritization simply means that a system requires the continuous allocation of a particular type, quantity and quality of resource to remain functionally stable. The inner loop is the known "operational cost" of the system and it involves strategic planning and resource budgeting. Essentially, the resources needed to maintain the operation of habitat systems, which have been designed, are known and are "budgeted for" so that knowable scarcities are avoided.

Most economic outputs are strategically planned and have an associated, and known, continuous 'operation and maintenance' resource cost, which are partially 'inner loop prioritized'.

A community desiring a higher potential state of existence might apply technological automation at the level of strategic design and preservation planning toward the overcoming of resource scarcity and the reduction or elimination of undesirable tasks by sentient beings.

> *"Anyone who believes in indefinite growth on a physically finite planet is either mad or an economist [for there are real resource limitations]."*
> *- Kenneth E. Boulding & David Attenborough*

8.4 Resource accounting

All variables associated with needed resources (e.g., food) must be accounted for, such as: collection, capture, cultivation, preparation and consumption, affects, etc.

Table 55. *Accountable operational processes for habitat coordination and control.*

Access Service Control Types	Control protocols
Resource service control	Resource Accounting
Production service control	Strategic preservation
	Strategic safety
	Strategic efficiency
Demand and Distribution service control	Strategic proximity

8.5 Resource surveying

> **MAXIM:** *When you know what resources you have, then you know what actions you can take.*

The surveying of resources occurs via multiple different mediums through the material existence of the habitat system. Some of the [proximity] surveying (sensor) instruments are automated, and other surveying instruments require manual input. Notably, we as individuals can share our observed record of the availability of a resource in a particular location; and when we coordinate at scale we can also perform this function at scale. Bees are known to communicate resource availability information, and we call their communication a “waggle dance”. Resource surveying in community naturally includes our shared surveys of our environment through a common linguistic interface.

For manual purposes the community uses input survey devices (or proximity survey sensors) in spatial location so that users and caretakers can input their observations of the area in some high degree of real-time (i.e., while they are still in the area).

> **INSIGHT:** *Every time a resource allocating system allocates a specific resource to a person (allocatable identity), this changes the system. And, the actions of the individual person (allocatable identity) also affect the future state of the whole resource system.*

8.6 System input-output tables and analytics

> *A.k.a., Resource planning, input-output literature, Input-output economic tables, input-output economic matrices, Scottish input-output table, Soviet input-output table, dynamic resource allocation problem, resource management, enterprise resource planning, logistics, economic planning mathematics, behavioral economics, economic mathematics*

An input-output table is a matrix showing the input and/or output of information, energy, and/or material (or technology, etc.) between systems. The tables track and show sensible environmental elements that pass between systems. Input output tables are essential for decisioning where analytics will be run with the tables as an input, in order to sustain, and/or produce a better, outcome.

In the current, real world, there are limited resources that need to be assigned in real-time (i.e., finite resources that require allocation in real-time). In the market, these problems are concerned with, “giving humans what they want, when they want it”.

All dynamic resource allocation situations deal with changing inputs and environments, some of which are (particularly, market-based scenarios) difficult to estimate and predict. In the market dynamic, resource allocation is difficult to predict because there is no unified, sufficiently integrated, working information systems model; thus, in the market, the future load on resources is not statistically dependent on the current load.

In a unified societal system, like community, one change triggers another change, and if the intention is to control the system with accurate decisions, then the decision system must consider the future status of the system.

Price adds abstraction to the calculation that dis-aligns the input-output table from optimal objective human fulfillment through the inclusion of abstraction (Read: money and authority) as reified (real) entities. Price confuses the table when the objective is mutual human fulfillment.

Fundamentally, dynamic environments (environments where change is continuous), require a dynamic control methodology -- require the selection of methods that can effectively compute real-time decisions about the allocation of resources and monitor execution.

> **STATEMENT:** *It is important for us to develop the ability to remain accurately observant of our environment, and we can use technology to facilitate this by recording and tracking our observations over time and as a population.*

9 Environmental inquiry

INSIGHT: *If humanity want its needs fulfilled, then it must fulfill (or at least not inhibit the fulfillment of) the needs of its ecological environment, which is humanity's lifeground. Humanity is 'viable' [in part] when its outputs do not significantly hinder the needed fulfillment of a greater ecology in the continued recycling of its many natural services. Humanity must account for the environment in the designed re-planning of its services.*

The process of *Environmental Inquiry* is the process of identifying the knowable impacts that a particular solution configuration will have on our social community and our environmental habitat. It is a form of environmental analysis where environmental economic effects are processed in the form of an evaluation (as a form[ed tool] of 'differentiation'). It is an inquiry into the **environmental viability** of a solution. The process of *Environmental Inquiry* is the process of assessing the potential damage to ourselves, our environment, and the continuation of our common resources for the particular configuration of resources that form a designed solution to an issue, and it is based upon resource trending data and evidence from the environment, which the decision system directly and explicitly accounts for.

The process of Environmental Inquiry often involves an environmental impact assessment. An environmental impact assessment (EIA) is an assessment of the possible positive or negative impacts that a proposed project may have on the environment, including the biophysical environment and social environment. Socio-physical feedback data is necessarily involved in this inquiry process to identify the impact a service solutions is having, or has had, on our total environment. Also, an 'environmental [feasibility/viability] study' might identify additional information needs and deficiencies, and clarify or modify the rationale for why a particular solution is more efficient, safe, value-oriented, and strategically meets our needs.

A 'comprehensive habitat viability study' is continuously ongoing within the decisioning system. In other words, it is an ongoing task of an interdisciplinary team to study and otherwise evaluate the viable capacity of the system as it is deigned utilizing all available information in the context of an issue. Viability studies provide evidence and may resolve individual and scientific concern that were previously lacking in information. An environmental impact study may be necessary before the transported application of a resource is "made into service" in order to maintain the safe operation of the habitat service system.

It is essential for the process of adaptation for a Habitat system to have multiple forms of feedback. Don't we all want to know how our designs are affecting us so that we can more intentionally (and safely) design. The habitat service system maintains interdisciplinary environmental assessment teams.

The term 'placemaking' refers to the shaping of an environment. The shaping of an environments has tremendous social and psychological implications for how people in the world think. Part of the idea of 'justice' is the underlying application of a spatial strategy involving 'access' (and not "property ownership"). By developing material space in particular kinds of ways it is possible to counter those impulsive, compulsive, and less serving forces that may exist within and around us, structurally. We can design structural environmental systems that facilitate our experience of certain states of existence, and not others.

In a sense, the process of *Environmental Inquiry* represents a continual scientific investigation into the results of our tasked behaviors on a responsive environment that to some measurable degree determines our continued *viability* (and feeds our Real World model with *data*).

The design of a living space influences the individual and social behaviors of those people interacting within the space. Nowhere is this subject apparently more researched then in the scientifically studied arrangement of classrooms and office spaces. To some degree there is a relationship between the qualities of the structure in an environment [of structure] and the emergent behaviours of the individuated sentience in that structure [who conform to some degree to the qualities of the structure]. Here, we ask, what qualities does our designed structure have that cause it to deviate from what we know is our optimized fulfillment?

The big social question about producing spaces, places, and environments is not the question, "what do we want them to look like?" It is instead a question of "what kind of future do we want to create for ourselves?" What kind of values do we want to maintain in our social interactions with one another. What types of social relationships do our structural designs, for our environment, reinforce in us? What kind of people do we want to be, and what kind of social relations do we want to maintain? The social/political/economic question of space and place and environment is partly about being able to integrate these concepts in such a way that it allows for the continuous fulfillment of our purpose, a movement toward a higher potential [environment of thought responsive creation].

Environmental assessments often include an assessment on the expected pollution of a design. Pollution is an undesirable form of emanation. It either damages the environment or prevents the environment from restoring itself. It should be noted here that those living in early 21st century society, particularly those living in cities, have become desensitized to some forms of pollution (particularly those of light and sound). In a sense, pollution is a dis-alignment of our patterns with evolutionary patterns. For example, the usage of lighting which emits blue and green photons of light at night disrupts our melatonin production, which has a host of health ramifications including the onset of sleep pressure and sleep quality.

Environmental inquires (e.g., surveys) give an economic computing system data to more greatly consider potential selectable decisions.
There are multiple forms of pollution accounted for by the decisioning system:

- Atmospheric.
- Electromagnetic radiation (i.e., EMF/EMR).
- Light (i.e., photon and wavelength; light is a form of electromagnetic pollution).
- Sound (i.e., mechanical wave).
- Material as chemical and biological (e.g., garbage & pharmaceutical hazards/metabolite hazards).
- Cognitive & visual (e.g., the very notion of 'advertising' could be considered a form a form of visual and cognitive pollution).
- Time (as general relativity and technical inefficiency).

Most environmental assessments also include an assessment on the recyclability of the resource, service, or system. To remain environmentally sustainable, resources must either be safely and timely recycled or they must be safely and timely decomposed, otherwise they risk becoming pollution that accumulates damage in the system. The accumulation of damage increases uncertainty [of the systems stability] and it signals the decay of the system. In community, we creatively construct our mapped systems through feed-back from an environmental terrain.

> **INSIGHT:** *It is a weird thing to do to take sensory input coming in from your environment and try to tune it out. A lack of situational awareness would have essentially resulted in the death of indigenous people. In other words, what would have essentially resulted in death in an indigenous person is locking out sound signals from the environment. If they weren't attuned signals from their environment they would be dead quickly. Early 21st century society creates so much "racket" that people are forced to tune out the signals. It is essential for us to observe changes in the signature of life around us.*

10 Preference inquiry

> **INSIGHT:** *Simply, the system is designed to meet as many issued needs and wants as possible given what the design of the system [by capacity], and the availability of resources, will allow - to produce abundance and meet the populations needs (with redundancy) through a cooperative model.*

It is important to first understand that in a community-type society, humans have needs and preferences therein. In concern to comprehensive planning, users of habitat services have a variety of things that they need and prefer. Here, planning is first done in terms of broader categories, the needs. For example, the plan has to come up for a plan for shoes, and then, there are preferences therein. The comprehensive planning is done in terms of broader categories of goods and services (e.g., life support footwear, etc.). In centrally planned economies of the past, consumers were disinfranchised (ignored and not taken into account). Community accounts for user's preferences. The user's needs, and preferences therein, must be accounted for in the process of deciding what is being (and, will be) done. Solving big matrices is feasible with computers in the early 21st century. When planning isn't done comprehensively and transparently at the global level, then some people's subjective preferences can reorder things outside of what "my or your" subjective preference actually would be.

Individuals have preferences when it comes to need fulfillment, which are identifiable and accounted for. Demand has two principal representations in this system, and one of those representations is the *Preference Inquiry* process (the other is the issue articulation process). *Preference Inquiry* is, among other things, a form of demand surveying and demand analysis. A demand survey is one mechanism for identifying use-value needs. In other words, this inquiry process uses continual surveys of demand in order to identify community needs and wants, and the preferences therein. Conversely, a market system uses price and money. In community, we ask ourselves what we need from an environment, and we intentionally re-design to meet that fulfillment. In community, the realized system provides enough well-being that people's experience of the inequality is reduced to a [rationally] tolerable level.

In its most fundamental form, *Preference Inquiry* is the process of accounting for the individual demand for service functionality from the habitat service system for any given user [in timespace]. Some design specifications will involve preferences, and others will not. But, the idea of a 'preference' is larger than just an account for 'functionality' at a population level. Individuals in a community have identifiable and relational preferences as to how their needs and wants are met. The notion of 'preference' signifies the importance that what works for others might not work for "me". Although the need of food and water is very much objective, some individuals in the community might prefer eating different foods or consuming different beverages than others. Hence, the system is designed to account for these “subjective” or “individualized” preferences, which are rooted in needs and wants, and can be continuously surveyed.

When planning, needs are separated from preferences ("wants"); and, both are motivations/desires:

1. Need is a concept representing a real-world relationship between an individual human organism and its psycho-socio and material environment, wherein the organism requires their fulfillment in order to have survival and total well-being. Needs can be categorized, and all human beings have a common set of needs. A need is a category of production, the productions for survival through flourishing requirements spectrum. Needs are requirements that an organism(s) experience as feelings, intrinsic drives and motivations for well-being. Each need involves human thoughts and behaviors, which are expressive of object acquisition and/or environmental reconfiguration.
    - At the population level, common needs have parameters, generally forming a bell shaped curve (e.g., shoe sizes, protein per day, etc.).
2. Preference is a concept representing an individual's decision about the aesthetic-type characteristics of the producible product (e.g., a park, a doll, a cup). Preferences can be categorized, and all human beings have a common set of preferences.
    - At the population level, preferences have surface differences, such as decorative, cosmetic, etc.

All humans have have objective needs, but how those needs are pursued is [in part] based upon conditions and conditioning (i.e., culture). Conditions and conditioning influence how individuals orient their decisions toward actions that we take to meet needs. Entrance into this community is based in-part on the value orientation that someone holds, both toward themselves and toward others. Here, it is possible to realize that a value orientation toward fulfillment is a ‘structure’, and so, also, is a value orientation away from it. But, we also realize, that if the Community is to remain stable, then it must remain composed of individuals with a measurable threshold of alignment with a common [trajectorial] “purpose". In other words, we must be in orientational resonance to resonate at the higher potential that we know is possible, and that we find intentionally desirable. In practical terms, this means that a screening process will be necessary, at first, for initial “agreed acceptance” into the Community. In community there are some preferences that we all share, and it is important for us to remain coherent as we scale (and become more resilient to initially corrosive value orientations). Hence, the Preference Inquiry process necessitates a value screening process for inclusion into the community; at least, in its initial phases of forming [into existence]. And, once in community, then value-reorientation becomes a restorative process and not a retributive one.

