In the managerial sense, the performance of an employee or sub-contractor, in the sense of the efforts, can be measured by the number of calls made, sales techniques used, leads quality, etc. Then, take note here that in community, there is not "management", in the conventional sense of one of the principles, "manage by motivating". In community, those who contribute are intrinsically motivated, performance evaluation as ones intrinsic drive, is otherwise a health-restorative issue.

"How can we measure the performance of that sales person?" This question is not a question that is asked in community; because, it is not computable in the decision system. People who contribute are assumed to contribute from a place of intrinsic (self-)motivation. The word, contribute, means self-motivated action to facilitate the fulfillment of everyone.

11.2.6 Characteristics of indicators

All indicators maintain the following characteristics:

- Meaningful, transparent, intuitive (easy to integrate) to communicate, valid, useful, and timely.

An efficient communications approach is to discuss with the team the requirements and other "success factors" that lead to the expected outcomes, both at the inter-team level, and at the accountability level of each.

11.2.7 Identifying and defining indicators

Therein, the following principles required to define indicators:

1. **Comparability** – results that are comparable with respect to time, or from one process to another. Indicators must allow comparisons to be made and must reflect changes of environmental impacts.
2. **Target orientation** –the selected indicators should pursue improvement goals that can be influenced by the organization. Indicators lead specifically to a goal, and may thus be said to be of value.
3. **Accuracy and precision** – These indicators must represent the environmental performance as accurately as possible and provide a precise (as possible) visualization of environmental problem areas as well as improvement potentials. How the process and value is represented to the organization.
4. **Continuity (current baseline or benchmark)** - the same data collection criteria in every period, comparable intervals, and measured in comparable units (to compare indicators). Historical data is required. A trace back of data is required.
5. **Timeliness** – the indicators should be determined in short enough intervals in order to have the opportunity to actively pursue and influence the target values, and to avoid providing outdated information. A level of frequent check
6. **Clarity** - the indicators fit into a more unified model of understanding representation of the whole system.

NOTE: *Metrics should be automated, because manual counts by humans are often riddled with errors and get neglected.*

The real world is knowable, and it provides feedback through environmental indicators. An **environmental indicator** is a numerical value derived from actual previous measurements of an environmental system (e.g., pressure, state or ambient condition, exposure, health, or condition) over a specified geographic domain (volume) whose trends over time represent and bring awareness to underlying trends in the condition of that environment. Environmental indicators indicate what is (or is not) occurring in an environment.

There are two main types of environmental indicator:

1. **Status indicators (indicator of current state/ condition):** What is going on now?
   A. Neutral interest in condition. No orientation/ problem space.
   B. Positive direction condition of interest. More positive means solutions ("good"). The current state/status could indicate a solution presence.
   C. Negative direction condition of interest. Less positive (negative) means problems ("bad"). The current state/status could indicate a problem presence.
2. **Trend indicators (indicator of change over time):** has the status (condition/problem) changed (improved or gotten worse)?
   A. For example: % change in forest cover; and, % change in GHG emissions.
   B. The current trend could indicate a problem or solution.

NOTE: *Because there is only one Earth system, for all types of phenomena, status and trend indicators apply.*

11.2.8 Indicator effectiveness

To be effective, indicators must meet the following criteria:

1. **Credible** – valid and reliable data based on scientifically sound measurements.
2. **Salient** – of relevance to the optimal resolution of the decision space.
3. **Comprehensive** – easy to explain in terms of whole system.

To be useful, indicators must meet the following objectivity criteria:

1. **Definability (precision): I**ndicators must not be ambiguous. Otherwise, different interpretations of indicators by different people implies different results for each and a negation of indication.
2. **Reliability:** Indicators must be reliable to yield the same results on repeated trials/ attempts when used to measure outcomes. If an indicator doesn't yield consistent results, then it is not a good indicator.
3. **Validity:** Indicators must be valid, described by measuring true (or false) alignment of expectation, with a current measure.
4. **Measurability:** Indicators must be measurable. If an indicator cannot be measured, then it should and must not be used as an indicator. To be measurable, an indicator needs a corresponding means of verification.
5. **Practicality:** In categorical cases, although an indicator could be measured, it is impracticable to do so due to the social, resource, or process constraints.

To develop indicators, there must first be an interest in the environment formed through an issue, goal, or question.

If the indicator measures an increase or decrease, then a starting point is required, a "baseline". What is the measurement at the beginning in order to measure the increase, or decrease.

All indicators should contain the following information sets:

1. Quality.
2. Quantity.
3. Time.
4. Location.

11.2.8.1 Qualities of indicators

There are certain qualities that indicators must have (Note that only number 1 must be valid for the information indicate):

1. Principally, every indicator is part of a coherent and more unified system.
2. Be informative about the trends and changes of the state of the environment.
3. Be able to recognize and demonstrate the emergence of problems.
4. 4. Be valid in the methodological sense (i.e., a change in the indicator identifies a change real world ("phenomenon") measured.

11.3 An 'index' (an indication data-base)

An **index** aggregates multiple indicators (often, in a database format). Think of the index of a book. Each index listing is an indicator to a point(s) in the book where the word, and accompanying topic, are present.

An indices is a piece of formalized information (a measurement) that is not directly linked to an objective or to an action variable will be called an index (and not an indicator_ an index is either a one-off or a regular measurement.

Therefore, an index is either:

1. A subject for which an objective cannot be set (for example, an element of the environment that cannot be controlled, as in the availability of a resource...).
2. A subject that has not yet been controlled.
3. Can be used to help build the representation of a problem by assessing the existing situation.

An index becomes an indicator should the organization set an objective intended to change the situation, and thus, the value of the index. The measurement, therefore, becomes an indicator of the achievement of this objective.

11.3.1 A visual index

Indicators are typically visualized and arranged in indicator systems or indicator models.

11.4 A simplified information system definition of an 'indicator'

An indicator is a variable that associates a measure of one aspect (attribute) of a system (natural or human), or measure an expected outcome, with a larger information system. An indicator aggregates and associates evidence that a certain condition (or certain result) has, or has not, occurred from the perspective of the information system.

11.4.1 Indication in a directional information system

An indicator is a descriptor (generally associating linguistic and numerical attributes) that is representative of one or more internal system and/or external environmental conditions. As a descriptor, an indicator is a sign or signal that descriptively relays a complex message, potentially from numerous sources, in a simplified and useful manner. When the observer (intentional processing unit) has an expectation (a goal through to requirement) from the internal sub-systems, or the environment, then intentional evaluation can be applied to the question of whether current or future probable systems and/ or environments align with the expectation. In other words, if there is a direction (within the information system) set by goals through requirements (etc.), then current measurements can be compared in alignment with those that correctly meet the goals (and complete the requirements):

1. The type of indicator that only associates is generally called a scientific. This type of indicator characterizes the current state (dynamic, etc.) of a system.
2. The type of indicator that only evaluates resolution from the user-perception is called a quality (or performance, progress, etc.) indicator. A performance indicator characterizes the current or expected status (state, dynamic, etc.) of a system (internal or external), and tracks or predicts significant change.
3. The type of indicator that only evaluates resolution from the engineer-perception is called a quality (or performance, progress, etc.) indicator.
4. The type of indicator that only evaluates risk is called a risk (or effectiveness) indicator. Note that, risk may exist in the acquisition of a scientific measurement, and hence, would have associated risk indicators. Risk may exist with any issue and any action. Continuous risk assessment (risk evaluation) can be accounted for, and projects, tasks, or actions that pose a risk that exceeds threshold can be put on hold or cancelled, which at risk project can be notified so corrective action can be taken.

DEFINITION: *A project, in an information system, is a sub-directional sub-system (package, packet) of information (i.e., it is a sub-group of information that has its own direction and control within the larger system).*

11.4.2 The directionally relevant indicators

A common indicator hierarchy:

1. Goal (vision and objective) - Look for and define a question and/or goal.
2. Success indicators (goal completion indicators) - Look for and define for the critical success indicators for the goal. What are the requirements of the successful result?
3. Performance indicators - Look for and define the performance and/or quality indicators of that success.
4. What are the metrics, the specific value of the goals.

11.5 Information system perception of [habitat] relevant indicators

The high-level indicator breakdown structure for [habitat] construction is:

1. **Concept layer** – the concept layer aims to identify the level of significance of an indicator from an organization (societal) perspective, the design specification or standard, patterned and predictable information.
- **Project layer** - temporal coordination measured indicators between decided and acted information.
- **Service layer** – physical measured indicators obtained through physical sensor and models.

In application, this high-level breakdown becomes an organization of:

1. **Societal [Information system]** - System transparency indicators.
2. **People [contribution InterSystem team system]** - System understanding (reason, quantity, quality, feel) indicators; visual corroboration.

Materializing new habitat service iteration through a calculation system that uses the indicator types:

1. **Basic indicator** – calculation formula is either a direct variable from the monitoring system (application response time), or a combination of several monitoring variables (transactions per second, tps).
2. **Composed indicators** – use other indicator values as inputs, such as application energy performance (ratio of tps and power).
   A. Power; time; memory; processing.

11.5.1 A data definition of Indicator

An indicator is a variable, and a variable is a name for a location (carrying more meaning) in memory, and used to store a 'value'. The indicator associates (i.e., "tells you") what is going to be measured (i.e., what is of significance). The means of verification relates to how that which is significant will be measured. The indicator, which is an entity, has the attribute of a 'numerical value', representing an actual number, proportion, percentage (i.e., rate).

11.6 Societal conceptual indicator types

In application in a societal information system, there are several types of indicators.

11.6.1 Performance indicators

Performance (a.k.a., Results and Output) indicators measure the results of action (efficiency and effectiveness), providing a measure of the efficacy of an activity. In order to ensure optimal performance, indicators are needed in order to enable the decision controller (or decision space) to compare the results of action with the objectives for action.

Performance indicators are the results of the previous decision as evaluated against requirements. Performance indicators measure a/the performance, to understand better how performance is occurring (i.e. how well things are working, to introduce corrective actions, to validate results, to improve accountability, etc.).

> *A performance indicator is a specification (a plan, a decision solution) that allows for comparison between itself, the target, and some execution, the actual result.*

Performance indicators include the following two additional characteristics:

1. Actionable (a measurement of ability).
2. Achievable (a measurement of ability).

In application, a performance measure is an aggregate [measure] that signifies (describes) the human-relevant condition of an ecosystem, or one of the ecosystems critical components/dynamics. Wherein, an indicator may reflect: biological, chemical, or other physical attributes of an ecological condition. Performance indicators are used to monitor the progress toward and objective.

A performance indicator is a 'strategic instrument' (tool capable of being integrated into the unified information space), which allows for some user (or group of users) to evaluate performance against targets (intended/ expected, demanded performance).

A performance indicator must have a target measure. There must be a target measure (or metric), because the organization is being moved [by change] toward an objective target.

In other words, an indicator has a metric that measures the direct results of decisions as to the overall direction of the organization. Technically, a performance indicator is not an 'objective' measure, since the measurement is not independent of the observer. In the contrary, the indicator is defined by its decisions ("author") in accordance to the type of action conducted and the goals pursued.

Herein, a performance measurement system is an information system that allows a user to track the execution and results of an objective (strategy) through the monitoring of performance indicators.

11.6.1.1 Performance indicator formatting

It is always necessary to define clearly each indicator with fundamental parameters.

1. (Label, name) The symbolic identification of the indicator.
2. (Optimal relationship articulated) The objectives (requirements) of the indicator.
3. (Issue articulated) The problem drivers (issues) related to the indicator.

A performance indicator becomes an objectives [chain] combining associated decision variables.

A performance indicator is: the objectives [chain] and decision variables.

1. A reference model, which gives a structure of the HSS system.
2. A structured approach, leading step-by-step from an existing system state to a future one.
3. Various modeling formalisms to describe the components of the structured system (graphic formalisms, entity/relationship formalisms).

The habitat service system (a.k.a., production) is classified by discrete service processes. The global model is composed of the description of the physical, decision, and information systems.

Performance measures include:

1. Output: Tangible and quantifiable results from efforts entirely within the project/activity, not involving interactions with individuals or organizations that are not project/activity members. Examples include planning workshops and conferences, staffing and equipment plans, publications, reports, draft standards or codes, software, algorithms, assimilated data.
2. Outcome: Measurable results of projects/activities. Examples include new expertise, knowledge, or capabilities; adopted codes and standards; and practitioner acceptance.
3. Impact: Substantial, positive changes enabled by, or due to, project/activity outputs and outcomes, including impacts on other agencies, industry, or society. Changes are associated with external entities, not internal to the project/activity. Examples include changes in societal behavior, changes in building codes and standards, etc.

11.6.2 Scientific indicators

A scientific indicator may be defined as an aggregate measure, index of measures, or a model element, that signifies (characterizes) an ecosystem, or one of its components. Scientific indicators are used to monitor the ecological environment.

Note here that scientific indicators do not have targets. Not all indicators have to have targets; they could just be reporting patterns of change.

11.6.3 An environmental indicator may be defined as

An environmental indicator is a variable related to any aspect of the environment, supposed to respond to modification, and representative for a delimited area. It is a variable for which a value in the reference state can be estimated. The set of indicators should cover as homogeneously as possible all aspects of the environmental system, an any addition of a new indicator should result in the addition of information.

An environmental indicator might refer to the density, abundance or distribution of a population, a taxonomic, functional or genetic metric, a behavioural parameter, or any other natural parameter fitting the definition.

11.6.4 An engineering indicator is

An indicator is used for the visual detection of the completion of a particular behavior (and/or reaction). Engineering indicators are used to monitor the progressive development and operation of a system.

Engineering indicators support the effective decision control of habitat systems by providing visibility into the current, as well as, expected project performance and potential future states.

> **INSIGHT:** *The specification of functional requirements involves mathematical concepts (e.g., number, and operation) and their metrics and indicators that quantify and evaluate them.. The specification of non-functional requirements involves calculable concepts (e.g., quality, accessibility, productivity) and their metrics and indicators that quantify and evaluate them.*

11.6.5 From an environmental coordinator perspective, an indicator is

An indicator is a characteristic or an entity that can be measured to estimate (predict) status and trends of the target environmental condition and/or resource, over time. Wherein, the numerical attribute of an indicator is a quantitative datum (value, level, etc.) that reflects (shows) the presence or amount, quantity, of a factor under observation by the system.

The conception of indication has three directability characteristics:

1. **Indicators indicate environmental nodes and relationships**. These type of indicators are often referred to as environmental indicators, or scientific indicators. There is are no directional "value" weights applied to them. They are indicators of extant quantities, or not, objects, relationships, and dynamics. The directability here is the measurement process itself, for which there are three types:
   A. Non-experimental research - Only measure once and no information need to compare over time or group. Non-experimental research can express if some event/behavior took place, describe the details, and concurrent occurrence (is this occurrence associated with another occurrence), but it cannot say that one thing caused another, there is no causality.
   B. Quasi-experimental research = group 1 and group 2, compare.
   C. Experimental research = group 1 (intervention) and group 2 (control), compare
2. **Indicators indicate environmental significance** (i.e., indicate something significant in the environment). Indicators represent data (of significance about the environment) whose meaning is consolidated and expressed at a higher level than the information upon which the data themselves are based. A factor (i.e., indicator) in the environment is carrying capacity. The directability here is the alignment, error and its correctability.
3. **Indicators express a link between the environment and an intended outcome**. These indicators are set by understanding prior data (as baselines, targets, benchmarks), and evaluated against incoming actual data to determine error and inform the control (i.e., correction) decision ... in order to maintain course (or the direction of human and ecological flourishing in the case of community). The indicators holds the "baseline" or "target" information on an issue of concern and presented in a form which informs an algorithmically pre-determined [common, objective] decision space. The directability here is the potential for alignment, error and its correctability.

11.6.5.1 Indicators as an objective expression

In objective expression, indicators are generally quantitative variables. They are expressed in single terms or brief descriptions, and in their container are generally the following associations:

1. Of a quantity.
2. Frequency of event.
3. Result of a scoring (weighting and/or comparing) system.
4. They can also be qualitative indices.