A **preference** is defined herein as a greater subjective liking for one perceptual design alternative over another or others. A preference is an aesthetic value, whose objective value cannot be verified or derived, and is currently unable to be scientifically measured; though it may be measured between by relationally subjective input (i.e., the input of our preferences). In other words, *Preference Inquiry* refers to the surveying of the preferences of the community as it concerns the potentially variable [by individual] attributes of a solution, which is fully accounted for. It accounts for the perceptual aesthetics of a demanded functional good or service. Community surveying indicates the existence of preferences and provides an “objective” (by “subjective”; like “price”) measure of preference, as well as the degree of difference between preferences, which may be more deeply inquired into.

A preference must be capable of being expressed and described such that its resource requirements and production costs may be known, otherwise there is not yet a preference, but simply an idea. If action cannot be taken, then strategy cannot be applied. Without meaning, which creates preference, there is no powered directive (or intentional attractor) in a task.

We know scientifically that the preferences of humans are sensitive to context and calculated at the time of choice. (Warren, 2010) To maintain a context that aligns to the real world the output of every other inquiry process is transparently available to those surveying themselves (i.e., to the community) so that they are capable of making a preference selection with at least the maximum amount of system information available at the time of preference (i.e., an accurate perceived contextual environment), which might also be said for issue articulation in general.

Fundamentally, when individuals among society understand what they have to work with, including their resources and common demands, then they are less likely to demand impulsively.

The *Preference Inquiry* process asks:

- Identify the ‘perceptual preference’ qualities of a good, service or system? This includes, but is not necessarily limited to: color preferences; color harmony; the quantitative use of colors; composition; orientation; balance; shape and form.
- How many people want the good or service, in how many different ways, and what are the production costs of each?
- Is mass customization/individualization/ modularization possible? The ultimate expression of freedom in the domain of technology is the freedom of mass aesthetic and personal

customization, which is facilitated through modularization and digital fabrication from “your” data (e.g., 3D printing based on measurements of “your” unique body). This is a condition that a host of technologies, such as 3D printing, FDM, additive manufacturing (additive engineering), extrusion manufacturing, and contour crafting are quickly allowing.
- Is this a ‘personal access’ item (e.g., goes inside of your home; is intimately connected to your body)?
- If mass customization is not possible then is partial customization possible? Such as, there existing a finite series of different aesthetic designs for the case of a smart phone.
- Is the preference design attribute being surveyed in any way an element of the functional design of the product or service?
- Does the perceptual design attribute serve a function for which closer degrees of technical optimization are possible? For example, the characteristics of an emergency door on a building.
- Are there any knowable cause and effect relationships between this preference attribute and a larger system, or environment, of which it is a part? For example, the color of a building might impact the behavior of bird species in the area, or even our sense of connection as we walk by it. Alternatively, the placement of a tennis court might impact the placement of other habitat services.
- Is the agreed threshold of preference diversion on an issues resolution?
- Is the design preference part of a larger infrastructure design decision? For example, the placement of a new architectural building in the community. In other words, at what scale do you visualize your preference emerging at the cost of the preferences of others (given that we all have a similar value orientation)? Can we “achieve” a common preference on those things that it is preferential to have a common preference?

In community, there are different population density buildings for persons. Higher density dwelling-type buildings have floors above one another. The need is for high quality productions (given what is commonly known and available) in concern to architectural habitat service. Service quality means sufficient fulfillment of architectural requirements by users. Therein, people are given additional choice, because they have preferences for where they want to live in terms of [at least]:

1. Density.
2. Dimensional size of space.
3. Floor level.
4. Locational coordinates on planet (what positional distance).
5. Locational quality (what socio-technical region of the planet).
6. Accessibility.
7. Likelihood of disturbing or being disturbed by others.

There are protocols that control for personal preference. These protocols are part of the decision resolution system, and are classified under preference inquires [by users] of the decision system.

For example, in the case of a personal preference for dwelling, the issue of floor choice may arise, because population density leads to the stacking of floors [of populations] in order to provide higher density.

1. In some cases, the ground floor or lower level floors are mostly commonly accessible on a disability scale. Wherein, the lower level floors, or lowest floor, is dedicated to those for whom it would be more difficult to access higher level floors, and therefore prefer lower level floors. In concern to the protocol, the protocol may be that some building with some given identifier is populated on the lowest (or, lower floors) only by those with significant mobility disability; and those with disabilities may not access the higher floors.
2. In some cases, the ground floor (or, lower level floors) are only accessible to those with pets whose movement is likely to make noise. The protocol may be those persons with pets may only use the lowest (or, lower) floors; and, they may not access the higher floors. They may not access the higher floors because as move higher and are also above others, they produce noise pollution, which is controlled in the building.
3. In some cases, when a dwelling becomes open for occupation, it is given out randomly to a pool of persons who have selected that occupancy as their next location.
4. It is also possible to restrict the pool so that specific sizes of dwelling units (e.g., 2,3,4 bedroom) go to a pools of family priority, then friend priority sizes of persons who prefer to live with one another. For example, size 3 bedroom dwelling units go to a priority pool of persons made up of 3 persons (or, bedroom's of persons).
5. In some cases, the ground floor (or, other specific floors) are only occupiable for visitors staying less than 2 months.
6. Not everyone will prefer every location. Some persons will not want a larger space to clean. Some people will prefer lower floors, and some people higher floors. People analyze their own needs and options, and community seeks to optimize the

fulfillment of their needs.

In context, aesthetic value has relative uniqueness to the individual, and categorically uniqueness to a culture; although, there are some common environments that are considered universally aesthetic: scenes of nature, for example. It may then be wise to mimic these universally aesthetic scenes in our own, infrastructural environments. We can plan beauty and a sense of connection into our community service environments; we can also [by degree] plan flexibility into our spaces. And, we can measure our responses to the environments we create and adjust our preferences accordingly.

Ask yourself if there are any principles which may universally describe an aesthetic environment, and whether these principles (if they exist) should be applied to the construction of our common spaces (i.e., not 'personal space')? Here, non-customizable, community access preferences are part, or become part, of the larger strategic integration plan of the community; they are fixtures (i.e., fixed), and hence, their aesthetic design must be integrated.

There can exist technically functional design "optimization" in a temporal sense given adequate access to resources and design alignment with the most currently understood scientific-engineering principles. As long as our knowledge continues to grow and evolve, so too would our definition of the "perfection" of a functional design. Yet, there is no perfect vision in community; there is only the emergent state up till now, which has been participatively and iteratively designed. Among community there is no system, nor person, to dictate the "preferred" structure of society to the rest of the community. The belief in authority would appear as one source for the modern dis-ordered mental state known as "perfectionism".

Some might argue that the human psyche (or mind) is most capable of entering "peak states of being" and "states of flow" under specifically identifiable, perceptual environmental conditions (under structures that signal in a certain way). And so, we ask ourselves, what perceptual conditions make us feel greater love, more connectedness, a sense of being at peace with ourselves and our world? Can we identify or approximate in our physical architectural designs these perceptual conditions? Should we design our perceptual community to evoke the emotional state of a sense of well-being, while also facilitating socialization and material fulfillment? Are there certain aesthetic environmental designs or arrangements that continuously support in maintaining a heightened sense of well-being and fulfilling interactions?

Do not confuse 'perceptual preference' opinions with 'functional requirements'. Someone who doesn't play the game of tennis may have perceptual preferences of the arrangement of lines on the court or the color of the net and its height. Their perceptual preferences, however, are irrelevant because these are not preferentially aesthetic elements of a tennis court as an economic product, a sporting game, or a habitat service. Instead, they are known functional design elements in a tennis court. Their permanent modification by individual preference would interfere with the functional integrity of the tennis court (or, the "game of tennis"). That said, a more technologically advanced tennis court might give its users selectivity over the color of the lines, their space, and the height of the net if the users desire the preferential functional variability of these elements, and the technology allows for it. Technology allows for flexibility in space, such as "gaming spatial area" that can be re-configured to meet the dynamic gaming needs of individuals in that spatially boundaried area.

In community, a tennis court placed somewhere in the community becomes a 'in-production service'. Upon integrated production, a tennis court in the Community would literally becomes a stationary part of the Facility > Recreational subsystem with an associated "community access" tag as well as a dynamic availability tag; and, its physical space will have a categorical flexibility tag (e.g., can the space occupied by the current tennis court be reconfigured into another activity space that is of that category, but differentiated, like a ping-pong court or racket ball court). Its placement in the physical space of the habitat has an impact on the placement of many other physical services, and layers of technological infrastructure. Thus, the placement of the tennis court is not a preference decision, but a functional decision for a larger and strategically planned habitat service system, with built-in preference flexibility. Essentially, new physical services that acquire a permanent physical placement must be strategically designed to integrate into the efficient functional nature of the habitat and the general aesthetic design of the community.

Permanent physical structures in the community must be designed in a strategically planned manner (and operated so forth) if the conditions of efficiency, aesthetics, and equitable access are to carry forward as characteristics of the future state of the physical community. Many of towns and cities in early 21st century society have developed "organically" - without functional consideration. This impacts the efficiency of their systems, and therefore, the lives of their populations, and ultimately, their values and their freedom.

It is likely that a individual that perceive everything as unowned, and values cooperation toward a purpose, will be more flexible in concern to the aesthetic design decisions of a fixed 'community access' nature, than an individual who perceives everything as ownable and values the ability to "mark" one's territory through personalization (often with contempt for another's personalization in the process) or defacement. The selfish behaviors of some persons, where everyone takes possession of everything they can, prevents the fruition of an environment where individuals work for their own and everyone else's betterment - the common betterment of everyone. Under conditions of self-destructive selfishness it is impossible to coordinate the use of natural resources for the sake of future generations or to commonly agree on an aesthetic decision, because [to a large degree] a "selfish person" cannot give up anything for someone else (i.e., they remain attached). Choice can be determined by one's feeling of responsibility to something of a greater importance than the self.

> **INSIGHT:** *Some things are of a greater preference, and some things have no preference. There are constraints to preferences in any society. And, a society with a common value orientation will recognize a common set of constraints (or, directionally constraining strategies).*

10.1 Decision options dissatisfaction

Having a hierarchy of socio-economic options (or, too many options in general) can often make people feel dissatisfied. For instance, someone selects on of the options, they then go home and start to think, "Maybe I should have got the other option". Or, after a period of time, they start becoming dissatisfied and want to "trade up" to a better, or different, option.

11 Justice inquiry

The *Justice Inquiry* process exists to identify **equitably feasible** solutions to the resolution of issues by applying a 'distributive justice strategy' to the proposed production of the design specification. The essential purpose of this process is to maintain **Equitable access** [fulfillment] to all common heritage resources. Distributive justice is defined as the socially just and equitably distributed (or coordinated) arrangement of [common heritage] resources toward the fulfillment of needs that involve material goods and services – and we recognize its benefits to society. Material equality is measured by the separation between what any two persons can access and participate in.

The *Justice Inquiry* process ensures that resources are distributed in such a manner that the value[d] condition of 'equitable access' is maintained throughout the entire community (or multiple spatially separated cities). In the primacy of achieving this, the expressible quantity and quality of every system, good or service, must be accounted for, otherwise equity in access cannot be accounted for.

The *Justice Inquiry* process also acts as a mechanism to prevent the appropriation of resources by private persons. In an open and free community resources are not 'appropriated' by private persons, which is a structural design element.

Justice in all of its forms can only exist within the coordinates of equality – for without equality, all forms of justice will be applied differently to those of different status, class, power, wealth, and influence. Power structures form naturally when resources are distributed unequally. A distributively unjust socio-economic system will have the characteristics of a coercive and violent (or "forceful") system because the unequal distribution of resources (or "material wealth") will lead many of those with greater wealth to seek its preservation through manipulative or coercive means - they seek their own natural preservation in a competitive system (or the preservation of just their "family", their "business", their "industry", their "creed and colour") ... at the expense of greater fulfillment through synergistic coordination.

There are inherent behavioral and social consequences to any economic system that allows, or even worse, promotes, the privatization of resources, and thus, the formation of hierarchical power structures. Manipulation and coercion are a natural consequence of a human's intrinsic desire for self-preservation under any socio-economic system's condition wherein self-preservation is tied [immediately and strategically] to resources and resource acquisition in competition for survival. Here, we ask ourselves, Do we live in a society where we vote to participate in a political destiny, a "democracy". What is a "political destiny"? If a people surrender their consciousness, their independence and sense of what is right and what is wrong, then perhaps without knowing they become passive and controlled, unable to defend themselves and those they love; they become lost in "repeat mode" unable to develop [new structures]; they may never have learned how.

Any socio-economic system wherein justice is found through judgment is a system that limits the self-directed freedom of the individual through the restriction of individual liberties; judgment reduces the coordinated ability to effectively maintain a state of higher potential fulfillment. The term 'judgment' is defined herein as the forming of an opinion, estimate, notion, or conclusion, as from circumstances presented to the mind and articulated through the construct of an authority (Read: a power authority). Here, 'liberty' is the state in which a person is not subject to coercion by the arbitrary will of another or others, and it is intimately linked with an individual's volition (or will) and ability form scientific, critical, and systematic thought [processing structures]. Thus, freedom is the environmentally influenced ability to direct one's own life and learning, and the opportunity to have learning experiences that improve our decisioning capabilities and construct decision space of a higher potential. But, this 'liberty' is not the absolute liberty to do as one pleases at the expense of others. Rather, it is the realization of responsibility through the integration of conscience in one's relationships and behaviors with others through self-integration.

If one person or group has the socioeconomic power or authority to judge another's life, then equitable access to resources does not exist (and there is likely some appropriation of resources by private ownership). Judgment is a form of discrimination and occurs prior to a full understanding of the root cause of a behavior, prior to systematically compassionate presence/understanding. Without compassion there is not community. Without compassion there are irrational, contradictory beliefs that are passed down generation after generation on the nature of the legitimacy of authority and the rationality of scaled cooperation; do you still hold any? Are "you" so used to living in a state of contradiction that "you" don't notice it? Judgment occurs prior to our common ability to comprehensively inform our decisions through parallel inquiry [into the capacitive abilities of our designs] and structured discovery.

Humans will quite normatively and naturally seek the preservation and continuation of the means by which their needs are being met. Within a socially unjust system those individuals and groups with "wealth" will quite naturally seek to maintain those systems that provide for their continued "wealth". Self-preservation becomes tragic when a socio-economic system does not recognize one community with common [life support] needs and [social & recreational (quality-of-life)] wants. When a system is structured in such a way that some individuals' needs are met at the expense of other individuals' needs, then it is not a compassionate or wealthy system. A distributive justice strategy accounts for the "spectrum of preservation needs" – from life support to technological support to social & recreational needs, which are of a spatial-temporal (i.e., logistically strategic) frequent nature.

This decisioning space structured in such way that everyone's core support needs are met and the sentient population uses its abundance of resources to pursue its higher potentials, wherever they may lead. Anything less than this is a system that simply does not go far enough in ensuring equal access to all resources, and it is likely to generate and reinforce corrosive social values.

Under conditions of privatization and material inequality individuals can be said to be only as free as their "purchasing power" allows them. As a community, we need access to goods and services, not private ownership of goods and services. Private ownership cannot lead to equitable access because its social consequences include the establishment of power structures that inherently prevent the expression of equal access, while generating the formation of human hierarchy. Consequently, wherever the community's data, resources, and categorical goods and services are concerned, no separation exists between what any two persons can access (with safety qualifications) - this composes the idea of **strategic access**.

The *Justice Inquiry* process exists to identify the feasibility/viability of a design in effectively fulfilling, or optimizing the fulfillment of, human needs with the understanding that: the structure of a system dictates its potential capacity to effectively fulfill known needs; and, the strategies that we encode through the use of tools determine what we produce (and whether or not it is selectively adaptive to our highest intentions).

11.1 Contribution inquiry

A.k.a., Contribution status.

The contribution inquiry status into a system solution could result in:

- Red: No volunteer at the moment.
- Orange: Insufficient volunteers, some scheduled periods are currently empty.
- Yellow: Barely sufficient, all scheduled periods have volunteers but there is; insufficient backup/redundancy or insufficient training for projected needs.
- Blue: Sufficient volunteers with adequate backup/redundancy and adequate levels of education/training to ensure future (the status is an indicator).

The status of the contribution

- Functional: Failure affects life support and/or technology support.
- Services or Support: Failure affects quality of life and comfort.

The priority of the contribution (e.g., habitat service system operational process prioritization from life to exploration and incident to strategic) may include:

- Emergency : Unforseen incident requiring immediate action (e.g., fire, accident injuries)
- Essential Services: Power, Life support, Medical, Transport, Hydroponics, Communications (Failure causes immediate interference in other activities)
- Operational Activities: Main activity, failure jeopardizes or interferes with production and has a short-medium term impact operations
- Maintenance Activities: Occasional and instanced, medium-long term impact on operations short term impact on quality of life.
- Improvement: Education, training material, R&D long term impact on operations

11.2 Use value

Goods and services are technological economic products and they have a **use value**. What does the term, 'use value', mean? Tools, mechanisms, and technologies are used to meet needs; these things have an expressible function and an -ability to orient a construction (i.e., strategy can be applied in their production and use) in a direction of intention. The value [of the use of an 'object'] lies in the meeting of a need, which is an intentionally fulfilling emergence of direction. The value does not lie in the technology because the technology is simply an emergent means to an end, wherein the end is the meeting of a need. Over time, some needs will stay the same and other needs will fluctuate. Here, fluctuations can be traced, and 'use values' adjusted accordingly in relationship to production [efficiency].

Technology is constantly adapting and evolving due to advances in knowledge and understanding, and thus, will continuously meet all needs in novel ways. The value does not lie in the technology itself; instead, the value lies in how efficiently and effectively the technology meets an identifiable need, the functional use for the good or service. A house, for example, has a 'use value'. It is first and foremost a place of shelter; sheltering from environmental exposure is a human life support need. It is also a place for restoration and contemplation. A house is a place where people can have privacy, and if they so choose, may "build a home" for themselves. A house has multiple 'use values', which are known broadly in every given society.

Goods and services are only as useful as the need they fulfill – some needs are functional and others are perceptually aesthetic. It is important to remember that interpersonal needs are not satisfied through technology, but through a value-oriented physically-interpersonal relationship. Essentially, use values can be divided into those goods and services that are necessary for the bio-physio-techno support of a society, and those goods and services that serve social and recreational, quality-of-life, needs.

A community that recognizes the importance of equitable access must also recognize the primacy of use value in the structured prioritization of access. This is because 'use value' has a primary relationship to the real world – the world where humans have a spectrum of needs that must be met for the continuation of our life, our health, and our higher fulfillment. This decision system is structured in such a manner that goods and services are produced for their 'use value' and not their data-deficient 'exchange value'. Please note that this does not mean that exchange will not or cannot occur between individuals in the community.

11.3 Access behavior

Individuals in an access-based community maintain a similar, emergent and relational value system. A functioning access-based community necessitates appropriate sharing and caring behaviours reflective of a relational value system and conscience in action. Herein, sharing refers to using an item and then returning the item so that it can be used by others. The process of sharing the use of community accessible items is commonly known as **collaborative consumption**. Collaborative consumption is based on an economic model where goods and services are technologically

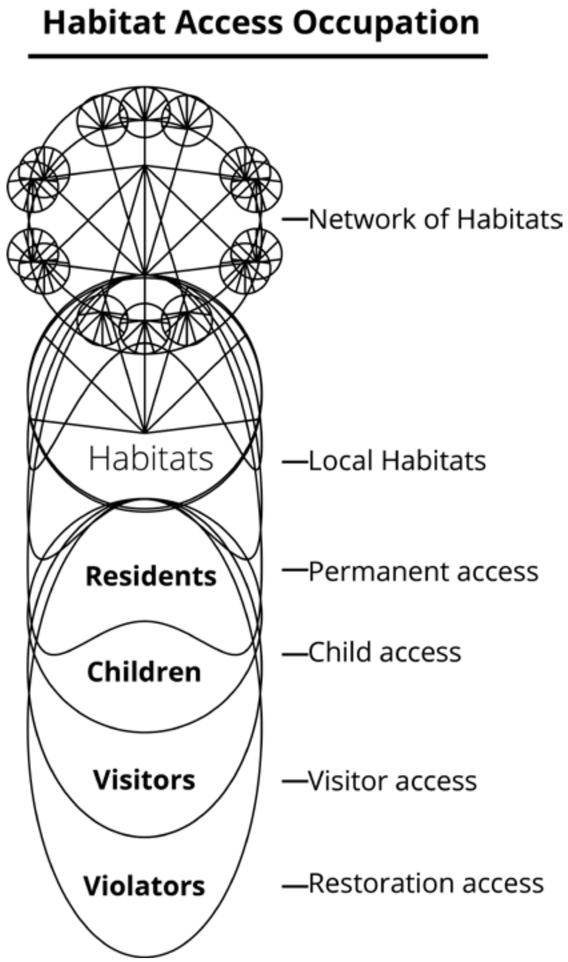


Figure 38. *The four forms of habitat access occupation.*

designed for sharing ("checking out"), instead of being designed for owning, which is similar to the notion of "renting" in early 21st century society, but without currency exchange.

Note that in the standard collaborative consumption model, the idea of 'caring' refers to "taking care" of items that are being temporarily used and accessed by an individual or group (i.e., not intentionally damaging items).

Communities that recognize the involvement of a value system in the process of deciding often maintain a screening process for the inclusion of those who originate from a different socio-economic system into their community. The screening process exists is to ensure that those who are included within the community share the same purpose, values and emergent approach to the process by which they arrive at decisions that affect everyone's resources. In other words, values influence access behavior (both social and material).

Also, this system is designed to incentivize collaborative behavior [by structurally facilitating it]. If not everyone can have the same number of what you are having, then your demand is in **overrun** and out of sustainable alignment with the community's current value decisioning structure. And, contextually, the system maintains alerts for events where someone's demand is likely to dis-align social stability from human fulfillment. Yet, herein lies the opportunity between individuals in community to collaborate and develop something synergistically more well designed than the design which was denied [for its viability] as 'overrun'. The 'overrun' alert represents an opportunity for improving our designs for greater fulfillment in access. Often, a design denial represents an opportunity for learning, growth, and adaptation, which might involve individual growth as much as social or material.

11.4 Access designations

When a good or service is produced, then it becomes accessed (i.e., used or occupied) by an entity or entities in the community and receives one of three access designations.

The three access designations are:

1. **Systems access** (a.k.a., InterSystem access, *contribution user* access) - work in society as part of the contribution service on societal services and objects. These contributors are users of the contribution system.
2. **Common access** (a.k.a., "community access", "social access", *common user* access) - commonly accessible services and objects. All community users have this access.
3. **Personal access** (a.k.a., *personal user* access) - personal identity only accessible objects. All community users have this access.

In Community, goods and services are accessed, including the habitat service operation itself, under one of three access [designation] categories. Every economic good or service is articulated and accessed through one of these three access designations. Briefly, 'Systems access' exists to maintain, respond to, and strategically improve the functioning of community systems. 'Community access' refers to those systems that are open to anyone (qualified by their safe operation). "Personal access' refers to those systems that are only accessible to individuals or families, and it involves the exclusive use of an item. Systems access users use the system for contribution. Everyone else, the individual community users, uses the system for personal and common access.

Remember, as this is an access-based economic model, resources are not owned, but are instead temporarily accessed by the Habitat's system, the community (in a habitat), or the individual (in a community habitat). In other words, issues that are resolved into modifications to the distributed design of services (and goods) acquire one of three categorical access designations: habitat systems access; community access; or 'personal access'.

All resources are accessed and composed into solutions that resolve the needs of individuals in a community. When the products of the economic system are accessed by an individual they are either accessed exclusively (as "'personal access'") or they are commonly shared with a proximal degree of returned access (i.e., "community access"). Production services may also be accessed collaboratively by habitat systems interdisciplinary teams (i.e., 'systems access').

In cases where specialist knowledge is necessary certain decisions are the domain of demonstrably accountable teams who have the knowledge, and in particularly, operational/development expertise, necessarily required to arrive at a decision expediently, within an urgency timeframe. This normally involves issues with an *urgent* or *priority* prioritization.

As noted earlier, all access is temporary and may, or may not, be based on the lifecycle of the resource, or the good or service that the common heritage resource currently, though temporarily, occupies.

In a sense, these three access types represent different types of coordination:

1. **Systems access** - highly coordinated access.
2. **Community Access** - shared access through coordination.
3. **Personal access** - individual access through coordinated customization.

Herein, habitats can be occupied (I.e., accessed) in various ways (categorically):

1. **Residents:** Full-time population who maintain a localized personal dwelling with personal access products. Residents have spent some duration of

time, from seven months an onward, accessing the local habitat service system on a regular basis.
2. **Visitors:** Visiting population of community members who maintain a localized personal dwelling with person access products in a different [local] habitat service system and/or are in a local habitat service system for less than seven months.
3. **Children:** Children have more restricted access to informational and physical systems to ensure safety and well-being development.
4. **Violators**: Individuals who are known to have violated a decision system protocol, and are thus, specifically monitored and/or have restricted access, while participating in restorative justice procedures.

   NOTE: Duration of access of a local habitat service system may have an affect on an individual's weight in the preference inquiry, in the decision system, for local habitat service reconfiguration via a preferential vote on a selection of options.

Universal access decision inquiries include, but are not limited to:

1. Is the requester authorized to access or request access [to the object or service]?
2. Is the object [or service] available either in the stockroom (library) or from a production unit?
3. Is the object on the list of hazardous objects?
4. Is the requester trained in handling the object?

   Note: A requester is any user. A user could be a final user (as in, common or personal access), or a user could be a contributing intersystem team member working on an intermediary task (as in, an intermediary user).

11.4.1 InterSystems access (system use)

A.k.a., System use and system access.