11.6.5.2 The indicator's metric view

An indicator is sub-classified as a metric, or a classified combination of metrics, that provides insight into (accounts for) the process, project, or product itself (i.e., accounts for the status or state of a system). Indicators (a type of inquiry identifier) define a trace from inquiry to that which is required to resolve the inquiry. Indicators are necessary for directional comparison and knowing whether something has occurred. If a metric reflects performance, it is a performance indicator. If a metric reflects risk, it is a risk indicator. Indicators are derived from questions, which are themselves derived from goals and objectives. Indicators are sub-composed of metrics. There are two types of change control indicator; one type of indicator that signals positive progress or quality, and another (risk) that signals delay or damage of progress or quality:

1. **Environmental indicators (scientific and resource indicators)** - indicators that indicate the state, status, or health and/or availability of an environment. General environmental indicators include the measurement of: humans; other living beings; ecological resources/services; knowledge (scientific); and equipment (infrastructure, components). An indicator is a linguistic representation that points to some signalled existence in the real world. An environmental indicator is an attributive, measurable characteristic of the environmental state. Scientific indicator is a single piece of information which acts as a surrogate for an environmental variable to serve a particular use or interest". Environmental variables and Environmental indicators. Each environment variable is analysed separately and an indicator representing this particular environmental aspect is adopted to monitor a phenomenon in time, in space, or to estimate progress toward goals that should be reached. An environmental "indicator" is a scale indicating various degrees of environmental quality with regard to a particular environmental variable. A scientific indicator is a linguistic representation of something dynamically observed in the real world.
2. **Performance/quality indicators** (a.k.a., "good" indicators, quality indicators, a type metric; positive progress; results indicators) - indicates the quality or state of a system; it is the goal of an expected performance in/through time. An performance indicator is a linguistic representation of something specified through requirements as being in the real world. A performance metric is something that can be pointed to in an information system or a physical system that indicates a quantitative use (i.e., is something useful) based on one or more metrics, observations, or both. Performance indicators (and their metrics) represent a desired state or status. Performance indicators indicate that which is desired from a project, process, or product. Performance indicators are factors that a system needs to monitor (and benchmark). To engineers, performance indicators indicate functions and quality indicators indicate conditions required from a system. Generally, performance indicators are quantitative variables, and are defined with a threshold (or standard) value. An objective to be reached or maintained can, at times, be considered an indicator without establishing a threshold as long as requirements are defined precisely. Performance indicators evaluate how successful a service system is at meeting a service directive, objective or requirement. Performance indicators define and measure ("express") progress toward the successful completion of a process or project. Performance indicators define and measure performance (progress) relative to project or process, organizational goals (objectives). Once an organisation has analysed its mission and defined its goals, it needs to measure progress towards those goals. A performance indicator expresses the achievement of a desired level of results in an area relevant to the evaluated entities activity. What are the "success" factors of the project/process? Performance indicators ask if a project/process is on track, or its results were as expected, and if not on track or as expected, where not.
   A. What are past goals (past performance indicators)?
   B. What is current goal (current performance indicator)?
   C. What is future goal (future performance indicator?
3. **Risk indicators** (a.k.a., bad indicators potential negative progress) - indicators of the potential to express negative change progression. Note that 'risk' is a measure of the probability that a negative outcome will occur. Risk indicators indicate an undesired state or status, one that could harm, delay or damage. Risk indicators may provide an early warning of increased risk exposure (i.e., metrics to define and measure risks). By monitoring risk indicators, the problems expressed by them are possible to identify early, whereupon a pro-active (planned) approach of mitigating risks before they escalate and have more serious consequences occurs. A risk indicator (a.k.a., effectiveness indicator) is a sign that an incident may occur, or is occurring.

Scientific performance indicators include:

1. Performance indicators express positive (i.e., evolutions) and negative (i.e., problems) change of progression.
2. Scientific indicators record intentional change.

Performance indicators components:

1. The measure - What is being measured.
2. The target - The expected value.
3. The source - System of input of the data.
4. The frequency - how often to report.

In this case, a metric is essentially a target - a quantitative value for a goal or objective.

Performance indicator sub-types:

1. **Count indicators** - How many, raw count.
2. **Progress indicators** - What percent complete of objective.
3. **Change indicators** - percent increase (possibly, compared to some prior date).

> **NOTE:** *Performance metrics data that indicate a problem area should not be considered "negative"; instead, these data are merely an indicator for [process] improvement, and an opportunity to be better.*

A **metric** is something set up as an example against which others of the same type are compared. A metric (a sub-type of indicator) is a collection of the same type of data used to understand and change optimally over time across a number of unified dimensions or criteria. Specifically, a metric is a quantitative [statistics] measure of the degree of alignment to which a system, component, or process:

1. Possesses a given attribute, or
2. Describes a given event, or
3. Predicts a given trend.

A metric is an aggregation of one or more measures to create a decision context (a.k.a., actionable information context, intelligence context). Actionable information is information that can be used in system control decisioning. Technically, every measure is a 'metric' when associated with contextual information. In this sense, metrics are the numerically counted values (measures) and their meanings (units and indicators). A metric is any contextualized measurement; it may refer to anything in the real world, which can be counted ("measured"). Any real world measure could be a metric. Metrics involve properties of the environment that can be measured directly.

A performance metric is a quantitative measure or derivation from two or more measures, which may not necessarily indicate something useful to particular observers. It is a measure of something that does not necessarily indicate something useful to particular observers.

Metrics for organizations include:

1. **Time** - hours or days elapsed from the time a request is made until evaluation is complete (t_{queue}).
2. **Effort** - person-hours to perform evaluation, (w_{eval}).
3. **Time** - hours or days elapsed from completion of evaluation to assignment of change order to personnel, (t_{eval}).
4. **Effort** - person-hours required to make the change, (w_{change}).
5. **Time** - required hours or days to make the change, t_{change}.
6. **Errors** - uncovered during work to make change, (e_{change}).
7. **Defects** - uncovered after change is released to the customer base, (d_{change}).

A **measure** (a type of indicator) is the directly recorded observable value or performance. A measure is measurement of the value of a specific characteristic of a given entity (collected data). A measure is a quantitative indication of extent, amount, dimension, capacity, or size of some attribute of a product or process. A measure is, How much there is of some thing that "you" can quantify. Measures enter an information space as data **--** a collection of facts and/or statistics for reference or analysis.

11.6.6 Applied societal control indicators

The common societal indicator types include:

1. Resource indicator (RI).
2. Environmental indicator (EI).
3. Material [economic-access] indicator (MI).
4. Human indicator (HI).
5. Social indicator (SI).
    A. Indicators of well-being.
    B. Indicators of social cohesion (note can't measure social cohesion directly).
    C. Indicators of human fulfillment.
    D. Indicators of human capability (capacity).

For example,

1. Air condition is a metric, because it can be measured.
    A. Air condition is a performance indicator for the habitat service system, because the organization is concerned with the impact upon and change of air condition.
    B. Air pollution is a risk indicator for the habitat service system (health, safety, security, and environment).

11.6.7 Common societal indicators

Common societal indicators include, but are not limited to:

1. **Hours used vs. hours estimated vs. hours remaining** through statistical calculation upon the log time data. Wherein, time is logged continuously and/or regularly (i.e., time tracking occurs).
2. **Resource loading (per person)** through statistical calculations and algorithmic expressions determines if the system (person or otherwise) is carrying too many tasks (i.e., too much responsibility). Wherein, time is logged (i.e., time tracking occurs).
3. **Earned value analysis** a method of measuring a project's progress at any given point in time, forecasting its completion date and final cost, and an analysis of variances in the schedule and resource requirements as the project progresses.
   A. **Potentially ineffective projects ("Projects at risk")** - projects with the potential to harm the functioning of an optimized and adaptive, resilient and regenerative [community-type] societal system.
   B. **Effective projects ("Healthy projects")** - projects with no potential to harm the functioning of an optimized and adaptive, resilient and regenerative [community-type] societal system.
   C. **Ineffective projects ("Trouble projects")** - projects possessing the potential to (*future*), or actually harming (*present*), the functioning of an optimized and adaptive, resilient and regenerative [community-type] societal system.
4. **Estimated priority ("Estimated value" and "Estimated profitability)** through estimated, predicted consequences to human and ecological fulfillment caused from a[ny given] state change to the material (or otherwise conscious) environment. Wherein, value is traced through to need. In other words, orientation is traced to reliably direct toward a set direction[al heading], and a test is predictable, regularly.
5. **Average time tasks take** to stay in each stage of the process.

11.6.8 Societal indicator types

There are three indicator types for any society:

1. **Systems-based indicators:** Indicators that relate more to the coordination and the information system; societal systems level. Indicators that relate more to the coordination of the societal system.
2. **Operations-based indicators:** Indicators that are relevant to the functioning of an organization's infrastructure (e.g. machinery, operations); potentially site-specific. Indicators that are relevant to the functioning of the societal system's structure.
3. **Behavior-based indicators:** Indicators that measure the behavior or actions of individuals or groups (in the workplace); people-to-people interactions related to work; useful at site-specific level through society level. Indicators that measure behavior or actions of individuals or groups in InterSystem Team Service.

11.6.9 Living environmental indicators

A total living environment has three primary types of indicators:

1. **Environmental condition indicators** (ecosystem service indicators).
2. **Indicators of societal coordination** (societal/social performance indicators, social cohesion and fulfillment indicators). These indicators are otherwise known as human development indicators. These indicators indicate the fulfillment of human needs, requirements, and capabilities. These indicators refer to the requirements of the unified societal system.
3. **Indicators of operational coordination** (operational performance indicators). These indicators are otherwise known as human service indicators. These indicators indicate the quality of the service [by the operational habitat service system]. These indicators refer to the requirements of the materialized habitat service system. On an activity level, it allows the assessment and control of ongoing processes and environmental impacts.

To living beings, indicators and metrics conceive and resolve decisions. In the real world, there are two primary types of environmental [performance] metrics, each defining a set of correctly orienting metrics for a specific environment:

1. **For ecosystem services**, defining the right metrics involves scientific investigation into the global ecosystem (i.e., the global habitat service system). Services at the planetary scale.
2. **For the human service system**, defining the right metrics involves the engineered construction, and scientific investigation of, the societal habitat service system. Services designed by humans for humans.
3. **For the personal system**, defining the right metrics involves the knowing of ones own capabilities through regular practice. The personal practice of capability as a service to oneself.

11.6.10 Ecosystem service indicators and metrics

Global environmental indicator's indicate the state/status of the planetary [environmental] ecosystem, given what is known. These indicators include:

1. What is necessary for all planetary life.
2. What is necessary for human life.
3. What is necessary for individual flourishing.

Humanity requires an ecology (ecosystem services to feasibly provide for itself on any major scale. Humans can purify air for themselves on an astronaut navigated spacecraft, but on earth, plants and other systems perform this operational service.

At a high-level, every ecosystem service is an environmental indicator. There are six major environmental indicators to determine the health of ecosystem (i.e., ecosystem sustainability):

1. Biodiversity – number and variety of organisms in an area.
   A. Genetic diversity – code for re-configuring provides resilience within a population.
   B. Species diversity – variety of living beings
   C. Ecosystem biodiversity – looking at planetary ecosystem.
2. Extinction rate – rate at which species disappear.
3. Food production – the amount of food an environment can produce.
4. Temperature and CO2
5. Population size relative to carrying capacity.
6. Resource depletion rate.

11.6.11 Societal information system indicators

Information organizational indicators (i.e., in the real world and in an in an organizational systems context, there are two usages of indicators):

1. **Conceptual (indicates potential meaning, understanding)** - structure a conceptual framework for understanding and working with information and problems therein. Conceptual indicators make use of scientific values (to form the semantic structure of science).
2. **Decisional (indicates potential decision, selection)** - the use of indicators to select decision options, resolve decision spaces. Decisional indicators make use of a *target value* (to take decisions once new data, new information, has arrived and integration is complete).

In the real world, the following types of indicators (and metrics) exist:

11.6.11.1 The scientific type (conceptual, to derive meaning)

A scientific-type information system involves, at least:

1. **Scientific indicators** - A scientific indicator is a single piece of information (a single identifier, with description) that associate the [real world] environment with [an environmental] variable to serve a particular inquiry (use or interest). Simply, a scientific indicator indicates what is being measured with a symbol and accompanying description of what is being indicated in the context of all knowledge (i.e., all science).
   A. For example, a direct scientific indicator is 'water' (H20).
   B. For example, an indirect scientific indicator is 'biodiversity'. All indirect scientific indicators are made up of direct scientific indicators. Indirect scientific indicators are abstract groupings of indicators conveying greater meaning and allow for intentional re-orientation within a useful information space (i.e., within society).
2. **Scientific metrics** - a measure(s) in the context of the whole scientific use interest.
3. **Scientific measures** - a specific, point measure composed of a value and unit.
   A. For example, a direct scientific metric is 2.3Liters of H20 in Pond X. Note that, in general, it is the 2.3 that is referred to as "the metric".
   B. For example, an indirect scientific measurement is the biodiversity of square kilometer X. Biodiversity is made up of multiple indicators, including number of species types, number in each species type, and size of region.

11.6.11.2 The performance type (decisional, to derive selection)

A performance-type information system involves, at least:

1. **Accuracy performance indicators** - indicates how well the system is performing, in a given environment, as compared to ("against") the specified system (with a descriptive requirements specification).
   A. For example, correct classification of data points could be one indicator
2. **Accuracy performance metrics** - measures how well the system is performing, in a given environment, as compared to ("against") the specified system (with a set of requirement's metrics).
   A. For example, check to "see" how many of the data points from a data set were classified

correctly. The name for this type of performance metric is “accuracy”. A metric of 20 classified correctly, and 10 incorrectly, which is 2 away from the 22 threshold. The metric indicates, when evaluated by the standard threshold of 22, that performance is below standard.

3. **Decision/Selection performance indicators** - indicates which of a group (set, {}) of options (choices, probabilities) is better (positive, +) or worse (negative, -).
4. **Decision/Selection performance metrics** - input into decisioning to resolve the determination/ selection (to determine, select) one probability path over another.
   A. For example, one classification algorithm ‘A’ classifies 80% of data points correctly, and another classification algorithm ‘B’ classifies 90% of data points correctly. An observer with a decision space realizes [through this ‘experience’] that algorithm B is performing better than (in comparison to) the other algorithm. Note, that there are nuances (intricacies) here.

11.6.12 Project life-cycle phase indicators

In general, every phase of a project will have its own indicators:

1. **Input level indicators** - survey of resources. For example, survey of availability of a specific type of water pump and horses that drink water to live.
2. **Process level indicators** - operational performance. For example, water pump performance.
3. **Output level indicators** – amount of output. For example, gallons of water pumped 3; number of buckets to carry 10; feet of leading rope prepared 40; bridles on horse 1.
4. **Outcome level indicators** – amount of outcome. For example, liters of water made ready for horse to drink 1; number of horses ready and willing to drink 1.
5. **Impact level indicators** - the environmental affect. For example, # of horses independently accessing water; # of gallons of water consumed by horses in the city 5.

11.6.13 Project and process indicators

Process performance indicators:

• On time delivery, user satisfaction.

Project performance indicators:

• Percent of project complete, milestones against target.

11.6.14 Project[-scale] indicators

Project indicators include, but may not be limited to:

1. **Process indicators** (Process indicators indicate the change process) – indicators that are used to measure project process or activities. For example, in a water project, this could be: the number of chlorine dispensers installed at water points, or the number of households that have received training on chlorination of water.
   A. # of farmers supplied with drought resistant crops.
   B. # of community awareness meetings conducted.
   C. No of wells/dams constructed.
   D. No of farmers enrolled in crop insurance.
   E. No of irrigation systems constructed.
2. **Outcome indicators** (Outcome indicators indicate the short-term change) – indicators that measure project outcomes. Outcomes are medium impacts of a project. For example, in a water project, this could be: the proportion of households using chlorinated drinking water, or the percentage of children suffering from diarrhoea.
   A. Proportion of food secure households.
   B. Percentage of malnourished children under 5.
3. **Impact indicators** (Impact indicators indicate the long-term impact of the change) – indicators that measure the long-term impacts of a project, also known as project impact. For example, in a water project, this could be: the prevalence of under 5 mortality.
   A. Employment rates of the region.
   B. Prevalence of under 5 mortality.

11.6.14.1 Project metrics

Project metrics include, but may not be limited to:

1. Effort/time per task.
2. Errors uncovered per review hour
3. Scheduled vs actual milestone dates.
4. Changes (number) and their characteristics
5. Distribution of effort on engineering task

11.6.15 Project progress indicators

Project indicators can have several uses and be of several types:

1. **Monitoring** (the state of health/progress of the project in a common-parallel decisioning space).
2. **Observing** (discrepancies in the memory-state of the project and the resulting deliverable of planned executions) .

3. **Analysing** (possible solutions 1. to project-level discrepancies, and 2. to system-level discrepancies).
4. **Synchronizing** (activities and tasks with availabilities).
5. **Anticipating** (issues, risks and improvement opportunities).
6. **Decisioning** (optimal solution selection).

Five project indicators (five indicators for the assessment method):

1. Entry criteria (scope of process).
2. Cost *of process.*
3. Duration *of process.*
4. Resource *of process.*
5. Expected criteria (scope of process).