'Systems access' refers to the entire operation of all structural habitat systems by interdisciplinary systems teams -- structured by the high-level variables of 'habitat system' and 'operational process'. Habitat systems use resources, goods and services to maintain their operations, and ultimately, their continued functionality and use value [to their participating users]. Economic products designated as "systems access" are [de-]integrated into the structure and functioning of the Habitat by those individuals who have the necessary knowledge, skill and responsibility for the system(s) into which the iterative solutions is being integrated. Systems access involves a high coordination of decisive action.

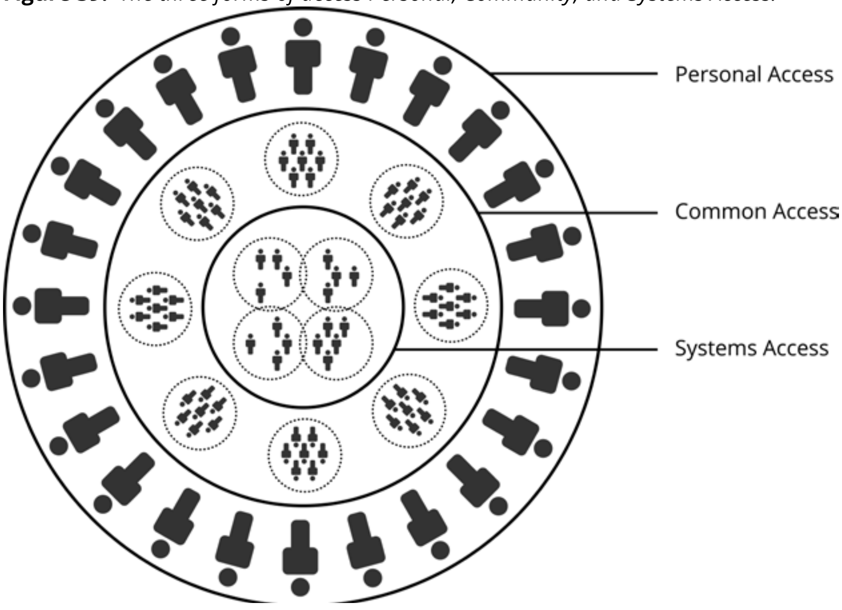
Each Habitat system involves a series of interconnected operational processes. These operational processes exist along an urgency spectrum. The urgency spectrum is a mechanism for the prioritization of all articulated issues in the community.

The Habitat's systems maintain the structure and economic lifecycle (e.g., production-recycling) of our very community, and they exist to meet the ongoing needs of individuals in the community. These systems structurally orient and organize the manner in which individual needs are met. Some economic products are of a life support nature, some are of a technological support nature, and others are of a social and recreational nature. These needs are reflected in the structural organization of our community. All economic products are composed of some form of interrelationship between resources and tasks applied to the structural redesign of the Habitat.

The Habitat System is divided categorically into four sub-systems: The earth; the life support system; the technology support system; and the facility system. At the core of the system is the earth, the natural environment (resource production, regeneration, and storage subsystem). The life and technology support subsystems are secondary core, then the facility subsystem exists as the capstone that facilitates a greater creative potential in our emergence. A capstone requires the support of all those stones beneath it. Essentially, the other habitat systems are the support structures that create an environment where every individual can pursue their highest potential self/life experience.

The Real World Community Model guides the process of change for each of the Habitat's systems. Subcomponents of the Real World Community Model

Figure 39. *The three forms of access Personal, Community, and Systems Access.*



include but are not limited to the phases of planning, production, integration, and feedback. Here, the Strategic Preservation Planning [operational processing] phase involves the iteratively formalized and parallel inquired solution-redesign for the full habitat service system. Who formalizes the plans? We do as individual users, as community sharers, and as teams of coordinated contributors (or "feedback sharing teams").

The operational processes of 'Maintenance and Operation' and 'Incident Response' solely involve the interdisciplinary systems teams responsible for the system(s) in question. The strategic preservation planning phase is structurally maintained and formalized by interdisciplinary systems teams, but as a platform it is neutral in processing transaction requests at that operational level. Alternatively, the 'maintenance and operations' and 'incident response' systems tasks are assigned and responsive to (access by) accountable interdisciplinary "teamed" individuals. Here, teams maintain access control by identity to the responsive modification of these operational environments. However, at the strategic preservation planning level this "access to modify" is distributed among all identities in the community. The interdisciplinary teams are themselves composed at this level of planning. Even the selection of an interdisciplinary team itself is a formalized planned-for event at the level of strategic preservation planning.

There are multiple ways in which habitat service system tasks are created and distributed.

11.4.1.1 Access levels

Inside 'systems access' (or 'root access') there exist levels of access associated with the priority urgency of operational processing tasks. Everything about these levels and their access is transparent to everyone in the community and access to these processes is selectively chosen by a distributed and planned agreement network.

There is likely to exist criticism around the inclusion of the notion of 'access levels' into the community by those who value "freedom" in the form of exclusive economic power to do whatever they want with their property. For example, some might say, "if I want to blow up a mountain that I 'own', I have the 'right' to do this." If that is how one defines "freedom", then the freedom of opportunity to develop to ones highest potential through this community system will definitely impose on that "freedom". The mountain has likely existed for hundreds of thousands of years; it is a mind-boggling thought that a human being that exists for a fraction of that time could "own" it and decide to destroy the mountain for no other reason than to watch the explosion. Do you see the difference in the descriptions of freedom – the freedom to develop oneself and ones society versus the freedom to de-construct oneself and society for temporarily rewarded pleasure; where is the choice, really? Humans like all living beings respond in an emergent manner to environmental signals. If the signals are continuously triggering aggression and competition among individuals in a population, then society will experience violence as well as the clawing desire to have greater access than others. Remember here, violence exists along a spectrum.

Now, let us grant someone for a moment the argument that [some] humans are just violent by nature. Let us just say that there will always be "bad people" who want to do "violent things". So, the best way to mitigate those violent peoples impact on society is to not give them armies, intelligence establishments, law creating powers, ownership over natural resources, managerial positions over others, capital in general, and especially not the ability to monopolize violence (i.e., police), or even the exclusive use and occupation of something or other (i.e., property) with which [in competition] they are incentivized to monopolize and tyrannize. It would not be wise to design a society where they could gain access to a hierarchy of power, to great acquisitions of property.

The access levels described herein are strategically designed not to form into social control hierarchies; instead, they are [strategically] participatively horizontal – they are openly contributory task positions that follow through the changes requested to be made to the system(s) we all rely upon. They involve output decisions from our formalized and distributively agreed upon information-decisioning re-solution system. Sometimes, of course, teams will have to make localized decisions about the 'in-place' systems they are operating within when an incident (or other event) occurs. And, although these decisions are transparent to the community they are consensually agreed upon at the scale of a team.

Fundamentally, the type of access being described here is not exclusionary; it is participative. Participation in a system must be coordinated if the system is to exist optimally and remain resilient. The allocation and occupation of resources are processes through a decisioning system where humans participate of their own volitional accord. The decisioning system says - this is what we are capable of doing and here are the different design possibilities; here are our resources and here are our needs, how are we going to approach this circumstance and what do we desire out of this event? No one in community is coerced (or otherwise forced) to labor for any design -- we either work to keep our community adapting and developing, or we don't and we watch the entropy of our total system gradually grow.

In order to truly understand participation, one has to understand the Community's social model, and hence what this type of a value orientation actually means. And, it is a social orientation reflected in the behaviors of individuals in the community, whom are also horizontally distributed among contributory interdisciplinary teams. Essentially, this decision model as a whole cannot be understood in its entirety without also understanding the design of the social model (i.e., it is a treatise; to understand one part another part must also be understood) - one has to understand the meaning behind why work is complete as well as how it is completed.

In a sense, the interdisciplinary teams could be seen as a collaborative operation; whereas, 'community access' is more akin to collaborative consumption.

11.4.1.2 Certification

Some levels of access may be dangerous without a sufficient skill or education about the operation of the service, technology, or procedure in question. These services (etc.) generally require certification, regular re-certification, and possibly, continuous education. However, because there is no State in a community-type society, there is no conception of a 'license' given to someone by authority.

11.4.2 Community access (community use)

A.k.a., Common access/use.

Community access refers to the sharing of goods and services among a community. When certain resources, goods or services are shared by individuals in a community, then a "community of access" is said to exists. A community of access is most easily recognizable as the form of interaction that occurs within the nuclear family unit where certain useful items are shared by all members of the family. Sometimes these items are stationary and part of a larger architecture (e.g., furniture, television, cabinets), and sometimes these items have no fixed location of use (e.g., bicycles, cookware, tools). The one characteristic these items all have in common is that they are used temporally and have no static relationship (e.g., private ownership) to any individual or group of individuals. They are accessible to everyone contingent upon their safe use. Individuals use them on a temporal (or temporary basis), and then they are returned or simply left for another person to use.

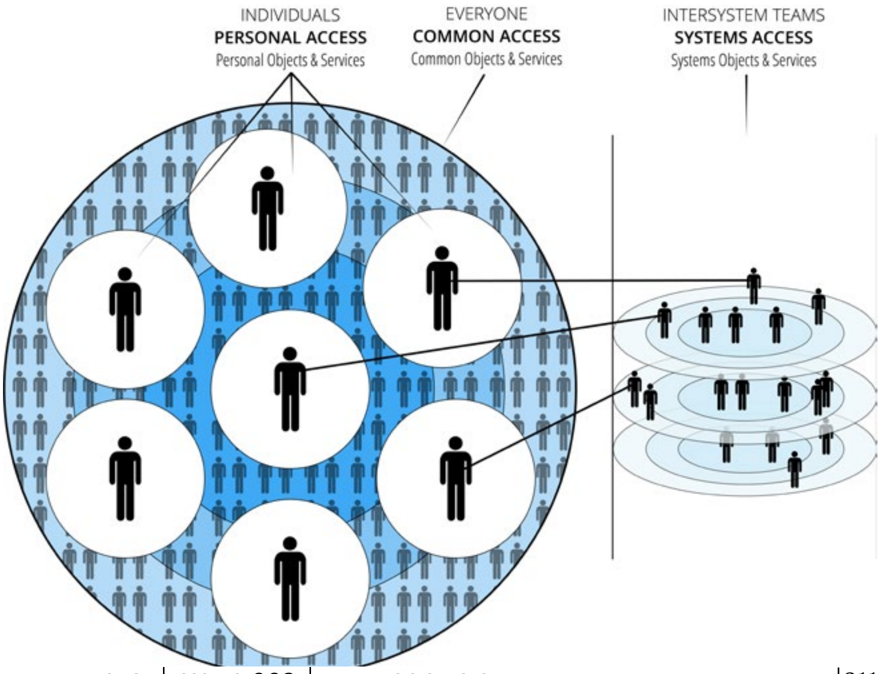
Resources, goods and services with a 'community access' designation become available and shared by everyone in the community. It is relevant to note here that the handling of some technologies requires training. If a resource, or good or service, cannot be safely accessed by an individual then the individual has the social responsibility not to access it at their own and the community's potential expense. The operation of some technologies present inherent dangers to others in the community. The operation of a motor vehicle is one example of this. An individual must be trained to safely operate a motor vehicle; it is a learnable and learned skill. If someone were to drive a motor vehicle without sufficient training they would put others' very lives at risk.

'Community access' items are "consumed" through sharing (or shared access). Conversely, "personal access" items are the exclusive use of an individual or family for the item's particular use lifecycle or desired use.

Community spaces are by relative degree functional for multiple different purposes under a **scheduling strategy** (i.e., layering in time). During one part of the day a recreational performance may be held in a space, and during another part of the day the room could be used for a sporting activity. Some architecture, however, has been designed to meet a technical function. A technically fixed squash court, for example, is a squash court and you can't do much else in it. When it is *occupied* by two people playing squash, then it is *in use* and only usable by those individuals using it. At no point in time does it become the 'personal access' of the players. The players use the court temporarily; they share it with others via a time scheduling strategy. Alternatively, a research laboratory may have been specifically designed for a defined research purpose and have special equipment in it that is fixed or cannot be easily re-located. This [existent object] represents a long-term "spatially represented" project area; and it too is scheduled for. If a space is to be occupied for a continuous community-oriented direction, then it is "projected" for by planning. These function-oriented 'community access' structures have become part of the continuous infrastructure of the Habitat System, as well as being integrated into the lifecycle of the habitat.

'Infrastructure' at the deepest level is not a static set of building blocks that serves as a kind of fixed foundation for economic activity, as it has come to be regarded

Figure 40. *The three forms of access designation in a community-type society are InterSystems access, common access, and personal access.*



in popular economic law. Rather, 'infrastructure' is an organic relationship between the technological service systems and their task constructors that generate the living economy. In community, the users are the intentional task constructors ... our intrinsic motivation is engaged and we become extremely capable [given structural capacity].

The design and production of 'community access' goods and services goes through at least the process of planning, production, and feedback. A percentage of 'community access' goods are also integrated into the infrastructure of the Habitat by interdisciplinary project teams. The planning phase of all 'community access' goods involves the economic decision system (i.e., the parallel process of open inquiry).

Please note that 'community access' items are produced in some quantity and a quality. The exact quantity produced is determined by demand for the product through the articulation and preference inquiry processes.

Here, there are two aesthetic options a single type of 'community access' item (or service) can adopt:

1. **Categorical [task] customization** - a known and finite number of customizations exist. In other words, the task has features that can be turned on and off by the user to customize the experience.
2. **Standardization* (standard task)** – no customization exists. In other words, there are no features; there is only that which is standard.