> **TERMINOLOGICAL CLARIFICATION:** *The cost, duration and scope of a project are sometimes called the "project management triangle".*

> **NOTE:** *Additional indicators may be specified depending on the project.*

Project indication has three types of possible indicator values:

1. **Planned value (PV):** the pre-decided value (e.g., budget or planned value of work scheduled).
2. **Actual value (AV):** the actual resulting value (of work completed, for example).
3. **Earned value (EV):** the "earned value" of physical work completed. This is a market-only term; there is no concept of "profit" or "market-State economic growth" in community.

11.6.16 Service indicators

There are two true services:

1. One support[ing] service.
2. For the whole societal system.

Whereas, 'technology' is "true" support, 'life' and 'facility' are "true" 'services'. Of course, technology support is also a type of service. In an operating system (societal), imagine technology support as the combination of firmware and hardware, which functions through physically and logically discoverable processes. In computing, this combination forms a computing platform upon which more complex computing operations can be run. For society, this means that (given what is known) the 'life' and 'facility' systems the two second layer platforms upon which the base, technological is formed. New experimental discoveries occur the Facility System and maintain operational processes protocols as common to all systems.

Each HSS has a set of indicators:

1. Medical indicators – health of individuals.
2. Energy indicators - energy usage of individuals.

From a general point of view, the term 'requirement' could be considered, "a thing that is needed or wanted". Requirements define the services expected from the [habitat service] system (functional requirements), and the [societal organizational decision-inquiry] constraints that the system must follow (i.e., obey; more practically, protocols-algorithms). Constraints may otherwise be known as non-functional, or qualitative (i.e., qualifying, constraining) requirements. Constraints place restrictions on the system been developed, notably in the fields of usability, reliability, mobility, regenerability.

Each time a system must be designed or re-engineered the design/re-engineering decisions are composed and resolved ("taken") on the basis of objectives flowing as user requirements. This is the basis for all outputs, results, performance, process performance, quality, and assessment and evaluation.

> **CLARIFICATION:** *The process named "requirements engineering" is 'the systematic process of eliciting, understanding, analysing and documenting requirements'.*

11.6.17 Societal service performance indicators

There are several levels of societal indicator representing the different layers of society:

1. **Systems-based indicators (project-based metrics, Level 0 indicators)** - Indicators that relate to the planning, coordination, and change control of systems (i.e., systems indicators). Everything is a project.
   A. Systems-based metrics (project-based metrics), may include: Assess the status of an ongoing project; Track potential risks; Uncover problem areas before "critical" flag; Adjust work flow or tasks.
2. **Societal-based indicators (Level 1 indicators)** - measure a societal system model's level of alignment with society standards. Indicators that relate to the design and functioning of the unified, societal information system (i.e., societal systems indicators). Indicators of their presence and functioning (as, how?, and how well?). Information system impact.
   A. Social system indicators.
   B. Decision system indicators.
   C. Lifestyle system indicators.
   D. Material system indicators.
3. **Operations-based indicators (Level 2 indicators)** – measure the habitat systems inputs, activities, outputs ('activities' are sometimes classified here, under 'outputs'), and performance. There

are indicators relevant to the functioning of an organizations infrastructure, the network of integrated and materialized habitat service systems (i.e., city operations indicators). Habitat Service System Operations impact. For example, amount of hazardous waste, total resource operating cost, # of activities to maintain service system.
   A. Life Support System.
   B. Technical Support System.
   C. Facility Support System.
4. **Behavior-based indicators (Level 3 indicators)** – measure the potential impact that the materialized habitat system's presence and activities have on its users (the community), its workers (InterSystem Team members), and the surrounding environment. Indicators that measure the behavior or actions of individuals or groups of actors, humans and/or machine (i.e., the behavior of humans and their services as indicators). Behavior impact.
5. **Ecological Service-based indicators (Level 4 indicators)** - measure the operation of the ecological service system. Ecological impact. These indicators measure how the network of city systems, and their production activities (i.e., the operating services) affect the larger picture of an ecologically sustainable society. For example, % renewable materials used at a lower or equal to renewal rate, community quality of life, worse health status compared to other companies in industry.

11.7 [Decision] Indication interface

> A.*k.a., Dashboard, passive system interface, monitoring interface tool, visual data analytics tool, indicator display, analytical indicator visualization*

In general, a 'dashboard' is a visual monitoring and data analytics interface for operating in a specific type of information space.

> **CLARIFICATION:** *Interface refers to a point of interaction between components, and is applicable to the level of both hardware and software (via an input/output system with associated protocols).*

A dashboard is a screen/page (a digital-computational information interface) that indicates, items and/or issues, in some sort of priority. A dashboard is an interface with two possible functions:

1. Viewing the information sub-system
2. Executing analytics on indication and measurement data, including upon indicators, metrics, measured values, and synthesized data itself.

> **INSIGHT:** *A dashboard is a visual interface into decisioning. All decisioning is procedural. A dashboard is a multi-functional display; the ability to execute analytics and synthesize the results of a transparent decision resolution inquiry.*

A dashboard is simply a monitoring and analytics interface into an information space. Dashboards provide an overview of current, past, and/or future, system status, including data about the events collected and generated by the system. A dashboard is a useful, highly customizable monitoring feature that provides actionable data given an objective direction.

> **NOTE:** *Analytics tools other otherwise known as discovery tools, because they synthesize new information from the information given (Read: prior available), and this new information may be said to be, "discovered".*

A dashboard is a visual display of the most important information needed [by a user] to achieve one or more objectives; consolidated and arranged on a single window. All dashboards have a visual layout (pre-designed to meets user requirements).

There are different names for different information space views, and hence, different names for different dashboard configurations:

1. Project dashboards.
2. Evaluation dashboards.
3. Assessment dashboards.
4. Change control dashboards.

A dashboard is a single place for viewing all key indicators (and metrics). A window into the overall assessment (health, progress, etc.) of all projects (or other directional information packages). A dashboard (and its backend) visually tracks all indicators, and provides raw, graphed, and calculated data. The system is [in part] capable of visualizing due to a backend tracking and statistical calculation system to which all project variables and metrics are available. Note that a metric appearing on the Community-user's dashboard is not necessarily a performance indicator.

The dashboard shows indicators, which carry pools of values associated with scientific measures and/or diagnostic measures.

1. Dashboard reporting (monitoring) of this operation.
2. Dashboard analytics (calculation on measures, and on, results). The sub-operation where new data is calculated in the system from prior.

In an integrated system, diagnostics are consistently run on sub-systems to ensure that they are functioning appropriately and to catch errors or potential further problems. Diagnostics are an essential element of the 'maintenance' operational process.

11.8 [Decision] Indicator assessment

A.k.a., Indicator analysis.

Analysis upon indicators may involve evaluation, assessment, or calculation.

11.8.1 Assessment (an analysis of results)

Information monitoring and analytics capabilities and tool.

Assessment and evaluation mean the same thing in an information systems context. However, evaluation is more commonly used in some engineering contexts, and assessment in some scientific-environmental contexts. Regardless of context, the meaning the re-solution [tool], is the same:

1. Requirements are assessed through evaluation of a system's alignment with those requirements (validation and verification).
2. Or, some variation of the same meaning, such as, An object and/or event is evaluated (to produce a new value for the environment) through an evaluation process (by means of a method) that compares states [wherein accurate information has been collected].

In general, the term, 'evaluation' connotes a direction of meaning (as in, engineering). And, in general, the term, 'assessment' connotes a meaning of direction (as in scientific research). Verification and validation data is used to determine the results of an evaluation.

11.8.2 Assessment of the project's progress

A.k.a., Measured achievement, measured success, metric analysis, indicator-metric analysis, solution progress, project progress, etc.

In order to assess the project, it is necessary to define the assessment indicators, including the two most common:

1. Milestones (are more broad than KPI) - a milestone is a strategically marked future event or deliverable (or, condition) that has occurred, has been documented to have occurred, and was measured in relation to the requirement that was expected for strategic longer-term outcomes/conditions.
   A. Work toward the completion of a project must get to "this document point, then get to this next, and so on".
2. Key project indicators (KPI) - are events, deliverables, or conditions that are expected to be occurring now or in the nearest future, and have been designed to occur, are documented and is measured in relation to the requirement for expected current (and near-term) operation.

A project's controlled execution uses the current project indicators to validate the conclusion of an expected project process (situation) at a specified project end time. Hence, in this case, monitoring is the comparison of a measurement-based estimation (e.g., derived from measurement of effort) with the respective project goal (e.g., total effort/resource budget [bounded access] of the project).

11.8.3 Project indicators and assessment

I.e., Project performance and completion indicators.

Indicators are widely used to measure the success (alignment) of any type of project, service, or product. At the project level, performance indicators are defined to assess the progress of the project. Project indicators informs decisioning, rather than being an end in themselves.

While a given task is under way, the execution of indication is applied to monitor changes to each indicator. By comparing them with the objectives (expected value, if present), it will be possible to detect deviations (in scheduling, performance, quality, materials, etc.).

Project indicators can have several functions and be of several types:

1. Monitoring (the state of "health" of the project).
2. Observing (discrepancies).
3. Analyzing (possible solutions).
4. Synchronizing (activities).
5. Anticipating (risks and opportunities).
6. Facilitating (decision-making).
7. Characterizing project progress in a summarized form.

Shared indicators include:

1. Resources (I_r).
2. Entry criteria (I_{en}).
3. Expected criteria (I_{ex}).
4. Duration (I_d).
5. Cost (I_c).

11.8.4 Environmental impact assessment

An environmental impact assessment identifies the various impacts (to all impactable systems) should a change (intentional or not) occur. As part of the societal design process there exists a sub-decision module that conducts continuous environmental impact assessments on information passing through the decision system. An assessment provides significant information on indication and measurement, and may be used to decide, select indicators and metrics.

There are [at least] five impactable systems in human society (i.e., the primary types of environmental impact are):

1. Social.
2. Decision (economic).
3. Lifestyle.
4. Material (local habitats).
5. Ecological (global habitat).

Evaluation through structured information flow:

1. Objectives - identify objectives that establish a need.
2. Goal - define one or more goals required to achieve stated objective.
3. Question - develop one or more questions that when answered, help determine the extent to which the objective or goal is met.
4. Indicator - identifying one or me pieces of information that are required to answer each question.
5. Metric - Identify one or more metrics that will use selected indicators to answer the question.

11.9 [Decision] Indicator evaluation

Evaluation refers to the evaluation of alternative designs [given a set of social inquiry criteria for integration into our active specification]. Evaluations are carried out for each domain (i.e., each service system; such as, life support, energy, tech support). The evaluation is based on indicators that verify requirements.

In order to acquire and calculate change data, a systems-level change [control] process of evaluation must exist. Evaluation provides necessarily useful information on change in time (e.g., increase or decrease, improvement or decline).

Because evaluation is a time affected process, if an outcome (project, engineering, etc.) mentions (requires) an increase, improvement, or decline, then the indicator will need to be compared/measured at least 2 different instances over time (i.e., two temporally separated measurements must be taken), for example:

1. Pre-testing, or a baseline [value] for initial conditions.
   A. Prior measure(s) (pre-tests) from which a baseline (target, metric) has been composed and/or selected.
2. Post-testing, or a post [value] for the new conditions (Read: value for conditions after the change was executed).
   B. Baseline to current [actual, post-test] comparison.

This process of comparing over time is quasi (almost/sort of)-experimental research.

11.10 Real world evaluations

There are two types of evaluation relating to the two measurement dimensions (categories of information) in the real world (two outcomes, one is scientific and one is engineered quality assurance).

11.10.1 Scientific evaluation (a.k.a., direct measurement and analytics)

Scientific evaluation involves the scientific method, and the real word, to collect and analyze data (i.e., to do true 'research'). Scientific evaluation produces and uses scientific indicators and scientific metrics. Scientific metrics (true research, facts) are the results of scientific experimentation.

The best way to establish change is to look for the occurrence of the indicators [of change] in two groups. One group is the 'target' group, to which an intervention is applied, and the second group is the 'control' group to which no intervention (or uncontrolled influence) has occurred. This process of comparison is often called [true] experimental research.

11.10.1.1 Experimental evaluation

Experimental evaluation refers to monitoring and evaluation of outcomes under conditions of direct controls over inputs and processes. Experimental evaluation refers to more scientific usability tests where hypotheses are being made and tested, and statistical results are collected and processed. (Preece, 1993:117) In experimental and quasi-experimental evaluation, the estimated impact of the intervention [in the experiment] is calculated as the difference in mean outcomes between the treatment group (those receiving the intervention) and the control or comparison group (those who don't). This method is also called randomized control trials (RCT).

11.10.2 Quality/progress evaluation (a.k.a., effectiveness evaluation, performance evaluation, program evaluation, process evaluation, environmental evaluation, diagnostic evaluation, and indirect measurement, and "monitoring")

Evaluation toward (i.e., progress, performance, quality, etc.) goals. Effectiveness evaluation involves statistical calculation on collected real world data, true analysis. Quality evaluation produces quality metrics and quality indicators. Quality metrics are the result of statistical calculations. Here, evaluation exists to determine progressive alignment with a direction by the method of ‘measurement’. Evaluation (and monitoring) is the process of collecting and analyzing measurement data (measures) to inform decisioning and ensure process results align with input objectives. Quality/progress evaluation answers the questions: What indicates achievement of objectives by a project or process, in time? What does not indicate achievement of objectives by a project or process, in time? How effectively is a project or process achieving objectives (directives and/or orientations) in time? Questions related to a process (i.e., “What is the process for ...?”) lead to implementation metrics. Questions related to effectiveness (i.e., “How effective is ...?”) lead to effectiveness metrics.

To measure quality, there are [at least] the quality indicators and metrics of:

1. **Correctness** – the degree to which a system (program) operates according to specification.
2. **Maintainability** – the degree to which a system (program) is amenable to change.
3. **Integrity** – the degree to which a program is impervious to outside attack.
   A. **Threat** – is the probability (which can be estimated or derived from empirical evidence) that an attack of a specific type will occur within a given time.
   B. **Security** – is the probability (which can be estimated or derived from empirical evidence) that the attack of a specific type will be repelled.
   C. Integrity can be defined as: sigma (1 - (threat x (1 – security)))
4. **Usability** – the degree to which a system (program) is easy to use.

From the engineering perspective, quality is conformance to requirements (i.e., “this is what is required, and this is what is designed”). Requirements are the foundation from which quality is measured, because requirements become designs, which become actualized. From the user’s perspective, quality is conformance to a design specification (i.e., “this is what was designed, and this is what was built”).

11.10.2.1 Project evaluation (Project performance)

> **NOTE:** *The measurement of project performance is an assessment of the magnitude of variation from the original scoped baseline (i.e., from the requirements).*

A project evaluation systems necessitates following life-cycle of information elements:

1. **Inputs** - Those elements that are used in the project to implement it. Inputs are what is composed to make the outputs. Time, resources, humans, equipment.
2. **Activities** – What the people and machines do in order to achieve the goal(s) of the project.
3. **Outputs** – The first level of results associated with a project. What has the project achieved in the short term.
4. **Outcome** – The second level of results associated with a project. Usually refers to medium term consequences of a project. Outcomes usually relate to the project goal or aim.
5. **Impact** – the third level of project results, and is the long term consequences of a project.

A more complete description of project evaluation is a follows:

1. **Input evaluation (input indicators and metrics):** At the initial phase of a project, indicators are important for the purpose of defining how the intervention (state change) will be measured. Through the use of indicators, engineers are able to pre-determine how effectiveness (of the engineered system) will be evaluated in a precise and clear manner. Input evaluation involves the evaluation of those elements (as indicators) that are used in the project to implement it: time (availability), resources (availability), humans (availability), equipment (availability).
2. **Process evaluation (a.k.a., formative evaluation, monitoring [project] progress, activity evaluation; process indicators and metrics)** determines the value alignment of a project/program while the project activities are forming (in progress). Process evaluation involves the evaluation of those actions that people and machines do (execute) to complete goals and objectives. Therein, monitoring is a continuous process of observing and assessing progress. Monitoring involves conceiving and perceiving change to the progress of a process, and that progress can be evaluated [at least] quantitatively. Technically, it is the routine collection of data that measures progress toward achieving objectives using record keeping and reporting. Here, evaluation is the process of measuring ‘progress’ toward a given direction (e.g., goal or objective). Progress is the status of the current state of a system in relation to prior and/or desired states. Here, an ‘evaluation’ is a measurement of ‘progress’, which provides information relevant to the resolution of *access*, *scheduling*, and *effectiveness* of a project.

   These are primarily process indicators; they indicate the change process itself.

During project implementation (project coordination), indicators serve the purpose of assess project progress and highlighting areas for possible improvement. In this case, when the indicators are measured against project goals, coordinators are be able to measure progress towards goals and inform the need for corrective measures against potential errors through to catastrophes.

Formative evaluations generally start with a baseline survey, carried out before an actual project is implemented:

A. Ask context questions about relationship and capacity.
B. Ask implementation questions about the quality and quantity of activities.
C. For each question, then develop 'process indicators' that are measures of whether planned activities are being carried out, and how they are carried out. Process indicators indicate a measure of whether planned activities are being carried out, and how well they are being carried out.

The purpose for formative evaluation (monitoring) is:

1. To keep processes/projects/programs on track.
2. To assess the extent to which a process is having its desired impact.
3. To maintain transparency.
4. To understand and support decisioning.

CLARIFICATION: *Formative evaluation generally refers to evaluation during a project, and summative means at the end of a phase of the project or the end of the project itself. A well-conducted and well-planned project will have several rounds of evaluation, at varying levels of fidelity.*

3. **Output evaluation (a.k.a., summative evaluation, end-term evaluation, ex-post evaluation, outcome evaluation, and impact evaluation; output indicators, outcome indicators and metrics)** assesses the final or overall [value alignment of the] result (i.e., product, outcome, output, impact, and effect). Although the concept of quality can be measured throughout, from the user's perspective, the concept of quality primarily applies here. Poor quality outputs indicate to the user poor quality inputs and/or processes.

It is intended to be carried out immediately at project or sub-project conclusion. Summative evaluation is carried out to evaluate project outputs and immediate outcomes, with results of the evaluation compared to the results at baseline. This evaluation generally informs all involved on the project of its success and is important for documenting success and lessons learned, and progressing at the supra-project level. At the end of every test through to final (and beyond) release, there is a summative evaluation.

Summative evaluations are primarily outcome indicators; they indicate the change to the web of life after the initial results on the change have returned, and are collected over a medium to longer duration of time.

Outcome indicators indicate change over medium and long-term periods of time. Summative evaluation occurs over time, and reveals the depth of the actual change. It is intended to capture the total impacts of the project's effect (output and activities) over time. Although not always conducted, a summative evaluation is usually the final evaluation associated with a project. If the project is a service, then every modification becomes a summative sub-component evaluation of the continuous formative evaluation of the projected service. Impact indicators indicate the long-term impact of a change.

During summative evaluation, indicators provide the basis for which evaluation will assess the project impact.

The purpose for summative evaluation (which may be continuous as a service, like monitoring is continuous) is:

A. To keep processes/projects/programs on track.
B. To assess the extent to which a process is having its desired impact.
C. To maintain transparency.
D. To understand and support decisioning.

11.10.2.2 Qualitative and quantitative evaluation

There are two types of project evaluation: qualitative and quantitative. A balanced approach combines both qualitative and quantitative evaluation.

Qualitative evaluation involves (the subject), for example:

1. Asking users about their expectation of what the

system will do and how it will function
2. Observing users interacting with a system while "thinking aloud" and noting areas that cause user confusion or frustration
3. Probing for suggestions from users and asking users about their level of satisfaction with the system

Quantitative evaluation involves measuring the following (work performance), for example:

1. Task Completion Rates: Percent of users who successfully complete each task
2. Time on Task: Time it takes for users to perform a task from beginning to end
3. Error Rates: Number of errors made during the course of a task

11.10.3 Evaluation as navigation

Evaluation involves the three navigational elements:

1. **Direction (goals and objectives, questions)** - the setting of a direction; what is to be accomplished, improved, expected? This includes long and short term intention(s) as well as broad to specific desired outcome/effect upon a system.
   A. **Articulate the objective (goal).** All measurements have an objective that structures the measured response.
   B. **Articulate a question** to refine the objective/goal to a quantifiable amount.
2. **Indication (indicator)** - factors that are significant to the successful completion of the direction (achievement of the outcome). Indicators measure success[ful accomplishment] of the direction. Indicators are composed of metrics, and metrics are composed of measures.
   A. **Identify indicators.**
   B. **Identify metrics (measures).** Metrics indicate the measurements required to answer each question.
3. **Determination (evaluator, comparator, analytics) -** was it accomplished as expected, and if not, what action is determined to correct alignment with direction. New value compared to baseline (benchmark as a selected historical, trace value).
   A. Calculate directional comparison.

Evaluation may involve calculating differences between temporal points:

1. **Current actualized ("current")**- The current actualized state (may not align with specified).
2. **Current specified ("target")** - The current specified state (may not align with actual).
3. **Next predicted ("predicted")** - The predicted (next probable future) state.

11.10.3.1 Performance measurement

A complete performance measure includes:

1. **NAME:** The use of an exact and expected (intuitive) name to avoid ambiguity.
   A. Name of metric: HSS.
2. **PURPOSE/OBJECTIVE:** The rationale underlying the measure has to be specified, otherwise one can question whether it should be introduced. The relation of the metric with the organizational objectives must be clear. Typical purposes include monitoring of the rate of change, ensuring that all delayed services are eliminated, and ensure that the asset materialization is efficient and effective for everyone's fulfillment.
   A. Reason for measure: Human fulfillment.
3. **RELATES TO:** The organizational (societal) objectives to which the measure relates should be identified, otherwise one can again question whether the measure should be introduced.
   A. Description of what is measured: Common human need fulfillment and ecological services.
4. **TARGET:** An explicit target, which specifies the level of performance "to be achieved" and a time scale for achieving it. A benchmark is another word for a target, and it means that some value is present. An appropriate target for each measure should therefore be recorded. Typical targets include 99 percent, global human access fulfillment, given common resources and knowledge. By what percent per year are we achieving this on a local and/or global scale. Improvement year on year, ? percent closer to global human access fulfillment during the next ? months, and the target is to "achieve" 95 percent global human fulfillment (given what is known) for a population of 500 on 1295 hectares with on-time delivery by the end of next year.
   A. **Specification** of next system state, as planned in execution.
   B. **Threshold calculation** for each *inquiry process*.
   C. **The target value** is the optimal value [range] as within a range, per indication along the lines of a units of measurement.
5. **FORMULA:** The formula—the way performance is measured -- to 'specify' affects how people behave. As a matter of fact, an inappropriately defined formula can encourage undesirable behaviours. The formula must therefore be defined in such a way that it induces good societal-organizational [ordering] practice. The exact calculation of the

metric must be known to everyone. Also, what is/are the units used (units of measurement must be known).
   A. Measured procedure for how the metric is measured.
6. **FREQUENCY OF MEASUREMENT:** The frequency with which performance should be recorded [and reported] depends on the importance of the measure and the volume of data available (in a technical solution space).
   A. Measurement frequency for how often the measurement is taken.
7. **WHO MEASURES?:** The person/system who is to collect and report the data should be identified.
8. **SOURCE OF DATA:** The exact source of the raw data should be specified. A consistent source of data is vital if performance is to be compared over time.
9. **DRIVERS:** As factors influencing the performance of entities in the decision space.
10. **INTERSYSTEM TEAM:** The team accountability for ensuring the specified performance. The actions taken by accountable persons to change the performance.

11.10.3.2 The performance evaluation process

Performance evaluation (related to ISO 1400:2015):

1. **Assessment** via monitoring, measurement, analysis and evaluation - Assess the organizations environmental performance in relation to society objectives.
   A. **Internal "auditing"** – performs conformity assessment to the requirements defined by internal standards. How does a local system conform to the Society Standard with a set of requirements.
2. **Project review** – review and evaluation for improvements, supra-system decision, and next steps.

11.10.4 The evaluation process

The following is a common example of an evaluation process:

1. Entry criteria of the process
Entry criteria (I_{en}) is the minimally acceptable inputs in order to perform the process. The values for this indicator are as follows:

- V^{pv}_{en} = the number of the inputs required by this process.
- V^{av}_{en} = the number of the inputs finished at this moment.
- V^{ev}_{en} = the number of budgeted inputs performed.

For example, the "Human Resource Plan Process" of PMBoK has four inputs: "project management plan", "activity resource requirements", "enterprise environmental factors" and "organizational process assets". If at the calculating moment, four inputs should be finished but only "project management plan" is finished, and the number of the budgeted inputs performed is 2. Then the three values are:

- $V^{pv}_{en} = 4$
- $V^{av}_{en} = 1$
- $V^{ev}_{en} = 2$

2. Cost of the process (Market only)
Cost (I_c) is the money allocated to the process. It will be used to evaluate if the process is over or under budget. The values for this indicator are as follows:

- V^{pv}_{c} = the planned value of the cost of this process (planned cost).
- V^{av}_{c} = the actual value of the cost of this process (actual cost).
- V^{ev}_{c} = the budgeted cost of this process performed.

For example, a process had a cost allocation of 10 money. If the cost that has been spent for the current moment is 5 money, and the budgeted cost of the finished work of this process is 3 money, then the three values are:

- $V^{pv}_{c} = 10$
- $V^{av}_{c} = 5$
- $V^{ev}_{c} = 3$

3. Duration of the process
Duration (I_d) is the money allocated to the process. It will be used to evaluate if the process is behind or ahead of schedule. The values for this indicator are as follows:

- V^{pv}_{d} = the planned value of time required of this process.
- V^{av}_{d} = the actual value of time spent on this process.
- V^{ev}_{d} = the budgeted time of this process performed.

For example, for a process requiring 400 hours of work, the time spent at the current moment is 200 hours and the budgeted time of the finished work is 300 hours. Then the three values for this indicator are:

- $V^{pv}_{d} = 400$
- $V^{av}_{d} = 200$
- $V^{ev}_{d} = 300$

4. Resource of the process
Resource (I_r) is the resources allocated to the process. It will be used to evaluate if the resource usage is over or under capacity. The values for this indicator are as

follows:

- $V^{pv}{}_{r}$ = the planned value of resource required of this process.
- $V^{av}{}_{r}$ = the actual value of resource spent on this process.
- $V^{ev}{}_{r}$ = the budgeted resource of this process performed.

For example, here the resource allocated to this process is 11 bricks; the resource assigned to this process is 9 bricks at the moment, and the budgeted resource of the finished work of this process is 8 bricks. Then the three values for this indicator are:

- $V^{pv}{}_{r} = 11$
- $V^{av}{}_{r} = 9$
- $V^{ev}{}_{r} = 8$

5. Expected criteria of the process
Expected criteria (I_{ex}) is the minimally acceptable outputs in order to perform the next process. The values for this indicator are as follows:

- $V^{pv}{}_{ex}$ = the number of the outputs required by this process.
- $V^{av}{}_{ex}$ = the number of the outputs finished at this moment.
- $V^{ev}{}_{ex}$ = the number of budgeted outputs performed.

For example, the process “Quality Plan Process” of PMBoK has five: “quality management plan”, “process improvement plan”, “quality metrics”, “quality checklists” and “project documents updates” expected outputs. If at this moment, two inputs should be finished but there is only “quality management plan” is finished, the number of the budgeted outputs performed is 1. Then the three values for this indicator are:

- $V^{pv}{}_{ex} = 2$
- $V^{av}{}_{ex} = 1$
- $V^{ev}{}_{ex} = 1$

11.11 [Decision] Evaluator

An evaluator is a statistical tool for comparison to provide analysis of a metrics, performance indicators and risk indicators, to explore trends, data patterns, and interdependencies for informing optimal decisioning, and ultimately the achievement of intended results. Here, process analytics are applied to indicators to produce actionable decisioning information.

> **QUESTION:** *What is the actual progress against goals.*

In general, the first analytic process is the determination of the ‘base rate’ [of a change]. The **base rate** is a statistical measure of what percentage of a population has a particular characteristic. This statistic is then used as the base (or prior probability) upon which to compare other measurements.

Determination involves analytics (assessment):

1. Assessment and analytic techniques provide the mechanism for measuring and evaluating the defined factors to evaluate progress and impact.
   A. **Performance assessment** - determine current and future performance by identifying performance indicators and measuring them over time.
   B. **Risk assessment** - determine current and future risks by identifying performance indicators and measuring them over time.

The primary three system change control evaluators are input, process, and output:

1. **Input indicators/metrics (Project indicators/ metrics, Project control)** - measures of the project, used to monitor and control the project. Through continuous monitoring and control: the development space may be minimized by making adjustments necessary to optimize and avoid problems; and product (service) quality can be assessed (evaluated) on an ongoing basis, and the technical approach modified to improve quality. Project control determines the targets of ‘resources’ and ‘timing’ in a project:
   A. Resources (cost) - alignment with required resources usage.
   B. Timing (schedule) - alignment with required timing.
2. **Process indicators/metrics (Project coordination)** - measures of the development process. Process metrics are collected across all project (forever), and provide indicators that lead to long-term process improvement. Process metrics reference/measure attributes of a process (people, environment, tools, techniques).
   A. Overall development time (% complete).
   B. Type of methodology used.
   C. Work products delivered (productivity, work delivered).
   D. Human effort expended.
   E. Errors uncovered before release.
   F. Calendar time expended (% on-time delivery).
   G. Conformance to schedule.
3. **Output indicators/metrics (Product indicators/ metrics, Service distribution)**
   A. Usage/productivity rate.
   B. Defect rate - Defects delivered to and reported by end-users.

C. Change request rate.
D. Resource usage / schedule variance.
E. Quality - alignment with required quality.
F. Effects - alignment with [required] goals and objective (effect).

Table 25. Decision Approach > Monitoring & Evaluation: *Table of project coordination metrics.*

Indicator Category	Metrics
Productivity	The number of (lines of code, modules, classes, deliverables, etc.) developed on time unit or per resource.
Quality	The degree of completion of project objectives.
Deliverables	The ratio between the achieved deliverables and the planned deliverables. The number of rewords because of no concordances between the specifications and the results.
Resources	Statistics regarding resource usage. Statistics regarding resource costs. Statistics regarding resources loading and distribution.
Risks	The number of identified risks. The number of raised risks. The number of avoided risks.

Control metrics are classified based on their roles, importance, and functionality:

1. **Roles (evaluation)**
   A. Forecasting (a.k.a., predicting) - predicting project resources (cost) and timing (schedule) outcomes based on the current understanding of project progress and performance.
   B. Diagnostic - signalling progress and performance issues to inform corrective actions.
2. **Importance (prioritization)**
   A. Priority (core) - "must have" metrics that provide the greatest insight into project controls (resources and timing).
   B. Significant - supplement or complement Core metrics as needed.
3. **Functionality (application)**
   A. Data (data collection).
   B. Information (progress measurement).
   C. Knowledge (performance assessment).
   D. Insight (performance forecasting).

12 [Decision] Quality indication

Quality ([high-level] "management") engineering indicators (quality assurance, performance indicators)

Quality is conformance to requirements. Quality is the totality of features and characteristics of a product, or service that influence it's ability to satisfy stated or implied needs. Fully satisfy user ("customer") requirements at the lowest resource usage. In engineering, service quality is now measured with performance-based measures. Quality is indicated by a source of/for feedback in order to re-orient the next state by controlling the adaptation.

High-level quality indicators are the quality and/or performance requirements, which are assessed through evaluation of a system's materializing/-ed alignment with it's [user] requirements (as validation and verification).

Quality is evaluated through feedback types:

1. **Metrics (an objective's criteria)** - provide ways of measuring each stated quality (objective). There may be multiple metric for each quality. At the level of systems engineering, metrics are measurable requirements -- requirements with an objective and/or subjective measure of progress or completion.
2. **Weightings (ranking)** - define the relative importance of different qualities in a particular problem environment.
3. **Strategies** - are methods for sustaining and/or improving the current quality and/or progress.

Project metrics are used, in part, to improve quality:

1. As quality improves, defects are minimized. A defect is a verified lack of conformance to requirements.
2. As defects go down, the amount of rework required during the project is also reduced.
   A. As rework goes down, the overall project input (e.g., time, resources, cost) is reduced.

The three service quality indicators (factors) are:

1. **Service/product operation (system operation):** its operational characteristics (do they align, meet requirements, meet metrics); its operational characteristics.
2. **Service/product revision (system revision):** its ability to undergo change.
3. **Service/product transition (system transition):** its adaptability to new environments.

The system quality functions (factors/indicators) are:

1. **Functionality** - the degree to which the system satisfies needs.

2. **Reliability** - the amount of time the system is available for use.
3. **Usability** - the degree to which the system is easy to use.
4. **Efficiency (optimality)** - the degree to which the system uses system resources optimally.
5. **Maintainability** - the ease with which the system may be repaired and enhanced.
6. **Portability** - the ease with which the system can be transposed from one environment to another.

System quality performance inquiries:

1. What are the results of task or test execution?
2. What are the results of their timings?
3. What are the results of the comparisons and calculation of all data their timing(s).