** Standardization [of genre components] is a micro-calculation strategy. Community use items (as those items that we share) are designed through our ability to construct comprehensively feasible solutions to issues.*

In a preservation-oriented economy the 'quality' of an item is determined by the items *functional* and *material integrity*. It is a strategy to produce all 'community access' items with a single quality - the item is of the highest material integrity and the item meets its required functional need. Material integrity is required to provide sustained functionality.

When a solution's demand and resource requirements are known, then production becomes a matter of whether the product can be produced in sufficient quantity to equitably meet demand (i.e., distributive justice). If an arrangement of resources or schedules cannot be arrived at to meet demand, then the only equitable action would be not to produce the product until sufficient resources are made available or the context in which a demand arises changes. Here, the number of different customization may a determinable variable.

11.4.3 Personal access (personal use)

A.k.a., Individual access, family access/use.

'Personal use' items are easily understood as those items that are occupied by an individual or family. 'personal access' refers to the exclusive use of an item, potentially including, but not limited to, items such as a toothbrush, personal computing devices, objects made by, given to, or bought by an individual, and customized or personal works and instruments. Conversely, community access refers to that which exists in the domain of the community, accessible by the community, and no single individual or group of individuals have exclusive use of.

'Personal use' items for *hygienic* or *emotive privacy/ restoration* issues cannot be used by another person or family for the duration of their use lifecycle. This includes, but is in no way limited to, health and hygiene items (Life Support), personal communication devices (Technology Support), and a personal home/dwelling (Life Support). 'personal access' may also include, for instance, individual human *ability* items and products such as customized personal musical instruments (Facility Subsystem). Practically speaking, some of these items are produced for the community and may be "fully consumed" by individuals. Single use medical equipment, for example, is standardized and produced for the community, but consumed by the individual.

'Community access' items are consumed "collectively" (i.e., shared). "personal access" items are the exclusive use of an individual or family for the item's particular use lifecycle or time-duration of desired use. The difference in 'community access' versus 'personal access' lies in how the following questions are answered.

When the item is not being used:

1. Is it part of or within the structural personal space of someone (e.g., furniture, fixtures, attire & adornments)?
2. Can it hygienically be used by someone else?
3. As it concerns emotive privacy (i.e., emotionally healthy conditions of personal space and restoration), can it be used by someone else? Personal use items cannot be used by another person for structural, hygienic, and emotive privacy/restoration reasons. A toothbrush, surgical needle, and other such items cannot under hygienic conditions be used by another person. A person's home, their bedroom, their furniture, their smartphone, their personal journal (i.e., healthy emotional conditions of personal space) cannot be used by another person (unless they selectively and subjectively provide access). Personal space (and "privacy") matters because its presence allows us to determine who we are and who we want to be, it also provides a space for restoration and personal communication.

   For instance, if someone's bag is closed then it would be expected to be an invasion of privacy to open their bag without permission, let alone take anything out of it. Behaving in this way would be considered not only a violation of emotive space, it would also be a violation of "personally" structural space. The ordered contents of the bag are the personal structure of the current user. The architecture of the bag and that which is inside of it is part of the personally structured space of its current user and it is a violation to access it without their access permission, which does not mean that the current user "owns" the resources or structure that is currently designated as 'personal space'.

It is considered a 'personal access' violation to access these in-service (and otherwise, personally occupied) objects beyond the permissions given to access them by the user-individual. And, as a community, we seek to make it structurally simple to identify and "secure" (where desired) 'personal access' permissions.

Before accessing another's 'personal access' space/ item, we ask: "Do I have your permission to enter your personal space? Or, may I have access to this item?"

'Personal technological access' items are those technologies that are continuously within an individual's personal space. For some people this may be a watch, a smart phone, the technological infrastructure of a home, or any other technology frequently used. Conversely, 'personal aesthetic' items are those "objects of art" that are found in the personal spaces of individuals and also created by individuals.

Someone may use a toaster, and although that toaster is "picked up" from an access center, the toaster has become part of the structure of someone's personal home, their personal space. The integration of the toaster serves a localized functional purpose in someone's personal space. There may come a time when the toaster breaks, the family no longer wants a toaster, or another multi-use technology absorbs the function of the toaster. Or, they may no longer desire the use of a personal home toaster and instead use the device in a 'community access' space where multiple individuals come to prepare food and eat together. Those products that become part of the structure of individual's personal spaces are highly dependent upon and influenced by need, want, culture, multi-functionality, and modularization. In a community space, the toaster would be a 'community access' item because it is being shared by the community. In someone's home it would be considered a fixed structural 'personal access' service item. In either case, usage is projected for by 'demand' into the decisioning system.

Some items may be used at both a community and a personal level, and others are exclusive to one or the other. Single use medical equipment, for example, can only logically be used at the 'personal access' level, unless a technology at the community-use level subsumes it functions; for example, using a pressure injector for medication as opposed to a needle for every person. The pressure injector is a less wasteful technology and the entire device does not need replacing with each use. But, pressure injectors only operate within certain environmental parameters the may not be the optimal delivery medium for a particular situation, which are 'functional use' considerations.

Both 'community access' and "personal access" items are produced in some quantity and a single, optimally value aligned quality. However, personal use items have one additional aesthetic category over community use items. There are three possible aesthetic forms that a single "personal access" an item can adopt:

1. **Individual customization** - customized by or for the individual
2. **Categorical customization** - several categories of customization exist from which to choose, which are finite
3. **Standardized** - no customization.

Some 'personal access' items are customized for the individual, some are standardized, and some have categorical attributes (i.e., having a finite variety of aesthetic designs).

Here, 'personal access' is a distinct category of access. However, some models may include 'personal access' as a sub-category of 'community access'. This model does not include 'personal access' as a sub-category of 'community access' because there exist some items that for whatever reason have never been shared with the larger community. For example, if someone takes a private photograph or writes something private, something emotively private, then that item (or thing) has never been and does not have the characteristic of 'community access'. Conversely, a toaster is a community accessible item that someone may use exclusively for its lifetime ("personal access") or may use for a single use and then return (temporal personal- access) or may use in a community setting ('community access'). In this case, it would be true to say that the toaster as a "personal access" item is also a 'community access' item. The toaster has the potential of being distributed to both access designation categories and when returned it is recycled [in some way] by the habitat service system.

11.4.3.1 The personal information system

> *"Scarcity and abundance are foundational and contextual ideas. They each give rise to a distinct system of thought and a number of rules, characteristics and measures which only make sense within their own system."*
> *- Buckminster Fuller*

An individual's personal information system is designated under 'personal access', and content therein may be kept private or shared. This system is similar to Google Drive, where files can be kept private, or shared.

We acknowledge that when a creative expression enters community awareness, then it potentially becomes accessible community-wide, and among community, no entity exists to restrict its storage or dissemination [on personal information systems]. There is no force in the community to restrict or prevent this. Herein, no one can prevent anyone else from sharing something in their personal information space. Similarly, no one can prevent anyone else from downloading content that enters community awareness into their personal information space.

Herein, it is wise to remember that all forms of expression, creative or otherwise, potentially become accessible community-wide when they are shared with another person. A another person with whom you share something "private" may chose not to honor your request to keep it private. And in community, there is no systems-level reprisal you can take against them and nothing you can do to prevent them sharing the information once it is in their personal space.

In the Community there are no licenses to any informational content -- there is no body to create them and no body to enforce them. There is no meaning to idea of a "license" given to any informational content. Someone may attach any license mark (e.g., trademark or copyright mark) to any content they want, but it will have no meaning in community.

For example, if a member of the learning community paints a physical picture of a "unique" scene, then that painting is their 'personal access'. However, if the painter shares the painting with a larger audience either through a social viewing or by sharing a digital photo of the painting, then the visual image of the painting in its digitized form becomes accessible community-wide without restriction; any degree of restriction necessitates a force-based power structure. The original painter cannot prevent or hinder the sharing of the digital content or the repainting of the work once the work enters community awareness. This is a principle built into the technical design of the information system itself. Note, the initial physical painting is still the 'personal access' of the painter. That personal access item may be provided to another (via trade or freely gifted) and by doing so becomes the other person's/family's personal access.

11.5 Access violations

A collaborative and open decision system in community accounts for needs and allocates resources and contribution to produce and distribute access. It is possible for people in community to take more than they are allocate or to violate usage protocols during usage that damage others access. Monitoring alarms are raised when something is taken beyond what is allocated by the decision system. If there is harm, then restorative justice protocols are engaged.

11.6 Forms of production

The common decision space accounts for three forms of production:

1. **Continuous** (A.k.a.., fixed, constant)
2. **Ad hoc** (A.k.a., on demand, flexible)
3. **Cyclic** (A.k.a., seasonal, periodical, cyclical)

Everything produced with one of these production tags has one of two other tags associated with it: in-production service; or, structure. Something that is structural becomes part of the Habitat Systems Service infrastructure. This integration of a structure into the Habitat systems infrastructure may be temporary (i.e., ad hoc or cyclic) or may be permanent (continuous). A structure is integrated into the infrastructure of the Habitat system for some "serviceable" duration of time. Continuous structures live out their usable / functional lifetime as a fixed component of the infrastructure. Production refers to a good or service being produced in some quantity and not integrated directly into the Habitat system's service infrastructure for any period of time. These are more flexible services. Note, that services always involve some infrastructural component, but the degree is relevant here.

Hence, there are six different production tagged input units to account for:

1. **Continuous production** – continuously recycled material space; such as food and energy, which are continuously needed and therefore continuously produced and recycled. For instance, a water recycling system is similarly a continuous production.
2. **Continuous structure** – the production of an absolute structure in material space, a building and service infrastructure with a functional space requirement – in other words it is continuously existing, not changing location or function. Continuously stationary.
3. **Cyclic production** – seasonal foods or items that are produced in some cycle and may be inventoried/stored as "input" at an access center.
4. **Cyclic structure** – a temporary cyclic event (e.g., an annual celebration); something that is set up and taken down on a cyclic scheduled basis.
5. **Ad hoc production** – produced on demand; many goods are produced on demand with reserve.
6. **Ad hoc structure** – a temporary event; an incident response event boundary is an example of this; a re-attachable crane is another example. Ad hoc structures generally exist to build, to take down, or to "section off".

The form of production described herein is akin to an on demand catalogued (or application) production system for goods and services. The more thought responsive an economic environment is the more it will naturally come to resemble a customizable catalogue for on-demand production applications. Through technological ephemeralization the tendency is toward a more thought responsive and "on-demand", customized service system. A community can host both a physical library system as well as a digital library "inventory" for on-demand production.

Inventory (digital & material) is assessed through a dynamic and direct feedback link between production, distribution, and demand. Inventory accounting and tracking is an entire area of study unto itself, and it is being done this very day at a globally massive scale. It is an access system, an item can be returned at any time for re-processing through the system.

> **NOTE:** *It is possible to be adapted to variation and variability (e.g., temperature variation and diet variability).*

11.7 InterSystem habitat service tasking

Tasks are divided between InterSystem Teams and Automated Systems in a way that maximizes the desires of humans and the skills and abilities of each. The default is that human users choose what they need, want and prefer as economic access, the required tasks are visible, and they choose to contribute to those tasks that are desirable, and then, automate therefrom.

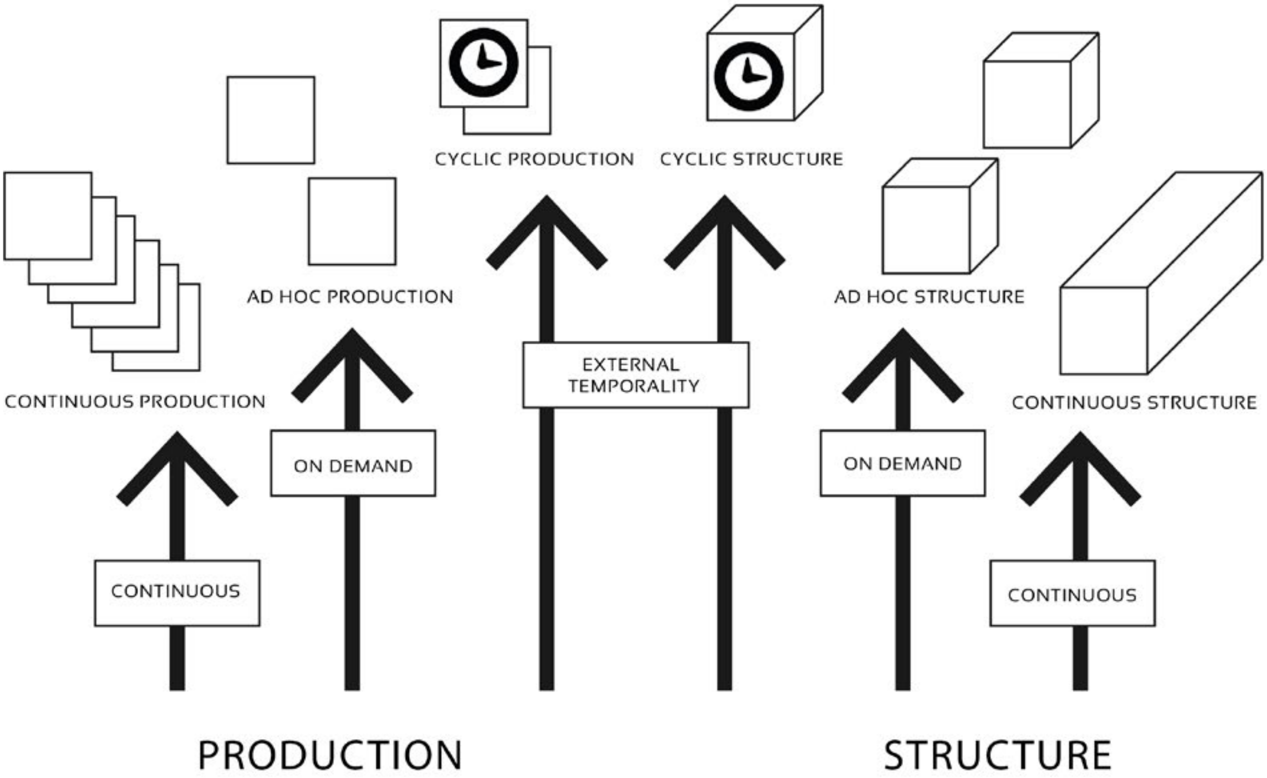
11.8 Automation

> **INSIGHT:** *What gets done is what you do, or what you have automated to do.*

To humanity, the term 'automation' suggests the "autonomy" of automated technologies. Automated technologies increasingly encompass autonomous possibilities. However, the application of any system highly determines its resulting outcomes. Automated systems can be applied to free humanity from drudgery, but they can also be applied to more efficiently and effectively reduce individual autonomy. Technologies are increasingly capable of performing physical and intellectual tasks traditionally the purview of human beings. As machines increase their capabilities to perform tasks, humans are freed to perform more personally meaningful activities. Fundamentally, automated techniques can be carried out at scales, speeds, efficiencies, and effectiveness in excess of human capability.