High-level project-coordinator indicators of quality include [the performance of tasks]:

1. The 'performance' [of a service system], in the context of an organizational outcome, can be measured (and have its quality determined) by [calculating] the number of tasks/projects closed.
2. Is the number of tasks of another, related project, becoming sufficiently overwhelming that that system is flagging an alert (leading indicator)?
3. Within the last # of days, how many tasks were not closed as expected? What is the user/requirements accessibility threshold for the closure of expected tasks (a lagging indicator)?

Quality can be simplified by measuring:

1. Quality is specification driven – does it meet the set requirements
2. Quality is measured at start of life – percent passing customer acceptance.
3. Quality is observable by number of rejects from customers.

> **NOTE:** *The quality characteristics of a service or product (functional object) are known as the 'Determinants of Quality'.*

12.1 Indicator(s) determinants of service quality

In the market, there are different theories of determinants of service quality, generally, satisfiers and dissatisfied with the following definitions:

1. **Satisfaction** refers to the outcome of individual service transactions and the overall service encounter,
2. **Service quality** is the customer's overall impression of the relative inferiority/superiority of the organization and its services.

In the market there is an expectation-perception gap view of service quality (i.e., customer expectation and perception). There is business [management's] perception and business [management's] expectation, and there is the customer's equivalent. Therein exists "the zone of tolerance, a range of service performance that a customer considers satisfactory". The importance of the zone of tolerance is that customers may accept variation within a range of performance, and any increase in performance within this area will only have a marginal effect on customer perceptions. Only when performance moves outside of this range will it have any real effect on perceived service quality. There sets up a desire to conceal real quality on the part of the business-service provider.

The following are how service quality was best understood in the literature circa 1995 (Johnston, 1995):

Parasuraman et al. (1985) provided a list of ten determinants of market-based service quality as a result of their focus group studies with service providers and customers:

1. Access.
2. Communication.
3. Competence.
4. Courtesy.
5. Credibility.
6. Reliability.
7. Responsiveness.
8. Security.
9. Understanding.
10. Tangibles.

Johnston and Silvestro (1990) suggested a refined list of 12:

1. Access.
2. Appearance/aesthetics.
3. Availability.
4. Cleanliness/tidiness.
5. Comfort.
6. Communication.
7. Competence.
8. Courtesy.
9. Friendliness.
10. Reliability.
11. Responsiveness.
12. Security.

Johnston and Silvestro (1990) went on to add the customer's perspective to the 12 service quality characteristics. They identified five "customer" service quality determinants:

1. Attentiveness/helpfulness.
2. Care.
3. Commitment.
4. Functionality.
5. Integrity.

Walker (1990) suggested that the key determinants are:

1. Product reliability.
2. A quality environment.
3. Delivery systems that work together with good personal service (staff attitude, knowledge and skills)

Grönroos (1990) postulated six criteria of perceived good service quality:

1. Professionalism and skills.
2. Attitudes and behaviour.
3. Accessibility and flexibility.
4. Reliability and trustworthiness.
5. Recovery.
6. Reputation and credibility.

Albrecht and Zemke (1985) suggested:

1. Care and concern.
2. Spontaneity.
3. Problem solving.
4. Recovery.

Armistead (1990) split the dimensions into "firm" and "soft":

1. The firm dimensions are time (including availability, waiting time and responsiveness), fault freeness (including physical items, information and advice) and flexibility (ability to recover from mistakes, to customize the service or add additional services).
2. The soft dimensions are style (attitude of staff, accessibility of staff and ambience), steering (the degree to which customers feel in control of their own destiny) and safety (trust, security and confidentiality).

Essentially, there are several emotional and physical determinants users apply when evaluating (the satisfaction, fulfillment, etc., of) their experience. Generally, these include,

1. Accessibility.
2. Service.
3. Expectations.
4. Communication.
5. Competence.
6. Courtesy.
7. Credibility.
8. Reliability.
9. Responsiveness.
10. Product or service attributes (the tangible characteristics of a product or service, for example, if acquiring a car, its size, colour, shape and engine size).

The names of the determinants of service quality do not distinguish between the effect of the determinants in terms its creation of satisfaction or dissatisfaction in a service user. It is implicitly assumed that they are the two aspects of the same conception. For example, reliability was Berry et al.'s (1985) most important factor, which implies that unreliability will lead to dissatisfaction and that reliability will lead to satisfaction.

In community, there are only contributors, who are themselves the users. There are two socio-economic identities in community: the user and the InterSystem Team. In the market, there are at least three: the employer, the employee, and the customer. The competition for access that such a system sets up is likely to leads to significant diversions from real world understanding and fulfillment. Because, individuals of the same society are competing for access [to some thing] through a set of relationships based upon power over others, and not access cooperation through a perception of common heritage. Guest/customer satisfaction (dissatisfaction) has meaning in the market, but community has only users who contribute, there are no economic guests or customers. Hence, when the real world is more greatly considered, then creation and awareness more based in the real world where humans have needs that are fulfilled from particular organizations of the environment.

In community, there is no business (i.e., no monetary) gap between access to fulfillment (i.e., the "customer", or user) and the production of fulfillment services and goods (i.e., the "employer and employee", or InterSystem Team contributor). In the market there are a number of different sub-gaps, including the real world knowledge gap (engineering), then, the policy gap, the delivery gap, the communication gap, the customer gap, etc. In the market, there is a customer gap, as the difference between expectations and perceptions; there are also provider gaps:

1. **Not knowing** what customers expect > ensure what customers expect, via research and analysis (or, user input, as well as, research and analysis).
2. **Not selecting** the right service designs and standards > establish the right service quality standards, via management (or, decision analysis).
3. **Not delivering** to service standards > ensure that service performance meets standards, via employees (or contribution to the InterSystem Team).

- **Not matching** performance to promises > ensure that delivery matches promises (of the enterprise).

But, when all of the information is present because the service is designed to directly fulfill needs, then there is no provider gap.

> *Note: In engineering, service quality is now measured with performance-based measures.*

In the market, there are customer expectations and perceptions. Customer expectations are the beliefs and assumptions of what an organisation's products, services and all-round customer service will be like. Customer perceptions are how consumers feel and regard an organisation's product or service after purchasing their product and using it first-hand. The company has a perception of the consumer's expectations, and the customer has a degree of expected service, and there are provider "gaps" in between. In community, however, service is derived from a open, transparent, and unified model, and hence, expectations become based upon the societal information system itself, and not on any specific business or industry (as in the case of the market).

1. Accessible time.
2. Accessible space.
3. Accessible services.

12.1.1 Validity (quality of information)

The term validity is used (by researchers) to characterize the degree to which information reflects the phenomenon being studied.

12.1.2 Reliability (trustability-testability of information)

Reliability, or the extent to which information is "trustworthy", can in principle be tested. It is "ensured" when indicators are unambiguous or measurements have no systematic errors. To test the data for reliability, several people independently using the same indicator for the same problem should obtain the same result. Sources and methods of acquiring information are decisive (in order to ensure reliable information).

> **INSIGHT:** *You can trust other people to do research and discovery for you, if they are following a transparent method and if their arguments are sound, free of bias and transparent.*

There are two ways to ensure higher validity information:

1. By choosing indicators that provide the most direct measure, and
2. By using several indicators that together comprise a good indication of the phenomenon describe[d by the indication].

> **NOTE:** *Unambiguity (Read: clarity and precision) is a precondition for dependable information, for intelligence in action.*

12.2 False quality indicators (false indication)

There are also false indicators of quality (i.e., indicators that appear to stand on their own as a representation of quality, but require a larger context to be integrated). For example, 'total lifetime' in age (cycles around sun) is not an indicator of 'life quality'. Similarly, 'age at death' is not an indicator of the quality of the life. Here, what it *means*, or *is*, to be alive needs to be defined. As a definition, what does it *mean* and/or *require* to be 'alive'? Life is something that needs to be measured with a matrix that is more comprehensive and nuanced than minutes or years (time) or currency (market). Life is something that needs to be measured with a matrix that is more comprehensive and nuanced than minutes or years or currency.

A false indicator by itself:

- Total lifetime in age is not an indicator of life quality -- age of death is not an indicator of the quality of the life.

12.3 Requirements quality indicators

> *A.k.a., Requirements traceability ensures reliability.*

The quality indicators of a requirements statements include, but are not limited to:

1. **Imperatives** - Command words (e.g., shall, must, is required to, are applicable to, should).
2. **Directives** - Words are often used to make requirements more understandable (e.g., for example, figure, table, note).
3. **Continuances** - Words that introduce more detailed specification (e.g., below, as follows, following, listed, in particular, support, essential, fundamental).
4. **Options** - words that allowing the developer latitude in implementing a requirement. this introduces risks to schedule and resources.
5. **Weak phrases** - Words and phrases that introduce uncertainty into requirements statements (as appropriate, as preferred, as possible, customizable).

12.4 Access derived quality control indicators

The meaning of access can be derived from various societal perspectives. Here, the relevant perspective is that of systems engineering. In an engineered system, 'access' is derived through/from the intentionality of the system's user. At a population level, users will (for fulfillment or not) determine the meaning of 'access', from which the meanings of 'stewardship' and 'quality' are similarly inter-defined (or left excluded):

1. Determination of meaning of 'access' (i.e., determining relationship of individual to societal access).
   A. *Access* to product (in service resources).
   B. *Stewardship* of product (in service resources).
   C. *Quality* of product (in service resources).

12.5 Measuring quality

Quality is a multivariate measurable, which generally includes:

1. **Correctness** - degree to which a system operates according to specification.
   A. For example, verified non-conformance with requirements.
   B. For example, defects per KLOC.
2. **Maintainability** - the degree to which a system is amenable to change and lifespan.
   A. For example, mean-time-to-change (MMTC) - given an incoming change requirement, what is the time to analyze, design, implement, and deploy a change.
3. **Integrity** - the degree to which a system is impervious to outside attack, environmental instability, or failure.
   A. Threat probability and security (likelihood of repelling an attack).
      1. t=likelihood of threat occurring and S=likelihood of repelling the attack
      2. Integrity = sigma [1 - (threat x (1 - security))].
      3. t=0.25, S=> I=0.99
4. **Usability** - the degree to which a system is easy to use.

13 [Decision] Measurement

> **DEFINITION:** *A mathematical model consists of one or more equations, in-equations, and objective functions and it has a role to describe the associated state. The metrics measure the project, service, or product characteristics based on the characteristic's influencing factors.*

'Metric space', also 'measure space', is the conception of distance in the real time (line).

Definition 1.1 A metric space is given by a set X and distance function d : X x X → R, such that

1. *(Positivity) For all x, y make X*
   - 0 ≤ d(x,y)
2. *(Non-degenerated) For all x, y make X*
   - 0 = d(x,y) set equal to x = y
3. *(Symmetry For all x, y make X*
   - d(x,y) = d(x,y)
4. *(Triangle inequality) For all x, y, z make X*
   - d(x,y) ≤ d(x,z) + d(z,y)

At level 4, a triangle can now be (a metric space construction:

1. *Found* for orientation (in real time).
2. *Formed* for construction (in real time).

The construction of a metric space allows for the following ability functions:

1. Measurement (measurability, ==, set equal to).
2. Comparison (comparability, !=, not equal to).
3. Analysis (decomposability, <, <=, less than and/or equal to).
4. Synthesis (composability, >, >=, greater than and/or equal to).
5. Estimation (probability).
6. Verification (verifiability, equatability, boolean, =, is equal to).

13.1 Indicators and metrics fundamentals

The following are the essential operational elements of an intentionally indicated measurement and its application:

1. **Indicator** - Indicators are categories (meaningful concepts associable to a context). There are many different sub-types of indicators.
2. **Metric/measure** - Metrics are the description of the variable that the indicator is expressing in some alignment, and the value itself in numerical form. Metrics that express a goal are sometimes called "targets".
3. **Statistics** - It is upon the values themselves that

statistical mathematics are run (computed).

4. **Parameter** - Parameters are what the values should or can be between in relationship to a single variable indicator; the range of acceptable or available values (important note: the word, "parameter", has other definitions applicable elsewhere, for instance, a parameter may not be defined as a range of values, but instead, a single parametric value itself). Note that in the decision system, user customizability would be considered a contextually available parameter; where, users could customize available variables within a set range of parameters or available values (or set, set the parameter).
5. **Threshold** - Thresholds are the minimums and maximums, which may act as limits and/or triggers (for events). Note that in the decision system, thresholds are used to resolve many supra-economic decision inquires.

13.2 Mathematical metric construction

A mathematical measure is a function that assigns a non-negative real number (or, +infinity) to (certain) subsets of a set X. As defined in [IVAN04] a metric represents a mathematical model (function model) developed around an equation having the following form[ed construction]:

1. The identity function: f(x) = x
   A. The identify function allows graphing.
2. The indicator function: y = f(x)
   A. The indicator function allows estimating probability.

13.3 'Metric' from a mathematical perspective

In mathematics, in part, a metric is a real [time line] function that measures the distance between two coordinated entities. Mathematically, a metric is a measure between two itens in a set. One mathematical definition of a metric is: Let A be a set of objects, let R be the set of real numbers, and let μ be a one-to-one function such that $\mu: A \oslash A \rightarrow R$, where $\oslash$ denotes the Cartesian product of A with A. Then, μ is a metric for A if and only if:

- $\forall \alpha, \beta \in A: \mu(\alpha, \beta) \geq 0$; (P1)
- $\forall \alpha, \beta \in A: \alpha = \beta \Rightarrow \mu(\alpha, \beta) = 0$; (P2)
- $\forall \alpha, \beta \in A: \mu(\alpha, \beta) = \mu(\beta, \alpha)$; and (P3)
- $\forall \alpha, \beta, \gamma \in A: \mu(\alpha, \gamma) \leq \mu(\alpha, \beta) + \mu(\beta, \gamma)$. (P4)

13.1 Simplified definition of 'metric'

A metric is a quantitative measure of the degree to which a system, component or process possesses a given attribute. The simple definition of metric containing the following two sub-characterizations is insufficient for computer processing:

1. A metric is a standard of measurement in comparison.
2. A metric is a function that describes distances between pairs of points in a space.

13.1.1 [Decision] Metrics classifications

The metric shape of that which can be classified as having shape.

The concept of a 'metric' carries two related meanings:

1. **A scientific/discovery meaning:** A 'metric' is defined to measure distance between two linear systems (real to real and real to abstract, where engineering is abstract to material). This type of metric refers to scientific metrics (scientific measurements in context).
2. **An engineering/evaluative meaning:** A measure (metric) is the objective allocation of a value to an entity, in order to characterise a specific feature. This type of metric refers to project metrics (project-program-process-quality evaluation).

Thus, there are two types of metrics, project metrics and scientific metrics.

1. A **scientific metric** is any scientific measure with context.
   A. Measures degree of alignment with the real world.
2. A **project metric** is a quantitative measure of the degree to which a system (engineered or not), component or process possesses an attribute.
   A. Measures degree of alignment with a direction (intention).

Defining the metrics for projects consists of building models and indicators (of occurrences) that start from values measured objectively with numbers (values).

13.1.1.1 Quantitative and qualitative metrics

Quantitative metrics are considered those that are based on factors that can be measured or counted. Such metrics include, but are not limited to: work productivity, project value, resource usage, costs, etc.

For example, <u>work productivity based on inputs</u> (is computed as):

- $W1 = (^{n}\sum_{i=1} O_i) / (^{m}\sum_{j=1} I_j)$
- Where,
- O_i = the output i (deliverables, results)

- Ij = the input j (human effort, resources per time unit)
- n = the number of outputs
- m = the number of inputs

Work productivity based on time:

- Ws = $(^{n}\sum_{i=1} O_i) / T$
- Where,
- T = time period

For example, a given project portfolio value at a gen moment in time (is computed as):

- $PPV^{s}(t) = {}^{ks}\sum_{i=1} VP^{s}_{i}(t)$
- Where,
- $PPV^{s}(t)$ - project portfolio s value at a given moment, t
- VP^{s}_{i} - the value of project i from the portfolio s
- ^{ks} is (k^{s}) - the number of projects in the portfolio s

For example, the degree of resource loading for a portfolio of projects (is computed as):

- $LD = (^{s}\sum_{j=1} UR_j) / (^{t}\sum_{i=1} RR_i)$
- Where,
- UR_j - the number of resources involved in the project s
- RR_i - total number of required resources for project s

For example, the degree of resoure usage at a gien moment in time (is computed as):

- DU (t) = NR(t) / TR
- Where,
- NR - the number of resources involved in a project
- TR - the total number of resources available

For example, the cost of resources per some other unit, such as energy (is computed as):

- $C = {}^{w}\sum_{i=1} NR_i\, d_i\, p_i$
- Where,
- NR_i - the umber of resources from the category i
- pi - energy per unit for the resource category i
- d_i - units of usage for the resource category i

For example, level of complexity, which assumes a project as a basis of comparison (is computed as):

- $C = (^{k}\sum_{i=1} r_i) \log_2 r_i$
- Where, k - the number of tasks in the project
- r - the number of unique resource types involved in the project.