There is human sensibility in opting for automation technology as a potential replacement for undesired human labor. Automation can alleviate humanity from

Figure 41. *Production and structure visualization. There are objects that are produced on some time-frame basis. Objects can be produced as individual items on a continuous, on demand, or on some cyclical, basis. Objects that become permanent (Read: continuous) structures within an environment can be produced/sustained continuously, on demand, or on some cyclical basis. Often, individual item objects that are produced via some service are used either used immediately (e.g., fresh food), held in a physical/digital library/catalogue repository, or held for some later pre-scheduled event in a repository. A repository (library) is a continuous structure.*



labor that reduces human flow and flourishing. Among the many other advantages include increased safety and programmable runtimes. There is no need [in a community-type society] for machine advancement to generate an adversarial relationship between humans and machines.

Among community, natural processes and technological automation are valued in helping the population foster a state of natural abundance; a state wherein there is no fear of insufficiency, and there are sufficient resources and services to strategically maintain the purpose of the society. The application of technology to the automation of labor frees individuals from mundane and arbitrary occupational roles, which have no true relevance for social well-being. The decision system is designed to structure the automation of laborious and banal tasks that are a drain on human potential and replace them with technological automation whenever and wherever possible. Automation provides individuals more time and energy to pursue their purpose, and the technical integration of naturally more efficient processing leads us to a state of greater economic abundance, which becomes dangerous when jobs are a life necessity. Abundance is most useful when developed out of wisdom, for as Heraclitus once stated, “Abundance of knowledge does not teach men to be wise”. A society may be creating an abundance with its technology, but what precisely is it creating an abundance of?

Machines exist to more economically and efficiently meet individuals’ identifiable needs. Here, question of automation efficiency asks, “How much energy does a task use to repeat the distribution of its service?” An **automation strategy** exists within the *Justice Inquiry* process to maximize the strategic access to resources while minimizing banal and repetitive human labor that individuals do not desire to do voluntarily.

Solutions that create states of greater self-directed freedom through greater efficiency (i.e., automation) are more free and fulfilling than those systems that restrict and set up barriers to efficiency.

Can the service be automated, and if it cannot and it is not an essential service, and there is no one willing to perform maintenance on the service, then the implementation of the service will need to wait until either (1) there are individuals willing to perform the work or (2) there is an automation system that can perform the work. Take for example, a grassed area (regardless of the non-life support purpose for which it is desired existence); if no one is going to mow the grass and no automation system exists to mow the grass, then the grass area will not exist, or it will be left as it naturally is/was.

Automation is:

- The use of certain methods for automatically producing and transporting objects, for processing information, and for making calculations, without human involvement.
- Operating and directing technical system by other technical system that control the flow of information and material.
- Automation is the process of developing and using machines that perform tasks without the necessity for human involvement.

There are forms of automation, and significant models and terminology therein:

1. **Human-automation interaction (HAI) model** - the interaction of humans with autonomous systems is primarily concerned with control as an operative function performed by humans and/or machines among automated systems.
2. **Human-in-the-loop model -** a model that places humans directly in the automation [algorithm] at key points.
3. **Human supervisory** or **monitoring model** - a model that positions humans in a supervisory or monitoring role over an automated system. In some cases humans must maintain situational awareness over the autonomous systems, and in other cases they do not.
4. **Semi-autonomous model** - a system that is semi, but not completely, autonomous such that it still requires manual human effort or control to function fully.
5. **Fully autonomous model** (a.k.a., **full autonomy**) - a system that excludes humans entirely, or places humans in the role of monitoring the autonomous system.

More simplistically, there are 4 automation categories that an economic product can be designated as. These designation categories concern the conditions under which something is being automated:

1. Automated without human supervisory control and self-sustaining (i.e., full automation, no human effort required, “automated automation”).
2. Automated with human supervision control and self-sustaining (i.e., human must be present to monitor operation, partial automation).
3. Automated with human supervision control and not self-sustaining (i.e., human must be present to participate in operation, mechanization).
4. Low/no autom*ation* (i.e., human primarily operates, manual).

The terms automation and robotic can be defined and combined:

1. **Robotic** - An entity that has the capability to mimic the human actions.
2. **Process** - A sequence of steps, that lead to

meaningful activity or task.
3. **Automation** - Tasks happen automatically (i.e., without human intervention).
4. **Robotic + Process + Automation** - Mimicking human behavior to execute a sequence of steps that lead to a meaningful activity without human intervention.
5. **Robotic process automation (RPA)** - A technology to configure computer systems to emulate manual tasks to automate processes; a robot that mimics interaction of humans with digital systems.

Whereas the brain is a consciousness processing device. A robot is a mechanical device that uses purely electronic processing to navigate its way around its world. The behavior of robots is preconfigured; they can't intend anything, they can only do. Robots are optimal for reoccurring, undesirable, and/or unsafe [human] tasks.

To human InterSystem Teams, the requirements of an automated information system include, but are not limited to:

1. User-computer interaction should provide the required information in an appropriate format.
2. Visual consistency should be provided.
3. Intuitive (i.e., easy-to-learn, easy-to-use) actions or commands that do not require significant memorization should be designed.
4. Escape, cancel and abort functions for all user actions should be allowed.
5. All information that the user requires to perform the task should be provided. Do not display extraneous information, but allow easy and direct access to more detailed information.
6. Make consequences of user actions across displays consistent. Provide distinctive, meaningful abbreviations and acronyms.
7. Prototype systems, and allow users to review them and provide feedback.
8. Design the interaction so the users can concentrate on the task, not the system.

To human InterSystem Teams, the defining characteristics of the operation of a decision support system include, but are not limited to:

1. Users can easily monitor a fully autonomous system during normal operations.
2. Human skill and reasoning can supersede or completely replace autonomous functions during anomalies.
3. System automation reduces demands on InterSystem teams, but still permits user interaction with the system.
4. System augments human sensory systems, mapping critical new data point an intuitive fashion.
5. System compensates for natural limitations on human sensory bandwidth by processing and filtering data before displaying data points that require intersystem intervention.
6. Interfaces are very fluid and respond to changing conditions, allowing system ton act as a human-multiplier when needed.

To human InterSystem Teams, the requirements of an automated information technology system include, but are not limited to:

1. **Autonomous science** - since science provides the primary underling purpose for exploration, some science will be conducted autonomously. Humans and IT system s may forge collaborative teams, with autonomous intelligent systems extending an Intersystem means reach and visibility. In advanced It systems, the level of scientist/system interaction

AUTOMATIC MENTAL PROCESSES

Just as automatic devices free us from having to attend to and intervene in order for a desired effect or function to occur, automatic mental processes free one's limited conscious attentional capacity from tasks in which they are no longer directly needed.[1][2] Many have pointed out how impossible it would be to function effectively if we used conscious, controlled, and aware mental processing to deal with every aspect of life, from perceptual comprehension to the environment (both physical and social) to choosing and guiding every action and response to the environment. But, none put it so vividly as the philosopher A. N. Whitehead:

> *"It is a profoundly erroneous truism, repeated by all copy-books and by eminent people making speeches, that we should cultivate the habit of thinking of what we are doing. The precise opposite is the case. Civilization advances by extending the number of operations which we can perform without thinking about them. Operations of thought are like cavalry charges in a battle - they are strictly limited in number, they require fresh horses, and must only be made at decisive moments."*

If our brains automate some of our mental processes for our cognition, then maybe we can do the same for our fulfillment.

1. Kahneman, D. (1973). *Attention and Effort*. Prentice-Hall Inc., Englewood Cliffs, New Jersey.
2. Miller, G. A. (1956). *The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information*. Originally published in The Psychological Review, 1956, vol. 63, pp. 81-97. [cogprints.org]

will change, with the team providing high-level direction and the automated systems making basic decisions, planning, and executing the plan, and carrying out much of the data collection and analysis.

2. **Automated operations** - Information technology systems enable the automated control of complex systems that support a human population, such as environment control, life support, and in-situ resource and production .
3. **Human amplification** - The fundamental human capabilities of the individual will be "amplified" or enhanced through information technology. This capability could be extended to areas, such as hazard identification and avoidance.

INSIGHT: *The move from "laborer" and "employee" to "contributor" and "user" is change that has the potential to heighten degrees of self-determination among a social population, and is brought on by the development and adoption of autonomous systems. In the early 21st century, most people outsource nearly everything in their lives to oblivious, obscure and institutionalized systems that perpetuate scarcity and servitude, and yet, they still fear automation.*

11.9 Prioritization

Social and recreational needs acquire their own internal prioritization. As was already noted, life and technological support needs are prioritized by their operational urgency. All goods and services associated with the life support and technology support systems are produced through the operational process of the Strategic Preservation Planning. This includes all community and 'personal access' items under the Life and Technology Support systems. Items produced by these service systems are usually not functionally customized to the individual unless there is a larger systematic bio-physiological reason for doing so, like the inside of someone's home. These items are generally standardized or a finite categorical aesthetic customization is applied - after a query of aesthetic preference. Life and Technology Support products meet needs that allow for the orientation and continued preservation of our community. Businesses this very day are planning the designs for most technological goods and services. The idea of planning something because it is a more efficient and effective process than making a subjective choice is not a new concept. The process of planning is just being applied by a community with a common approach to deciding.

INSIGHT: *Arriving at technologies that allow the rapid thought-responsive transformation of our environment in an unplanned way is not wise. Today, there are things that a few people can do with technology that risk many other people's lives (e.g., feeding antibiotics to farm animals enmasse, or developing and deploying biological weapons). We have developed our technologies to a miraculous extent. And we have incredible tools because of it, but we have not sufficiently developed our emotional, spiritual, and mental capabilities so that we can handle the technologies (them toward our fulfillment and flourishing) we have and orient them toward our fulfillment and flourishing.*

11.10 Change acceptance

NOTE: *Adaptive change must involve the identification of patterns, such as: demand patterns; patterns of renewal and regeneration; ecological patterns, patterns of waste; patterns of efficiency; patterns of functional effectiveness; patterns of fulfillment; and patterns of fairness.*

The idea that "change" is necessary for a "higher expression [of potential]" sounds rather mundane, but its implications are incredibly far reaching, and they effect all of us to a person. It has to do with our assumptions about change. Deep down most of us don't really recognize that profound change, radical change, extraordinary change, is actually possible. Whenever we think about trying to change something or reach for a higher possibility most of us tend to assume things are much more fixed, much more static, much more unchanging than they actually are. During the vast eons of our evolution things changed so slowly that in one person's lifetime it seemed like nothing was changing at all. There was very little change visible, other than a person aging. Essentially we are deeply wired to look at the world around us and the world within us and see it as something that is standing still, that is not moving.

Carter Fips has published a work entitled "Evolutionaries" in which he explores the emergent evolutionary world view. In this book he named the very thing which is being discussed above. He called it "the spell of solidity". His point was that even though we all kind of believe in evolution in some way, there is a deeper more persistent belief that the world we live in is static, is unchanging and that we are solid or static too - we hold beliefs. So even today when technology is changing at such a rapid rate, we still tend to assume that things are much more unchanging than they are. For instance, on a societal level when we look out at the many problems facing humanity we tend to see these problems as intractable, unfixable. Or on a cultural level when we look at human greed, violence and other aberrant behaviors we see they all seem so deeply rooted in our human nature that we have a hard time imagining how these things could ever really change. Its human nature after all, or so "they" say. And similarly, on an individual level, when we take up efforts to try and change our own consciousness and our own behavior we also tend to assume that our own nature and interrelationships are much more permanent and unchanging than they actually are. So this assumption of limitation is something all of us experience and I want to invite "you" right now to see if you can notice it in "your" own experience.

What is only just beginning to sink in, for all of us, is that life is evolving in a universal cosmos, and that includes you and me. The cosmos is evolution in motion, and so are we. What this means in practice is that we need to constantly question the appearance of solidity, of stasis and to realize that things are not as solid as they seem; or are they? When you look around and see something that is stuck or immovable, you need to take a step back to a larger frame, even maybe a larger time frame. By "stepping backward" we are more likely to see that it hasn't always been this way and it won't always be this way, whatever it is, it is going to change.

We are in a process of 'emergence', of evolution, and of unfolding. Anything you can say about yourself, about the kind of person you are or what defines you, isn't really a statement about how you are in any static or solid sense, it is just a statement about how you are now. You are fluidity, a process of unfolding fulfillment; you are not a static unchanging thing. That can be a little disconcerting to the part of ourselves that images us to be a static and unchanging being, but if you can stay with it a bit you can start to feel the thrill of being in motion, *being in the flow*.

It is only when we begin to open to this reality of unending change, the dynamic of a process that we are, that we can make room for dramatic transformation and our highest human potentials.

11.11 Justice ≠ force

I.e., Justice is a valuable design state that cannot be en<u>forced</u>.

Resources that are occupied by individuals cannot be forced from them, for no entity exists or may exist to assume such a force. The system is not designed to give rights or privileges to any one individual, or group, that every individual in the community does not have. No entity exists to force anyone or any group of individuals to relinquish their access to a resource that is currently occupied by them. It is generally at this point in the discussion that people existing within the private property-based paradigm "stop believing" in the veracity of an access-based economic model. They simply cannot believe that humans can arrive at decisions and act according to a value set and purpose. If you had no fear, how would you behave? This is why a screening process must exist for the community, and any similar access-based community. Individuals who fear for their preservation, their material sufficiency, are significantly likely to portray socially corrosive behaviors.

Hoarding is a human behavior commonly seen in societies where someone's success, influence, and very survival are predicated upon how much material wealth they have accumulated. Under a private ownership model this type of behavior cannot be considered pathological because it is a behavior necessary for one's very survival (physical and identity), and it is encouraged by established institutions. The behavior is promoted and reinforced by organizations that require its expression for their own continued survival. This is generally known as "consumerism" – consuming not for a need, but for the act of consumption itself in the satisfaction of a pseudo-need. The act of consumptions temporarily satisfies the fear of insufficient material wealth and can become a habit or dopamine addiction. An individual who values efficiency and the equitable access to all resources is someone who would return a "personal access" item when it requires recycling or when it will no longer foreseeably be used – this is someone who does not hoard the item out of fear for their very survival. Such behavioral relationships are unlikely to occur in a socio-economic system that is entirely transparent, otherwise there will exist a reduction in trust, which leads to the potential for fear and the generation of a particular set of behavioral maladies. A transparent system is the only system wherein its users have total trust in the system that services their common needs.

Note that hoarding should not be confused with preparing for emergencies, accidents, and disasters (i.e., buffering and redundancy). *Stockpiling* is a method used to accumulate and maintain a reasonable supply of needed items with a known value for future use should supply be disrupted. Stockpiling insures that needed items will still be available for use when required regardless of incident. These items are usually carefully acquired and maintained. Disaster recovery and [operational] service continuity systems exist as components of the Incident Response operational process. Incidents are prepared for (i.e., planned for).

12 Feedback inquiry

NOTE: *Simple navigation errors can take a navigator increasingly more off course the farther s/he goes out. Navigators must maintain a state of continuous error-corrective feedback if they are to remain on course, on point, and on alignment with fulfillment.*

The decision process of any system must adapt to new information when it becomes available, otherwise the information model that informs the method is likely to become an increasingly inaccurate representation of the real world, and clearly, less rational. Decision feedback, wherein, feedback is error correcting feedback. The ability to adapt to new information when it becomes available is commonly known as **strategic adaptation**. If an entity does not adapt its total information set, and its decision process in particular, as it receives new information, then its decisions are likely to become increasingly unpredictable and likely less aligned with its desired outcomes. Imagine for a moment an archer who for several seconds before releasing an arrow toward a target (e.g., a purpose and goals), fails to account for the abrupt change in wind speed and direction. The final resting place of the arrow becomes unpredictable as soon as the archer stops accounting for incoming sense data about the wind. If it begins raining, the archer must now account for an additional input factor by which the arrow's aim is arrived at. At a socio-economic scale, accurate information is necessary for a stable and directionally oriented community. For information models to remain accurate, and thus, useful, their must exist a feedback mechanism. All issues with feedback are addressed by the societal information system, and decision system therein. Feedback is accounted for throughout (Read: anticipatory design); feedback is built into the societal program.

Feedback inquiry is the process by which data about the impact of decisions concerning the allocation of resources toward needed goods and services is fed back into the design of decision solutions as well as the future design of the decision system itself. In this sense, any change to the material environment whatsoever if fed back into the model that accounts for all information in the societal system. Note here that the term 'inquiry' herein implies that there is a active process of seeking or otherwise inquiring into feedback. In other words, feedback is a proactive process.

All feedback is aggregated as data into the Data Domain in The Real World Community Model before being integrated into the Knowledge Domain, which leads to the adaptive evolution of the direction and orientation of the community through iterative modifications to decisioning. Fundamentally, feedback allows for re-direction and re-orientation.

In this societal model, feedback about all changes of state and dynamic in the habitat in specific, and natural environment in general, is continuously fed back into the Data Domain by autonomous effort where possible and manual effort where otherwise. Feedback is a dynamic system requirement; it is required for the existence of an adaptive "living" societal system. Feedback ensures that decisions and actions are having the desired effects and ensures that future decisions account for all changes, whether expected or not, in the environment. If a population pays attention to effects (and affects), then it is more able to know whether or not goals are being attained, and also, whether it might be achieving that which was never intended and may not be desired. Fundamentally, living purposefully entails living consciously, and living consciously entails a willingness to accept feedback.

Decisions effect the environment, and in turn, the environment affects the decider (i.e., our decisions effect our environment, and in turn, our environment affects us and our decisions). Fundamentally, if a deciding system (or entity) seeks to improve its decisions, then it must revisit, question, and analyse its past decisions. The deciding system must be willing, and able, to explore the results of its decisions (in the context of its fulfillment) toward the improvement of its next decision space. Then, the whole system (of which the decision system is a sub-system) can be updated based upon new findings.

Additionally, by incorporating user feedback throughout the design of a system, it is easier to identify major problems or flaws at a much earlier stage. The cycle of evaluation, feedback, and modification should be repeated as many times as is practical.

NOTE: *The brain is desperate to learn and upgrade itself if it only had the information and resources to do so. Neurofeedback research clearly shows that when a human brain has accurate and timely information about itself available to itself, then it can autocorrect itself. In other words, the human brain functions more effectively when it is more aware of itself, and neurofeedback technologies facilitate said feedback process. (Kvamme, 2016:14)*

12.1 Cybernetic feedback

Cybernetic systems are systems with feedback; they accept feedback and use it to control an environment. A first-order cybernetic system detects and corrects errors; it compares a current state to a desired state, acts to achieve the desired state, and measures progress toward the goal. A thermostat-heater system serves as a canonical example of a first-order cybernetic system, maintaining temperature at a set-point. There is also the conception of a second-order cybernetic system, which is a system that nests one first-order cybernetic system within another. The outer or higher-level system controls the inner or lower-level system. The action of the controlling system sets the goal of the controlled system. The addition of more levels (or "orders") repeats the nesting process. A second-order cybernetic system provides a framework for describing the more complex interactions of nested systems. This framework provides a more sophisticated model of human-device interactions. A person with a goal acts to set that goal for a self-regulating device such as a cruise-control system or a thermostat.

It is relevant to note here that design (the internal solution inquiry process within the parallel inquiry process, herein) is a cybernetic process; it relies on a simple feedback loop: think, make, test, observe, improve. It requires iteration through the loop. It seeks to improve things and to converge on a goal, by creating prototypes of increasing fidelity. Design is devising courses of action aimed at turning existing situations into preferred ones; it is goal directed, and hence, intrinsically error correcting. Designs (and, designers) rely on feedback to exist and operate stably.

12.1 Feedback types

There are two general forms of feedback, negative and positive. There are several definitions for feedback in the literature. However, Bale (2020) provides on the clearest:

1. **Negative feedback signals** the absence of deviation, or the absence of any perceived mismatch, between the system's actual behavior and its targeted goal(s). In effect, the negative message of "no problem" is reported back to the systems central regulatory apparatus (servomechanism, computer, autonomic nervous system, brain, etc.,) signaling that no change in the system's output is necessary. Thus, negative feedback stabilizes the system, allowing it to remain steady or constant within its prevailing course of trajectory.
2. **Positive feedback signals** a mismatch between the system's actual behavior and its intended performance. Positive feedback messages initiate modifications in the system's operation, until the feedback is again negative and the system is on target. In fact, within highly complex systems, positive feedback can actually modify the goal(s), and hence the aim(s), of the overall system, itself.

12.1.1 Punishment (per say)

The punishment, per say, is that if someone submits a solution to the system that isn't sustainable and doesn't meet the conditions of the decision system (i.e., if someone's solution doesn't conform to the system), then the system cannot activate it. In other words, if a solution doesn't meet a set of base expected conditions, then the decision system, and protocols therein, won't let someone execute that solution in the system.

12.2 Feedback loops

Feedback loops are the building blocks of system dynamics. A feedback loop is a structure within which a decision variable (flow) controls an action that is integrated into the system to generate a system state. Information pertaining to the state is then fed back to the decision variable, which in turn is used to control the flows. Two kinds of feedback loops comprise all complex behaviors of a system:

1. **Positive feedback loop** - a self-reinforcing loop that tends to amplify whatever is happening in the system.
2. **Negative feedback loop** - a self-correcting loop that tends to counteract and oppose changes. An increase in one parameter causes the other parameter to increase, which then decreases the first parameter.

A feedback loop is composed of two kinds of variables:

1. **State** - an accumulation characteristic of the state of the system that generates the information upon which decisions and actions are based. A state variable is altered by inflows and outflows and is represented by a rectangle in a model.
2. **Flow** - a variable that changes a state over a period of time. Flow variables are of two types: An inflow increases a state and an outflow depletes a state. In short, a flow is a statement of system policies that determines how information about the system is translated into action(s).

Cycles define process loops. A system is said to have undergone a cycle if it returns to its (or, an) initial state at the end of a process. The process of returning to an initial state is often called a 'loop'.

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TABLES

Table 56. Decision System > Inquiry > Issue Recognition*: Decision urgency/priority spectrum (in brief). This is a multi-layered view that includes associated operational processes.*

Urgency Spectrum					
Weighting	Category	Descriptive criteria	Predominant approach	Operational process	Urgency states
1	Emergency	Life, immediate health, safety and the operation of critical systems	Reactive (protocol-driven)	Incident Response	High Urgency
2	Critical	Continuous operation of core functions at risk			
3	Recovery	A return to normal operating conditions			
4	Routine	Regularly followed tasks; the repetitive and cyclical effort to sustain or apply an improved design to the operation of systems	Preventative & Predictive (procedures and protocols involving a planned schedule)	Maintenance and Operation	Moderate Urgency
5	Strategic Preservation Planning	The procedural process of integrating new information from the Real World Community Model into the future design of systems	Strategic Integration (procedure-driven)	Strategic Preservation Planning	Low Urgency
6	Discretionary	All other economic issues	Inquiry-driven	Common decision space	No Urgency
0	Deferred	Review issue only when resources are available	On demand	No process assignment	

TABLES

Table 57. **Decision System > Operational Issue Processing**: *Decision urgency/priority spectrum (in full). his is a multi-layered view that includes associated operational processes.*

Urgency Prioritization Matrix					
Weighting	Operational Process & Systems	Urgency Assignment Category	Continuous / On Demand	Characteristics And Criteria	The Process
1	Incident Response	Emergency Response	On demand	The issue's resolution necessitates the immediate activation of emergency services and those services assume priority allocation of resources - the emergency issue becomes the priority. Either (1) human life and community safety is at risk, or (2) the core support systems of the community are not operational or severely impacted with no presently available solution. Priority occupation of resources resolves to the system(s) or trained individuals that are required to resolve the emergency by following their evidence driven protocols and interdisciplinary team's procedural design solutions [in cases where problems require innovative solutions]. These individuals and/or systems represent the initial response to a disruptive incident. Emergencies usually involve the urgent life support needs of human beings and involve multiple habitat systems.	(1) The process of reducing and removing risk to human life; (2) The initial response to non-operational core support systems
2	Incident Response	Critical Continuity Response	On demand	The core life or technology support systems of the community are in the process of failing [if no action is taken the system(s) will fail]. Processes, controls and resources are made available to ensure that the organization continues to meet its critical functional/ operational objectives. All critical issues threaten the near-term stability of a system. Critical issues have a time interval within which some action is needed to occur for the system to remain functioning. HIGH LEVEL CRITICALITY: (1) Immediate restoration is required (2) Maximum outage/downtime is between # and # hrs/ mins/sec before impact to human life occurs. MEDIUM LEVEL CRITICALITY: (1) Function can continue in default mode or not performed for 5 days. Immediate restoration not required. Failure to perform action will eventually impact performance of high level functions, but will not result in impact to human life. LOW LEVEL CRITICALITY: (1) Function can continue in default mode or not performed for 15+days. Function can be delayed until operating environment has been restored to normal.	(1) The process of taking action to prevent the failure of a system;
3	Incident Response	Recovery Response	On demand	After a system fails it must be recovered before normal operation of the system is attained. Recoveries are planned for by the process of disaster recovery and system continuity planning. Planning is a priority issue and not an incident response issue.	(1) The process of recovering from a disruption;
4	Incident Response Subsystem	Priority	Continuous "inner loop"	The incident subsystem is a permanent part of the Habitat's architecture and requires continuous resource dedication. The incident subsystem handles the incident cycle – preparedness, response, recovery, and mitigation. The three response states of the incident subsystem are all protocol driven: emergency response; critical continuity response; and recovery response.	(1) Continuously monitor technological systems for signs of an incident; (2) The processes of predicting and responding to incidents.