Qualitative "metrics" are formal[ly meaningful] answers. For example, Why did something happen (with linguistic reasoning)? What is the source, cause, or influence of something? These are not expressed as indicators. The first three qualitative metrics are: quality of work, team cohesion, and degree of satisfaction. The two qualitative contexts are social abilities and personal experience. Note that social abilities depend on the communication skills and knowledge, which could/ should be quantified.

For example, the degree of satisfaction (can be computed):

- $DS = (^{p}\sum_{i=1} DSR_i) / TR$
- Where,
- DSR = the degree of satisfaction for the requirement i.
- TR = total number of requirements.
- p = the number of requirements
- The degree of satisfaction for a user of requirement is a value from 0 (no satisfaction) to 1 (fully satisfied).

13.2 Metrics service-level overview

Every constructed system has the following initial metrics:

1. **Functionality delivered** - provides an indirect measure of the functionality of the system
2. **System size** - measures the overall size of the system defined in terms of information available as part of the analysis model.
3. **Specification quality** - provides an indication of the specificity and completeness of a requirements specification.

13.2.1 Service metrics

The following are a high-level list of metrics for indicating the presence of a service [type].

1. **Architectural metrics** - provide an indication of the quality of the architectural design.
2. **Component-level metrics** - measure the complexity of system components and other characteristics that have a relevance to quality.
3. **Interface design metrics** - primarily focused on usability
4. **Specialized object-oriented design metrics** - measure characteristics of classes and their communication and collaboration characteristics.
5. **Complexity metrics** - measure the logical complexity of a system.
6. **Length metrics** - measure the amount between.

13.3 A metric indicator random variable

A.k.a., The indicator function, characteristic function.

The set of possibilities is the *sample space*, in which each possibility is an *outcome*. A proposition (a set of possibilities) is an *event* in statistical usage. The indicator function (a.k.a., characteristic function) of a proposition is its *indicator function*. Indicator functions are a type of random variables. Any function defined point-wise on the sample space is a random variable. By convention, its range is usually the set of real numbers or subset thereof, such as {0,1}. Generally, random variables are continuous (there is no substantial difference between the discrete and the continuous type with respect to this context. Herein, conditionals denote random variables, and the probability of a conditional is the expectation of its values. Probabilities are defined in terms of the expectation of the assignment function.

Essentially, an indicator function links expectations and the probability of that event/result occurring, which would be represented by an indicated variable.

For random variables X,Y, expectations and conditional expectations are defined as follows:

- **X = f(x)**
- $E[X] = \sum_{x \in range(X)} x \cdot Pr(X=x)$
- $E[X|Y=y] = \sum_{x \in range(X)} x \cdot Pr(X=x|Y=y)$
- where,
- E[X] = the expectation of X

INDICATOR RANDOM VARIABLE - A random variable that has the value 1 ("true") or 0 ("false"), according to whether a specified event occurs, or not.

- For example, X is an indicator random variable for the Event A, where p denotes P(A).
- If: E(X) = p
- Then: Var(X) = p(1-p)
- The derivation: EX = 1 • P(X= 1) + 0 • P(X=0) = P(X=1) = P(A) = p

There is an expressible relationship between the taking of an expectation of an indicator random variable, and the probability of that particular event occurring (as represented by an indicator random variable). To "take an expectation" is to set an event value; whereupon, there may be calculated a probability for the event value occurring. The indicator function of an event takes on (associates) a value of 1 when an event occurs (true), and 0 when an event does not occur (false).

The indicator function is a function that returns the value 1 when something is true:

- 1[A] = { 1, A is true,
{ 0, A is false.

As the name implies, an indicator random variable indicates something:

1. Either a value of '1' when the event happens, or if expression is true.
   A. For example, the value of I_A is 1, when the event occurs.
   B. Where, I is the random variable assigned to the occurrence of an event A.
2. Or, a value of '0' when the event does not happen, or if the expression is false.
   A. For example, the value of I_A is 0, when the event does not occur (that is, A^c occurs).

Thus, I_A is a Boolean variable that indicates the occurrence of the event A. This Boolean variable has value 1 with probability P(A) and so its average value is P(A). Over time, I_A will have value 1 on N • P(A) of N [trials of an experiment, for example].

The indicator random variable method involves randomness in two ways:

1. The variable assigned is random. 'I' in I_A for example.
2. The intentional agent cannot be sure whether the next time I_A is check, that the variable I will have value 1 or 0.

The expectation is the same thing as computing the expected value of the variable: the value 1 times the probability that A is true, plus the value 0 times the probability it is not.

In application, indicator random variable is a method to convert between probabilities and expectations.

- For example,
- x{f} *(set f is given the indicator random variable x)*
- x{f} = 1 if f occurs || 0 if f does not occur

A density (distance) function may be expressed for a random variable:

- For a continuous random variable:
  - $E(X) = \int^{\infty}_{-\infty} x f(x) dx$
  - The expectation of X is the integral from negative infinity to infinity of x f(x) dx.
  - $f(x) \geq 0$
  - $\int^{\infty}_{-\infty} f(x)dx = 1$
- For a discrete random variable (replace integration, ∫, with summation, ∑)
  - $E(X) = \sum_{x \in S} x f(x)$

Whereupon, the expectation of a discrete random variable is defined as the sum over all type of values which that random variable can take multiplied by the probability of that particular value occurring. The indicator function is:

- $E(x) = \sum_x n\, P(x=n)$
- Where,
- $\sum_x$ - sum of all values which the random variable x can take
- P(x=n) - probability of that value x occurring

When the outcome is a continuous number, then a continuous random variable is expected. Examples of random variable are weight and height.

Probabilities are specified over an interval to derive probability values:

- $P(a < X < b) = \int^b_a f(x)dx$
- Where, the probability of taking on a single value is 0

13.3.1 The resolution of a metric space, boolean

Boolean expressions use relational and logical operators that result in either a 0 (true) or 1 (false). Boolean expressions allow for the existence of an instruction (programs) that decide whether to execute code (a decision). Code is a set of rules, that when an input (of energy) is applied, information is processed and a result is produced.

13.3.2 Arithmetic (counting expression) operators:

The arithmetic operators are:

- **Operator & Name**
- + addition
- - subtraction
- * multiplication
- / division
- % modulo (remainder)

13.3.3 Assignment (expression) expressions (operators):

The assignment operators are:

- **Operator & Name**
- = set equal to
- += set greater than
- -= set less than
- *= set multiplicator
- /= set divider
- %= set modulo (set remainder)

13.3.4 Relational operators

Determine the relative ordering between values. Relational operators may be used to compare expressions that evaluate numeric and character data.

The relational operators are:

- **Operator & Name**
- == equal to
- != not equal to
- < less than
- ≤ less than or equal to
- > greater than
- ≥ greater than or equal to

13.3.4.1 Logical operators

Combine boolean values and evaluate to a boolean result.

The logical operators are:

- **Operator & Name**
- ! logical NOT
- && logical AND
- || logical OR

13.3.5 Operator precedence

The operator precedence types are:

Table 26. Decision Approach > Measurement: *Counting operators and precedence.*

Operator type	Operator	Associates
grouping	(expression)	left to right
unary	++, --, +, -	right to left
cast	(type)	right to left
multiplicative	*, /, %	left to right
additive	+, -	left to right
assignment	=, +=, -=, *=, /=, %=	

13.4 [Decision] Measurement method

Measurement is the method of producing metrics (i.e., actionable, relational data), and it includes of the following components:

1. **The measurement method (the sense-feedback, observation method)** - The method used to measure something; collection of information.
2. **The measurement (actual) value (The counted value)** - The resulting value obtained from measuring, also called the measure.
3. **The expected value (the predicted value)** - The predicted, intended, or otherwise expected count.
4. **The calculation (the mathematical value)** - the resulting calculation or combined set of measures. In order to determine the degree of alignment, statistical processes are used.

One simple example of the measurement method is, Goal, Question, Metric (GQM). The GQM method's fundamental principle is that the carrying out of the measurement must always be oriented (alignable) towards an objective. GQM defines an objective, refines that objective into questions and defines [mathematically precise] measures that are most probably likely to answer those questions, given what is known. Indicators are then generated to collect and process information for useful synthesis by calculating the separation between a result and that which was probably expected as a metric.

13.4.1 Simplified definition of a 'measure'

A measure provides a quantitative indication of the extent, amount, dimensions, capacity or size of some attribute of a product or process. When a single data point has been collected (e.g., the number of errors uncovered in the review of a single module), a measure has been established. Measurement occurs as the result of the collection of one or more data points (e.g., a number of module reviews are investigated to collect measures of the number of errors found during each review).

Measurement is, by definition, empirical. Measurement, as a collection of information, is knowledge that is derived from observation and/ or experimentation. A 'measurement' is the act of determining a 'measure' by counting that which is perceived ("having that information of quantity"). A measure provides a quantitative indication of the extent, amount, dimension, capacity, count, or size of some attribute of a product or process. To measure is to inquire into the sensed unified-separation of the environment through something already known (something standard or common). Measurement is the process by which numbers or symbols are assigned to attributes of entities in the real world to describe them according to pre-defined rules. Therein, measurement is the act of determining a measure. Measurement provides data into the way systems *change* and *operate*.

> **NOTE:** *Measurement is a system boundary function. Measurement is the act of determining a measure.*

The term 'measure' is used to mean the 'value' measured (identified and recorded) by whatever mechanism is used. All measures are composed of a value (a number) and a unit of measure. The number provides magnitude for the measure (how much), while the unit gives number meaning (what is measured).

From a data context, a measure is a number or value (and unit) that can be summed and/or averaged, or have other statistical calculation applied, such as distances, durations, temperatures, and weight.

Note that the term, 'measurements', is often used alongside 'dimensions', which are the categories that can be used to segment, filter or group, such as the physical dimensions of length and volume, or the societal dimensions of social, decision, lifestyle, and material organization.

Measure[ment] is a common process to all embodied consciousness, and a necessary process for:

1. **Understanding a system (discovering)** - *associations* in space and time.
2. **Changing a system (decisioning)** - *modifications* in space and time.
   A. **Adapting** - processes to remain resilient.
   B. **Optimizing** - processes to improve functioning.

There are two real world domains of measurement related to the experience of separation by consciousness:

1. **Direct measurement (physical collection)** - the real world occurrence is observed and recorded as a 'measure' (and in context, 'metric'). Some [statistical] factors can be directly measured.
   A. For example, defects uncovered during testing.
2. **Indirect measurement (abstraction level)** - the abstract occurrence is implied to have occurred in the real world by one or more direct measures. Some [statistical] factors can only be measured indirectly
   A. For example, usability or maintainability.

The three process domains of measurement are:

1. **Measurement objectives (inputs)** - intention for measurement.
   A. For example, to know temperature difference between two days.
2. **Measurement process (process itself)**
   A. **Measure** ("measurement record") - Measurement occurrence via a method recording new data.
      1. For example, 30 kelvin is a measure.
   B. **Metric** ("measurement record in context") - New data is contextualized to be used in decisioning, providing orientational information.
      1. For example, 30 kelvin on 24 March.
   C. **Indicator** ("signal")
      1. For example, thermometer system change as indicator of temperature.
3. **Measurement result (output)**
   A. **Directional comparisons ("indicator of objective")** - new decisioning data is statistically processed (compared to itself and/or past data) in order to determine direction.
      1. For example, measure (1) at 30 kelvin on 24 march, and measure (2) at 29 kelvin on 23 march, and their statistical comparison results.

Thee full change cycle involves the following phases:

1. Intending (Objectives).
2. Questioning (Objectives).
3. Measuring (Measurement process).
4. Evaluating (Measurement process).
5. Planning (Measurement process).
6. Forming (Measurement process).
7. Monitoring (Measurement process).
8. Effecting (Results).
9. Evaluating (Results).
10. Cycle repeats.

13.5 Measurement optimizes decisioning

The measurement method enables more optimal decisioning by allowing allows for the estimation of probabilities, and thus, informed decisioning (as decisioning that is capable of orienting correctly toward a direction of alignment).

Measurements a re used in decisioning to:

1. **Form a reference baseline** value (benchmark, base rate) for estimated change (*of* quality/progress).
    A. Is reference value set by prior measurement?
    B. If reference value not set by prior measurement, then synthesize reference value.
2. **Determine if change is necessary** (*for* progress).
3. **Inform a necessary change** (*to* progress).

Measurement objectives include those abilities necessary for decisioning:

1. **Conceivability** - To what (where) did something happen?
2. **Observability** - Did something happen?
3. **Comparability** - To what degree did it happen?
4. **Temporality** - How often is it happening?
5. **Stability** - Is the change sustained, or not; to what degree?
6. **Predictability** - Did that which was expected or predicted to happen actually happen?

These objectives are generally expressed as:

1. The number of...
2. The percent of....
3. The ratio of...
4. The incidence of...
5. The proportion of...
6. The probability of...

13.6 Measurement from a scientific (discovery) perspective

Measurement is the [experimental] process in which, to precisely describe the entities or events in real world, numbers or other symbols are assigned to its attributes by using a given scale and clearly defined rules. The result of the measurement is called measure. A Metric is a quantification of a specific characteristic from an entity in the real world, which can be inferred from a set of attributes.

13.7 Measurement from an engineering (technical) perspective

Measurement is the process by which numbers or symbols are assigned to attributes of entities in the real world in such a way as to describe them according to clearly defined rules.

In engineering, measurement contains information about attributes of entities. An entity is an object (such as a person or a room). Entities are described by the characteristics that are important to distinguish one entity from another. An attribute is a feature or property of an entity. Entities can be:

1. The products (deliverables) generates as outputs and outcomes from the service life cycle, as requirements specifications, documents with design, source code, testing, etc.
2. The project/development environment.
3. The user(s).
4. The events corresponding to the phases if the life cycle or to activities and incidents.

The attributes that can be measured depend on the entity or event considered.

Table 27. Decision Approach > Measurement: *Measurable attributes in relationship to generation entities and events.*

Entity or Event	Measurable Attributes
Requirements Specification	Words, phrases, paragraphs, verbs, adjectives
Block Diagram	Modules, coupling between modules, dependencies

14 [Decision] Tabular database

A tabular systems is an extension of relational databases. A tabular system is a system that can visually specify both conditional data (conditional rules) and unconditional data (unconditional knowledge, data patterns). A tabular system consists of a table with columns labelled by attributes. Any row of such system specifies characteristics of some object defined in the attribute space; it can also define a rule, provided that some attributes refer to preconditions and at least one is a decision attribute.
Tabular systems can encode both facts and rules:

1. Facts provide knowledge that is unconditionally true (given what is known).
2. Rules specify conditional knowledge.

Any tabular system specifies characteristics (knowledge) of certain objects. For some objects this knowledge can be valid, while for other it may be not true.
Tabular rule-based systems may be used to define attributive decision tables or control algorithms.
In computation, there are at least two types of computational systems:

1. Tabular computational - a system that supports tables as a data structure, but not the set of algebraic operators.
2. Physical computational - a system that supports algebraic (geometric) operators as a data structure.

NOTE: *Algebraic relation operators include, but are not limited to: greater than, less then, etc.*

14.7.1 Tabular system usages

The following are usages of a tabular system:

1. A tabular system may be used to perform material yield (e.g., water yield) calculation.
2. A tabular system may be used for recording the characteristics of material yields (e.g., the characteristics of each seedling fruit produced). In other words, material object characteristics can be tabulated (e.g., for a fruit, the following could be recorded: the external characteristics of size, color, skin; the internal characteristics of color of flesh, firmness, texture, grain, juice, degree of acidity or lack of it; and the environmental characteristics of quality, season, and the desirability of the fruit.