Urgency Prioritization Matrix					
Weighting	Operational Process & Systems	Urgency Assignment Category	Continuous / On Demand	Characteristics And Criteria	The Process
4	Maintenance and Operation Subsystem	Routine	Continuous "inner loop"	Involves all scheduled activities that preserve, improve, or adapt [to external conditions] the functioning a system(s), including modifications, updates, corrections, replacements and additions. Maintenance is a technical and procedurally driven process. Maintenance includes upkeep (and preservation activities) as well as installation issues, and requires an ongoing dedication of resources. If a system is not maintained then it will "fall over" and stop functioning, or its functioning will be detrimentally altered. The need for maintenance is predicated on actual or impending failure – generally, maintenance is performed to keep equipment and systems running efficiently for the usable life of the component(s). Ideally, maintenance would be an autonomous or unnecessary process. Maintenance is an ongoing exercise, a permanent part of the habitat's infrastructure and requires the continuous dedication of resources. A technologically advanced society will inevitably end up with an automation service infrastructure as technology resources reduce the need for human labor. The maintenance and operation subsystem represents a variety of degrees of effort.	(1) The continuous process of preserving systems to maintain their ongoing operation; (2) The process of modifying or replacing a system to improve or adapt its operation.
5	Strategic Preservation and Planning Subsystem	Priority	Continuous "inner loop"	The plan for the future state of the Habitat's systems, which follows a particular set of preservation strategies. The value system represents the desired effect that newly deployed systems will have on the individual and community. Plans are designed to achieve alignment with the community's value system. Remember that values are outcome orientations.	(1) The "change management" process by which we direct our adaptation to new states of the environment (the real world community);
				Coordinating a Comprehensive Strategic Plan - A comprehensive strategic plan for the coordination of projects and integration of new designs, solutions, and needs.	
				Functional Strategic Plan - a functional strategic plan is a strategic planning process for major support functions/sub-systems/programs/services/products.	
6	Economic Inquiry System	Discretionary	On demand	Prioritized as first come / first served. This category represents social and recreational needs, generally as part of the facilities system.	The process of arriving at decisions via a formally agreed upon and collectively informed method.
0	Deferment	Deferred	On demand	Review issue only when resources allow	Review

Table 58. Decision System > Inquiry > Justice > Personal Access Designations*: Personal information system sharing options.*

Sharing option	Definition	Cryptographically secure; Account required to access
Not shared (i.e., kept cryptographically private)	No one else can access the file	Yes; Your own account only
Specific people	You are the only person who can access the file or folder until you share it with specific people or groups	No; Yes (to edit or comment)
Anyone with the link	Anyone who is given the link to the file or folder can access it	No; No
Open web access	Anyone can access the file or folder on the Internet through search results or the web address	No; No

TABLES

Table 60. Decision System > Inquiry > Issue Efficiency: *Alignment of level of robotic automation (involving decisioning and independent executability) with human autonomy.*

Level Of Robot Decisioning ("Moral Agency")	Sheridan's Autonomy	Level Of Autonomy
No robot decisioning (No moral agency)	Machine/computer offers no assistance; human does it all.	Level zero: No automation.
No robot decisioning (No moral agency)	Machine/computer offers a complete set of action alternatives (*information only*).	Level one: User assistance.
Robotic analytical support processing (Implicit moral agent)	Computer narrows the selection down to a few choices.	
Robotic analytical decisioning (Implicit moral agent)	Computer suggests a single action.	
Robotic execution approval (Implicit moral agent)	Computer executes that action if human approves.	Level two: Partial automation.
Robotic execution override (Implicit moral agent)	Computer allows the human limited time to veto before automatic execution.	
Robotic execution (Explicit moral agent)	Computer executes automatically then necessarily informs the human.	Level three: Conditional automation.
Robotic execution status (Full moral agent)	Computer informs human after automatic execution only if human asks.	
Robotic execution priority (Full moral agent)	Computer informs human after automatic execution only if it decides to.	Level four: high automation.
Full robotic execution automation (Fully moral agent)	Computer decides everything and acts autonomously, possibly accepting or not human input in decisioning.	Level five: full automation.

Table 59. Decision System > Inquiry > Issue Efficiency: *Service production automation types.*

Operational Service	Production Service	Automation Service
Service	Continuous Production	Auto without human & Self-sustaining Automated Automation (AA)
Service Components	Continuous Structure	Auto with human & Self-sustaining Hight Automation (HA)
Operational Systems	Ad Hoc Production	Auto with human & Not self-sustaining Moderate Automation (MA)
Hardware	Ad Hoc Structure	Low / No Automation (LA / NA)
System Software	Cyclic Production	
Application Software	Cyclic Structure	

TABLES

Table 64. Decision System > Inquiry > Issue Effectiveness: *Tasking contribution status.*

Contribution Coordination Data For Determining Task Priority	
Urgency/Criticality Weighting	Contribution/Participation Criticality Weighting
4	Insufficient contribution to sustain service; all scheduled 'operations' periods are currently empty, and there is insufficient backup/redundancy or insufficient training for project needs.
3	Insufficient contribution to sustain service; all scheduled 'operations' periods are currently empty, but there is sufficient backup/redundancy or sufficient training for project needs.
2	Insufficient contribution to sustain service, all scheduled periods have contributors, and there is insufficient backup/redundancy or insufficient training for projected needs.
1	Insufficient contribution to sustain service; some scheduled 'operations' periods are currently empty, but there is sufficient backup/redundancy or sufficient training for project needs.
0	Sufficient contribution with adequate backup/redundancy and adequate levels of education/training to ensure future sustainability of the service.

Table 62. Decision System > Inquiry > Issue Effectiveness: *Tasking contribution status.*

Contribution Coordination Data For Determining Task Priority	
Urgency/Criticality Weighting	Contribution/Participation Criticality Weighting
1	No contribution at this time.
2	Insufficient contribution to maintain service; some scheduled 'operative maintenance' periods are currently empty.
3	Insufficient, all scheduled periods have contributors, but there is; insufficient backup/redundancy or insufficient training for projected needs.
4	Sufficient contributors with adequate backup/redundancy and adequate levels of education/training to ensure future sustainability of the service.

Table 63. Decision System > Inquiry Solution: *Material element design attributes.*

Variable	Composition	Generator (Materializer)	Result
Dimensions	E.g., Length, volume, angle, etc.	Machine tool	*Statics* Assembly
Surface geometry	E.g., Texture, roundness, cylindricity, etc.	Manufacturing process	*Dynamics* Translation Rotation
Physical attributes	E.g., Hardness, residual stress, etc.	Material properties	*Endurance* Wear Fatigue

Table 61. Decision System > Inquiry > Resources: *Renewable classification.*

Resource Classification Table		
Non-Renewable	Renewable	Resource Transformation
Oil and Gas; Coal; Metals & Mining; Industrial Agriculture	Biofuels (hemp fuel); Solar Energy; Wind Energy; Hydro-Current & Tidal Energy; Fission/Fusion Energy (inherently dangerous); Permacultural Agriculture; Geothermal* Energy (*geothermal may not, in fact, be a renewable energy, at least not on massive scale; we need more research)	Chemicals; Organic Decomposers (Fungi & Bacteria); Electromagnetic Radiation; Quantum Information
Non-Replenishable; Possible Resource Substitution Necessary	Periodically and Cyclically Replenishable	Knowledgeably Replenishable (i.e., necessitates knowledge acquisition and communication)

TABLES

Table 65. **Decision System > Operational Issue Processing:** *The coordinated focusing of relationships throughout the decision system.*

	FOCUS OF RELATIONSHIP								
Relationships	Constraints	Capacity	Work	Ability	Inquiry	Strategy	Protocol	Efficiencies	Architecture
Conceptual	Boundary	Structure	Requirement	Capability	Solution	Solution orientation	Design optimization	Design efficiency	Design services
Environmental	The habitat	Strategic preservation	Strategic planning	Viable/ -ility	Environmental inquiry & Resource inquiry	De-/composition control strategy	Recyclability / Adaptability	Recycling efficiency	Information model (Environmental restoration service)
Technical	The habitat service systems	Strategic efficiency	Operations and maintenance	Feasible/-ility	Technically economic inquiry	De-/integration strategy (I.E., Production control strategy)	Interoperable / Durability	Production efficiency	Service systems (Constructions)
Social	The community operational processes	Strategic safety	Incident response	Desirable/- ility	Justice inquiry & Preference inquiry	Distribution control strategy	Updatability / Automatability (labor)	Distribution efficiency	Operational processes (Our emergent task behaviors)

The Auravana Project exists to co-create the emergence of a community-type society through the openly shared development and operation of a information standard, from which is expressed a network of integrated city systems, within which purposefully driven individuals are fulfilled in their development toward a higher potential life experience for themselves and all others. Significant project deliverables include: a societal specification standard and a highly automated, tradeless habitat service operation, which together orient humanity toward fulfillment, wellbeing, and sustainability. The Auravana Project societal standard provides the full specification and explanation for a community-type of society.

This publication is the Decision System for a community-type society. A decision system describes the formal structuring of decisions involving a comprehensive information system that resolves into a modification to the state-dynamic of the material environment. A decision system is a collection of information-processing components -- often involving humans and automation (e.g., computing) -- that interact toward a common set of objectives. This decision system is designed to coordinate and control the flow of resources for global accessibility to all goods and services. To navigate in common, humanity must also decide in common. Herein, individuals maintain a relationship to resources that focuses on access rather than possession, maximizing the advantages of sharing, and incentivizing cooperative, rather than competitive, interest. All requirements relevant to human fulfillment and ecological well-being are factored in to the allocation of resources, optimizing quality-of-life for all, while ensuring the persistence of the commons. The standard's decision processes produce tasks that are acted upon by an intersystem (a.k.a., "interdisciplinary") team involving the coordinated planning and operation of projects. Through this comprehensive and transparent decisioning process individuals know precisely what needs to be accomplished to sustain and evolve their fulfillment. Herein, through formalized decisioning and cooperation humanity may continuously restructure society toward a higher potential dynamic of life experience for all. The use of a common social approach and data set allows for the resolution of societal level decisions through common protocols and procedural algorithms, openly optimized by contributing users for aligning humanity with its stated values and requirements.

Fundamentally, this standard facilitates individual humans in becoming more aware of who they really are.

All volumes in the societal standard:

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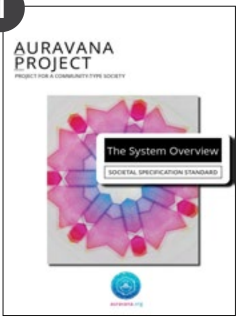

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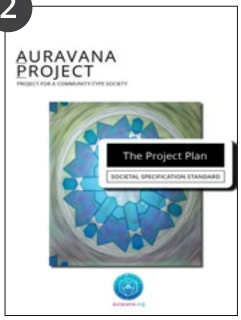

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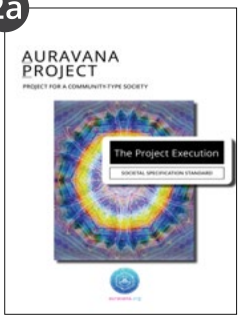

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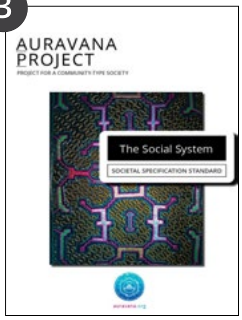

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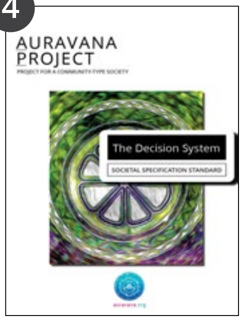

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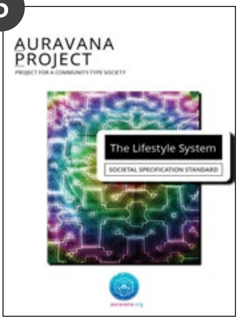

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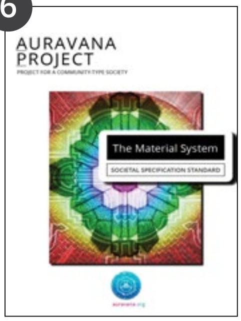

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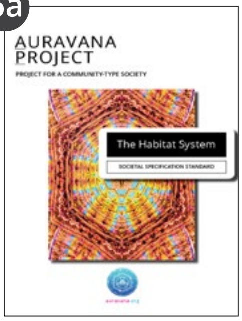

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