14.7.2 Database characteristics

The following are characteristics of a tabular database:

1. 'Minimally relational' is a system that supports tables, access, project, and join operators, but no other relational operators.
2. 'Relationally complete' is a system that supports tables and all of the operators of the relational algebra, and can thus be spatially visualized (as an object in relation to other objects).
3. 'Fully relational' is a system that support all aspects of the model when executing a SELECT command [for a 'solution'], and JOIN command using the SUB-LINK command. More simply, a fully relational system is a system that may be fully realized as a material solution from a selection of material solutions. The SUB-LINKING of relationships occurs between different material solution configurations (in the reference frame, context of, their expected results). Then, designs that match potentials can be JOINED, from which a single is SELECTED ... for EXECUTION by CONTRIBUTION.
4. In classical relational database (RDB) systems all the attribute values must be atomic ones.
   A. Atomic values (a.k.a., single values) are values where single cell contains single value. For example, a violation of a single value per cell would be an RDB with one column in the table named 'Energy', and beneath it there is a cell with two values, 10 and 5, instead of just the one value 10. Additionally, in an atomic value RBD, each cell (record) needs to be unique, and there should not be any repeating groups. Repeating group means a table contains 2 or more values of columns that are closely related. For example, the existence of repeating groups would be an RDB with multiple columns that contain only energy data and have the names 'Energy 1', 'Energy 2', etc. These columns that contain only energy data are repeating groups. The three design coherency requirements for an atomic value RDB are:
      1. User shall eliminate repeating group in individual tables.
      2. User shall create separate tables for each set of related data.
      3. User shall define the primary key for related data.
5. An object is:
   A. Value objects:
      1. Any atomic object:
         i. $o \in C$
         ii. For example: travis, John, 28, 389
      2. Any interval object:
         i. $I = [a,b]$, where a and b are atomic objects belonging to the same ordered set being a subset of C (such as integers and floats)
         ii. For example: $\in[2,5]$, $[17,123]$, $[a,b]$
      3. Any sequence object:

   i. Q = [o1,o2,...on] (*1,2,n*=subscripts), where o*1*,o*2*,...o*n* are objects.
   ii. For example: [1,2,3,4,5,6,7], [2,4,6,8], [1,2,3,5,7], [English, French, Russian]
4. Any set object:
   i. S = {o*1*,o*2*,...o*n*}, where o*1*,o*2*,...o*n* are objects.
   ii. For example: {potato, carrot, tomato}, {john, mary, sue}, {5,1,3,7}

B. Structural (tuple) object:
1. Any tuple object:
   i. O(*a1* : o*1*, *a2* : o*2* :,...,*an* : o*n*), where *a1*,*a2*,...,*an* ∈ A are distinct attribute names and 0*1*,0*2*,...0*n* are objects
   ii. For example: O*1*(first:travis, second:john, age:28), O*2*(town:London, street:Oxford, number:25), O*3*(languages: [English, French, Russian]), O*4*(cars: {honda, audi, bmw}), and a more complex object of the form O*5*(first:travis, second:john, age:23, O2(town: London, street: Oxford, number:25), children:[james, mary, jane], languages: [English, French, Russian], cars: {honda, audi,bmw}).

14.7.3 What is data

An atomic data item is some piece of information represented in certain accepted language, and:

1. As precise as possible (within the selected language).
2. Meaningful (having some interpretation).
3. Positive (no negation is used).
4. Unconditional.

14.7.4 What is knowledge

Knowledge emerges from data when information is systematically collected, organized, and interpreted, transforming raw facts into meaningful insights and understanding. It is best defined as the theoretical and practical understanding of the computational ability of common-kind. By using different systems approaches and methodologies, data can be collected in quantitative and qualitative form for the purpose of explaining, interpreting, and reflecting on the various aspects of a [societal] system. The sharing of knowledge has the potential to optimize technical interest in the prediction and control of natural and social systems (causal explanation); a practical interest in communication and creation of shared understanding among all individuals in a social systems (practical understanding); and a desire for self-integration to protect them from constraints imposed by power structures (reflection).

An atomic knowledge item is any data item and any more general elementary item of the accepted language, which:

1. May contain variables/sets/intervals/structures (according to the selected language).
2. Meaningful (having some interpretation).
3. Positive or negative.
4. Perhaps conditional.

Data and knowledge can be differentiated by their intended interpretation: a data item (such as attribute value, record, table) is considered to be data if the main intended use of it is to provide static, detailed and precise image of some fragment of real world while a knowledge item (such as fact, simple conjunctive formula, DNF formula, and especially rules) is intended to provide more general knowledge defining universal or local properties of the world. From practical point of view, one can consider data to be the part of knowledge expressed with the finest granularity and unconditional.

If the specification contains variables (e.g. universally quantified, or defining some scope ones) or it is true only under certain conditions (e.g. takes the form of rules, allows for deduction or any other form of inference), then it should be normally considered to be knowledge. However, in the uniform, simplified model proposed in this paper explicit distinction is in fact not necessary. A RDB table would be normally considered as data, but it may be considered as most detailed knowledge as well. On the other hand, tabular system of data templates can be considered as extensional specification of data.

Scholarly references (cited in document)

- Armistead, C.G. (1990). *Service operations strategy: framework for matching the service operations task and the service delivery system*. International Journal of Service Industry Management, Vol. 1 No. 2, 6-17.
- Blackburn, M., & Bone, M. (2016). *Transforming System Engineering through Model-Centric Engineering*. Technical Report SERC-2016-TR-109. Stevens Institute of Technology. https://web.sercuarc.org/documents/technical_reports/1526315380-SERC-2016-TR-109-Transforming_SE_Thru_MBSE_Interim_RT-157_v6.1.pdf
- Johnston, R. (1995). *The determinants of service quality: satisfiers and dissatisfiers*. International Journal of Service Industry Management, Vol 6, No. 5, 53-71. https://pdfs.semanticscholar.org/5923/4dfc81e571232626e15cf2feecf72cc5c2a6.pdf
- Johnston, R., Silvestro, R. (1990). *The determinants of service quality – a customer-based approach*. in The Proceedings of the Decision Science Institute Conference, San Diego, CA, November.
- Johnston, R., Silvestro, R., Fitzgerald, L. and Voss, C. (1990). *Developing the determinants of service quality*. The Proceedings of the 1st International Research Seminar in Service Management, La Londes les Maures, June.
- Newcomer, J.T. (2012). *A New Approach to*

Quantification of Margins and Uncertainties for Physical Simulation Data. Sandia Report: SAND2012-7912. Sandia National Laboratories. https://prod-ng.sandia.gov/techlib-noauth/access-control.cgi/2012/127912.pdf
- Parasuraman, A., Zeithaml, V.A. and Berry, L.L. (1985). *A conceptual model of service quality and implications for future research*. Journal of Marketing, Vol. 49, Fall, pp.41-50.
- Rizzo, D., & Blackburn, M.R. (2015). *Use of Bayesian networks for qualification planning: a predictive analysis framework for a technically complex systems engineering problem*. Procedia Computer Science, 61, pp133-140. https://doi.org/10.1016/j.procs.2015.09.173 | https://www.researchgate.net/publication/283197628_Use_of_Bayesian_Networks_for_Qualification_Planning_A_Predictive_Analysis_Framework_for_a_Technically_Complex_Systems_Engineering_Problem

Scholarly references (non-cited)

- Perny, Patrice & Pirlot, Marc & Tsoukiàs, Alexis. (2013). *Algorithmic Decision Theory Third International Conference, ADT 2013,* Bruxelles, Belgium, November 13-15, 2013, Proceedings. https://doi.org/10.1007/978-3-642-41575-3
- Allaire, B. (2007). *A system of indicators for culture and communications in Quebec. Part One: Conception and concerted development of the Indicators*. http://www.stat.gouv.qc.ca/statistiques/culture/systeme-indicateurs1_an.pdf
- Certain, G., et al. (2011). *The Nature Index: A general framework for synthesizing knowledge on the State of biodiversity*. https://doi.org/10.1371/journal.pone.0018930 | https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0018930
- Cowlagi, R. V., & Saleh, J. H. (2015). *Coordinability and consistency: Application of systems theory to accident causation and prevention*. Journal of Loss Prevention in the Process Industries, 33, 200–212. https://doi.org/10.1016/j.jlp.2014.12.004
- Elfouly, M., et al. (2015). *General Indicator Modeling for Decision Support based on 3D city and landscape models using Model Driven Engineering*. Peer Reviewed Proceedings of Digital Landscape Architecture, Buhmann/Ervin/Pietsch (Eds.), Wichmann Verlag, 2015.
- Heini, O. (2007). *Performance Measurements Designing a Generic Measure and Performance Indicator Model*. Geneva, 2007. https://pdfs.semanticscholar.org/a54a/3605dea5d5cd37c162bc9d9436f047d74fa1.pdf
- Olsina, L., et al. (2004). *Ontology for software metrics and indicators. Journal of Web Engineering*. Vol. 2, No.4 (2004) 262-281. https://pdfs.semanticscholar.org/047e/4cce849f91abdfa1c5c699521f572fe65cf5.pdf
- Vincente, K.J. (2008). *The Human Factor*. Expanding Frontiers of Engineering Journal. 32(4). https://www.nae.edu/19582/Bridge/ExpandingFrontiersofEngineering7308/TheHumanFactor.aspx

Book references (cited in document)

- Grönroos, C. (1990). *Service Management and Marketing.* Lexington Books. Lexington, MA.
- Preece, J., Benyon, D., et al. (1993). *A guide to usability: Human factors in computing*. Harlow, England: Addison-Wesley.
- Russel, S.J., Norvig, P. (2015). *Artificial Intelligence: A Modern Approach*. 3rd ed. Pearson Education India. https://www.pearsonhighered.com/assets/samplechapter/0/1/3/6/0136042597.pdf | https://www.slideshare.net/MohammedRomi/ai-03-solvingproblemsbysearching?next_slideshow=1

Book references (non-cited)

- Salles, M. (2015). *Decision-Making and the Information System, Volume 3*. Wiley & Sons, Inc. https://doi.org/10.1002/9781119102663
- *Systems engineering leading indicators guide*. (2010). Version 2.0. January 20, 2010. INCOSE-TP-2005-001-03. http://www.psmsc.com/downloads/other/seli-guide-rev2-01292010-industry.pdf

Online references (cited in document)

- Acheson, N. (2016). *What is the difference between an algorithm and a protocol, and why does it matter?* Linked In. https://www.linkedin.com/pulse/what-difference-between-algorithm-protocol-why-does-matter-acheson

Online references (non-cited)

- *Reliability & Validity.* Warwick. Accessed December, 2009. http://homepages.warwick.ac.uk/~psrex/Lecture%20W7%20Reliab.ppt
- *Summary of the 2018 Department of Defense Artificial Intelligence Strategy: Harnessing AI to Advance our Security and Prosperity*. (2018). US Department of Defense. https://media.defense.gov/2019/Feb/12/2002088963/-1/-1/1/SUMMARY-OF-DOD-AI-STRATEGY.PDF
- *zGuide 6: Systems engineering competency framework*. (2010). INCOSE UK. Issue 1. https://incoseonline.org.uk/Program_Files/Publications/zGuides_6.aspx?CatID=Publications

Approach: Standardizing

Travis A. Grant,

Affiliation contacts: *trvsgrant@gmail.com*

Version Accepted: 1 April 2024

Acceptance Event: *Project coordinator acceptance*

Last Working Integration Point: *Project coordinator integration*

Keywords: standardization, the standardization approach, standards, unified information production,

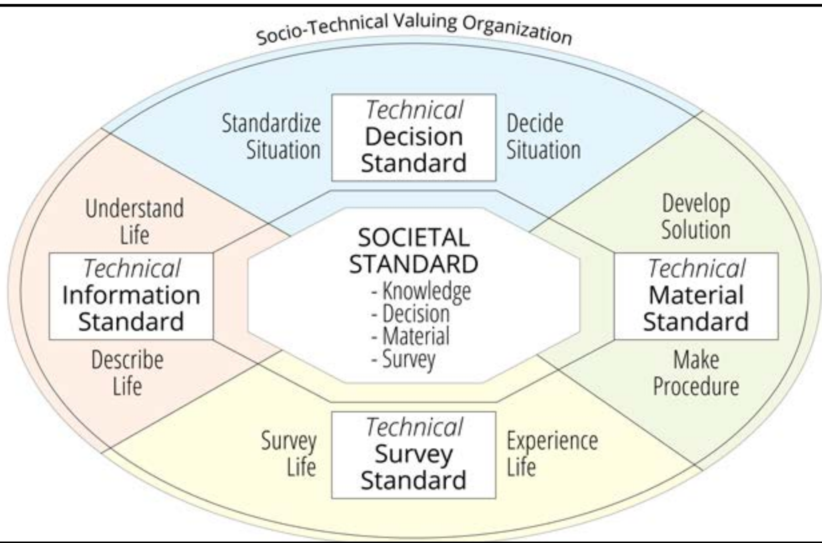
Abstract

This article explores the pivotal role of standardization in the transition of society towards a community-based operational model. In any given environment, the expression of function is fundamental, with these functions serving as manifestations of underlying capabilities. It posits that these capabilities can be effectively standardized through the implementation of consistent procedures and technologies. A standard, defined as a commonly agreed-upon knowledge set and/or method of operation, plays a critical role in simplifying life and enhancing the cooperation, interoperability, effectiveness, and efficiency of any repeated interaction. The core purpose of developing and adhering to standards includes: ensuring appropriate performance levels, meeting safety requirements, achieving consistency and repeatability in products, systems, or processes.

The article emphasizes that standards are established beyond the organizational level, incorporating the collective intelligence and efficacy of community-wide working groups. It highlights the process through which societal standards can be developed, suggesting the use of working groups drawn from the community's population to collaboratively outline operational procedures and standards. These societal specification standards not only dictate the operational framework for a community, but also elaborate on the rationale behind these procedures, ensuring a shared understanding across the community.

Graphical Abstract

Figure 7. *Standards are a repository of useful knowledge and ensure technical systems are built and operated correctly. Every technologically advanced society uses standards documentation to sustain expected standards of function, quality, and safety.*



1 What is a standard?

A.k.a., Socio-technical standard, integrated knowledge set useful for understanding, creating, and operating anything socio-technical.

A standard is a commonly agreed way of doing something. A standard is any set of technical and/or social specifications that either provide or are intended to provide a common design and/or operation for a product, process, service, or system. Standards not only make life simpler, but are essential in increasing cooperation, interoperability, effectiveness and efficiency of any repeated interaction. The purpose of developing and adhering to standards is to ensure minimum performance, meet safety requirements, make sure that the product/system/process is consistent and repeatable, and provide for interfacing with other standard- compliant equipment (ensure compatibility). Standards are primarily to ensure interoperability and, in matters relating to safety of the product, to ensure that the producer has not overlooked important safety-related design requirements. Fundamentally, standards are functional (useful) documents. Standards specify the characteristics, reasoning, and/or performance requirements of countless aspects of the early 21st century socio-technical world. Standards are an important part of society, serving as rules to measure or evaluate capacity, quantity, content, extent, value and quality. Standards are structured documents that iterate and contribute to a structured body of content that is clear, coherent, precise, unified, non-contradictory, and unambiguous. Working group experts draft and develop the content within technical committees (working groups). Working groups comment and decide on the content. Decisioning is done through protocols and working group consensus voting. Project working group coordinators prepare and publish the final product. Standards are usually developed through discovery and information integration (analysis) by working sub-groups. Generally, as new information is discovered that is relevant to a standard, the standard will integrate the newly given information, and evolve/adapt.

A standard is a process or system that has been agreed upon (formally or informally). Standards emerge when cooperation is present, and when safety is required. Therein exists the necessity for a repeatable process for comparing within a single category some known quantity and/or value with some to be known quantity and/or value. Standards define that which is required to effectively and cooperatively perform some function (or, "do some thing"). Take note, however, that there are multiple kinds of standards, and their meanings may vary slightly; they include, but are in no way limited to: measurement standards, standards of practice, protocol standards, law standards, policy standards, etc.

Standards vary in nomenclature across industries, resulting in numerous distinct terms used to refer to them within specific sectors. Standards can be published in the form of documents that contain:

1. Technical standards (a.k.a., technical specifications).
   A. A technical standard is an established norm or requirement for a repeatable technical task.
2. Social standards (a.k.a., social specifications, behavior and procedural standards).
   A. A social standard is an established norm or requirement for a repeatable behavior, or, not engaging in a behavior.
3. Political standards (a.k.a., policy, legislation, constitutions, legal standards).
4. Rules (a.k.a., code standards).
5. Requirements.
6. Agreements.
7. Guidelines.
8. Procedures and practices (a.k.a., protocol standards).
9. Models.
10. Definitions and explanations.
11. Articles.
12. Etc.

Standards may be called different names in different disciplines and under different applications:

1. Standards that are used for information storage are called '**formats**' (e.g., *information formats*).
2. Standards that are used for transmitting information are called '**protocols**' (e.g., *decision protocols*).
3. Standards that are used for material transformation by humans are called '**procedures**' (e.g., *material procedures*).
4. Standards that are used for material transformation by machines are called '**instructions**' or '**commands**' (e.g., *material commands*).

Technical standards are often documented in a so-called "standard specification" (or, "specification standard") that describes ways to consistently organise information so that it can be understood and used by multiple independent applications and users.

Using a standardized method of expressing information and a standardized way of delivering it cuts out the need to adapt your systems for every organization you intend to do business with. If everyone is using the same standards, communicating data becomes easier and cheaper, ultimately meaning there is more revenue to be distributed across the whole digital supply chain.

In the language of innovation, standards help to harmonize technical specifications of products and services making global materials cycling more efficient, while breaking down barriers to cooperation. Conformity is what the InterSystem Team does. The InterSystem Team conforms the environment to the set societal standard while following other set societal standards.

Standards are used to control processes and outcomes, and establish levels of excellence. The benefits of standardization to the individual, society, and the ecology are many. It is difficult to imagine a world without industry (and industrial) standards. Without standards early 21st century society would not function. Human interaction depends on standards. Human speech is ruled by rules and standards. And, in early 21st century society, human behavior is significantly governed by the standards of manners and laws. We can't live as a society without an agreed upon set of expectations to make our interactions and systems predictable, rational, safe, and stable. The ubiquity of standards indicates that nothing less than 'quality' should be settled for, particularly at the societal level.

Open societal standards are the backbone of a community-type society, ensuring the safety and quality of products and services, facilitating transparency, understanding and improving the environment. Conformity to standards reassures everyone that products, systems and organizations are safe, reliable and good for the community.

Standards and specifications are documents that describe and/or recommend a set of rules and conditions for how materials and products should be manufactured, defined, measured, or tested. Standards are used to establish minimum levels of performance and quality and optimal conditions and procedures for the purpose of ensuring compatibility of products and services from different sources. Specifications tend to have more limited applications than standards and generally establish requirements for materials, products, or services. Standards and specifications may be issued by voluntary technical or trade associations, professional societies, national standards bodies, government agencies, or by international organizations. Standards may be developed by organizations operating at national, regional or international levels, at the market level, the State level, or some combination thereof.

In the context of data, a standard is a technical communications file-document that applies collectively to codes, specifications, recommended practices, classifications, test methods, and guides. Standards represent the integration of multiple sets of data by multiple parties (humans and machines) into an optimal 'standard' data set about a socio-technical topic. Standards are composed in accordance with an established social procedure in order to ensure clear and coherent communications. A standard is like a blueprint; it provides guidance to someone when he or she actually build or operate something. A standard can refer to a level of quality or attainment, or an item or a specification against which all others may be measured. A technical standard is a set of commonly agreed decisions, rules and behaviors, in regard to technical systems; and a social standard is a set of commonly agreed to decisions, rules and behaviors, in regard to individual humans and the organizations in which they participate. A standard establishes common ground that provides means for cooperative development and shared operation.

> **NOTE:** *A practice is a repeatable approach to doing something.*

Standards serves several purposes:

1. Standards describe and explicate a design in a way that makes it duplicable.
2. Standards facilitate communication and shared understanding through a shared set of definitions and visualizations.
3. Standardization improves consistency in understanding and in results.
4. Standards are a set of final/last integrations on a subject matter.
5. By using standards, the end user can be sure a minimum due diligence has been exercised (quality control and assurance).
6. In the case of dispute one can use "following a standard" as a defense.

A standard is a formalization, a record, a log, official information, standardized information, selected information, and an understandable model. In concern to formality, standards are:

1. **Formal**, in that they are officially established, documented, and recognized as authoritative guidelines or benchmarks within a particular field/context.
2. **Semi-formal**, meaning they are not entirely mathematically formal. While math embodies complete formality in data representation, standards may incorporate formal mathematical elements along with other forms of data representation.
3. **Semi-structured,** deviating from complete tabular structure. Tabular data is highly structured, unlike the semi-structured nature of standards, which can encompass formal mathematics, graphs, completed tables, and other forms of structured and unstructured data representations.

There are three modeling language types:

1. **Informal** (e.g., human natural language).
2. **Semi-formal** (e.g., graphical languages such as flow charts).
3. **Formal** (e.g., mathematics).

In the context of a formal document, "formal" is an attribute of information identifying that it is stored in memory (has a documented state), such that the information can be recalled and acted upon at a later time. A formally documented solution that has influenced results in the real world, can have its results assessed (evaluated) at a later date, or even, in-between documented usages.

> **NOTE:** *A formalized structure gives people a method and location from which to work together.*

A formally documented visualization can be expressed in any of the following, and any combination thereof:

1. **Written (text)** - Linguistic directions with an accompanying set of understandings to ensure comprehension.
2. **Diagrams (graphic)** - A diagram is commonly understood as a means to convey information through symbol and figure, and as such, it is used to synthetically represent concept and form.
   A. **Drawings** - diagrams with spatial information.
3. **Simulations and Computer Aided Designs (computation)** - computing spatially dynamic information over processing cycle-time.

Simply, a standard answers the question, commonly, given what is known: How do "I/you/we" know how to do (build or operate) something (read: something material)? A standard is something that should, given the integration of all that is known by "me/we", be followed when doing something. If standards aren't used then design iteration and project intercommunication becomes exceptionally challenging and is more likely to lead to conflict. In a sense, a standard is a protocol, and protocols are how individuals (i.e., we) communicate. When protocols aren't define communication is poor.

Among a material network of integrated habitat service systems, global and local Intersystem teams need to be able to reliably depend upon each other; that other individual Intersystem team members and other local habitat service systems are doing what is expected, following standards and doing the right thing.

> **CLARIFICATION:** *A standard of work is the standard (quality and/or function) at which something is made, built, or operated. Standards ensure quality of service, clear communication, and operations transparency.*

Standards exist for anything that can be materialized and operated, such as software computer hardware, telecommunications, health care, automobiles, aerospace, and many areas of manufacturing. Standards are also employed when we have to ensure that things made by different people will either work together or work in the same way. There are standards that describe the "blueprints" for the plugs and jacks, but the standards themselves are not the actual plugs or jacks. We separate the ideas of "a standard which may be implemented" and "something that is an implementation of a standard."

For clarification, there are different types and sub-types of "standards":

1. In science and engineering, and operations, there are technical and procedural standards.
2. In the State there policies, political standards [delimiting when the violence of the State occurs].
3. In the market, there are contracts, social standards [delimiting when engagement of the State occurs].
4. In a community system, there are decision standards (sets of inquires) that become computable thresholds at an understandable, algorithmic level [delimiting issue prioritization].

Standards often appear complex. To some degree, this is unavoidable. To be useful, standards are details. Standards may specify characteristics or performance levels of products, processes, services, or systems. Humans need standards to generate and operate society together. In other words, humans need standards for information construction, coordination, and materialization if they are to work together at a population scale. Standards are required to meet global human needs and human advancement.

As systems are being designed, new standards issues or need for clarifications may arise. An iterative/adaptive process should be used to incorporate any updates, changes, or clarifications into the standards document and supporting materials.

Humanity has long needed a unified societal standards to realize the intended benefits of standardization and complete effectiveness of community at the global scale. Shared goals and principles embodied in the a societal standard provides motivation and direction. Societal standards establish a basis for collective action so that members of the community can contribute and participate together efficiently. All humans have some fundamental set of mutual goals. Humanity's mutual goals oblige everyone to work pro-actively with one another to further shared technical, social, and individual interests. These goals they commit some of humanity to participating regularly in the critical activities of technical workgroups (for standardization of the habitat support system, life support system, etc.).

A socio-technical standard is an established procedure or requirement for a repeatable technical task. It is usually a formal document that establishes uniform engineering or technical criteria, methods, processes, and practices.

Standards are necessary prerequisites and complement of products, processes, and services. Wherein, standards can:

1. Ensure safe materialization and operation, everywhere.
2. Promote technical efficiency.
3. Foster cooperation and integration.
4. Lower barriers to access.
5. Diffuse new technologies.

6. Protect human health and the environment.
7. Transparently meet human needs/demands.

> **NOTE:** *Unlike in community, in the market-State, standards can be used to disadvantage others.*

In the market-State, standards are hierarchically organized in the following ways:

1. National standards - are federal State created by authorities that dictate territorial-level regulations.
2. Regional/sub-regional standards - are created by local authorities that dictate local regulations.
3. International (e.g., ISO, IEC, ITU) standards - are developed by inter-national standards setting organizations (SSOs; or standards development organizations, SDOs).
4. Associations - are guidelines setting bodies that produce guideline documents and research studies to inform future standards.
5. Companies - have business standards, also known as their standard operating procedures.

In general, going up the hierarchy the standards are more restrictive and less generic, and going down the hierarchy, the standards are less restrictive and less generic.

1.1 *Why apply standardization?*

Standardization enables, beneficially,

1. The accumulation and integration of knowledge [into more unified/integrated forms].
2. The optimization of states and processes [via the repeatability of the standard process, which allows for the optimization].
3. The collaboration of self-directed entities by the standards processes [producing a value set and behavior conducive to sharing and cooperation].

Thus, resulting in:

1. Increased quality.
2. Increased speed.
3. Reduced effort.
4. Increased safety and control.

1.1.1 Coherence

A.k.a., Alignment.

Coherence (alignment) is important for standards (and therein, humanity and the ecology) in the following way:

1. Internally coherent.
   A. Standards should not conflict.
      1. How do you ensure that standards do not conflict with one another?
         i. Final approval, after working group approval, of the coordinator is necessary, because the role of the coordinator is that of someone who must have shown and maintains an understanding of the whole system (and not just an expert at the sub-group/-team subject).
      2. How do you coordinate superseded and withdrawn decisions, solutions, standards and articles?
         i. Coordinators meet regularly and monitor each other's feeds (where appropriate).
      3. How do you ensure that two groups do not develop different decisions, solutions, standards and articles for the same subject?
         i. Coordinators meet regularly and monitor each other's feeds (where appropriate).
   B. One system, one standard.
      1. Axioms divide systems into separate (but, unified) standards.
2. Externally coherent.
   A. Avoid conflict between standards and operations. Users and habitat service teams apply the standards.
   B. Avoid conflict between users and contributors (i.e., meet real-world human need fulfillment).
   C. Agreement by contributors and users is/feels intuitive.

1.2 *Information adaptation*

In the early 21st century, standards are developed in a distributed way with many equivalent-level standards present for any given need. Hence, there is a need for developers (of standards) to seek out and embrace opportunities to harmonize standards and adopt the best ideas from the range of standard setters, contributing standards into a commons for the formation of a unified standard for community operations within a societal commons. Collaboration must take precedence over competition, and perpetuation in the commons must take precedence over privatization (commodification/commercialization).

During the period of uncertainty that will exist until the most appropriate standard(s) become widely adopted, to allow for consistent interpretation by readers (educators and adopters) it is essential that reporting of data (observed alignment) include sufficient detail regarding the underlying methods used. Such transparency will enable the ability to apply an additive and iterative approach to adapting the executed societal specification to a higher potential for human fulfillment, regardless of which standards become more globally accepted. It will also be important to ensure a clear transition from interim standards (a.k.a., transition standards) and the final accepted standards, including methods to determine and present comparative figures for interim results that reflect the final measurement method chosen (i.e., so that appropriate comparison can be made between results of different periods). It is important not to harm needs (i.e., interrupted needed human support services) during transition between standards.

1.3 The specification standard

> *A.k.a., The design standard, the construction and operation standard.*

A specification often refers to a set of documented requirements to be satisfied by a material, design, product, or service. A specification is often a type of technical standard. Specifications are a type of technical standard that may be developed by any of various kinds of organizations.

There are different types of technical or engineering specifications (specs), and the term is used differently in different technical contexts. They often refer to particular documents, and/or particular information within them. The word specification is broadly defined as "to state explicitly or in detail" or "to be specific". Specifications are a specific communication about a system.

Common specifications for systems include, but are not limited to:

1. Requirements specification.
2. Functional specification.
3. Design/product specification.
4. Construction, assembly, disassembly specification.
5. In-service, maintained as, operations specification.
6. Usage specification [usage parameters].

1.4 Standards developing organization (SDO)

Early 21st century understandings have evolved over the last 100 years to meet the needs of international industry and society in general. These standards systems primarily operates on a sector-by-sector basis. If humanity is to survive and flourish, then global standards developers must share and cooperate at the level of what is actually possible, with each other, in standards and conformity assessment activities.

An SDO is an organization that is an accredited representative of:

1. International Organization for Standardization (ISO), or
2. International Electrotechnical Commission (IEC) [iec.ch], or
3. has been accredited by these organizations.

The American National Standards Institute (ANSI) [ansi.org] is the sole U.S. representative to the ISO/IEC, and in turn, ANSI accredits more than 270 public and private standards developers that adhere to ANSI criteria for developing voluntary consensus standards. In contrast, Standards Setting Organizations include not only formal SDOs, but trade organizations, consortia, alliances, and others. Note that organizations like IETF, OASIS, and the W3C are considered SSOs, and their patent policies are independent of governing SDOs.

1.5 Standard setting organization (SSO)

A standards developing organization (SDO) generally refers to an industry or sector based standards organization that publishes and develops industry specific standards. Other names for this type of organization include, but are not limited to: standards setting organizations (SSO) or consortia. Many standards are developed by the standards body itself, or developed by a corporation and accepted by a standards body (and the standards body may, or may not, be a corporation, itself).

There are many SSOs, national, regional as well as industry-based. A formal SSO refers to one that is recognized directly or indirectly by a government entity. Very often, there will exist a formal SSO in a country that the government recognizes as the national standards body and which has the authority to designate a specification as the national standard for the country. Thus, for example, in India, the Bureau of Indian Standards (BIS) is the national standards body; in the USA, the American National Standards Institute (ANSI) is the official body; while in the United Kingdom, it is the British Standards Institute (BSI).While any organization can come up with its own specification and call it its standard, to be an internationally acceptable standard, it has to be either set or adopted/adapted by an SSO that is recognized as an international standard-setting body. The three organizations having the highest international recognition are the International Organization for Standardization (ISO), International Electro-technical Commission (IEC) and the International Telecommunication Union (ITU). ISO is an international standard-setting body made up mainly of representation from national standards bodies. IEC is a standards organization that deals mainly in setting standards for electrical, electronic and related technologies. A body that is an accredited representative to ISO or IEC is called a Standard Development Organization (SDO); most national standards bodies are SDOs. ISO produces standards in many domains, including IT. Many of its standards are also developed jointly with IEC, in particular, the ISO/IEC Joint Technical Committee 1 (JTC 1) is active in setting standards for the IT domain.

> **NOTE:** *The State often acts as a standard setting organization as well as the coercive enforcer of standards. Some laws are legal contracts for*

enforcing cultural standards (socio-standards) and others are legal contracts for enforcing technological standards (technical standards).

1.5.1 What is a "proprietary" standard?

A.k.a., De facto standards.

A de facto standard is a specification that became popular because everyone just happened to use it, possibly because it was implemented in a product that had significant market acceptance. The details of this specification may or may not be available publicly without some sort of special legal arrangement.

The basic problem with a de facto standard is that it is controlled by a single commercial entity, who can, and often does, change it whenever internally decided. At that point, everyone else who is trying to interoperate with the information. The owning vendor gets a time-to-market advantage, possibly increasing its market share, again.

Traditionally, it was not in the interest of the owner of a de facto standard to make the details too widely available because they didn't want to make it easier for anyone else to move into their market space. They would say, "Why would I voluntarily let other people build products compatible with my data? They might steal away my customers!". In answering these questions, it is essential to think in terms of transparency, community, democracy, costs, freedoms and permissions, and restrictions.

In the market-State, proprietary standards require financial payments (i.e., have a fee, require trade, need money). Conversely, in community, standards relevant to the design and operation of society are not proprietary (i.e., do not require a fee or trade). Proprietary standards use the State enforcement mechanism to restrict the ways and opportunities with which people can interact with their societal information system (i.e., with their "government").

For example, proprietary software is usually made available in a form that will run on your computer, but you are not given the original material from which it was created. You cannot freely incorporate proprietary software in your own products, though you may be able to obtain some sort of fee-based license to let you do this. The basic idea here is that proprietary software contains intellectual property that was created by the software provider and that is not shared because it offers competitive advantage. Licensing proprietary software to users for a fee is a long standing business model in the software industry. Licensing is not the only way revenue can be created, and it is often supplemented with subscription, maintenance, and support charges.

Problems arises when a standard is owned by one market player that uses the position of advantage (over others) to control the further development of the standard, or tries to manipulate it through licensing policies in order to exclude or include some specific groups of actors. In this case, the standardisation is used for contrary purposes than promoting co-design, co-operation, and co-usage.

The full co-operation in the community is, therefore, provided by standards that are open; because, open standards are freely available without any restrictions, they allow standardised information and technology to be used in products and services without ownership. As a consequence, the access to information and technology is accessible globally to everyone.

1.5.2 What is an "open" standard?

Open standards are usually defined as standards that are available for all to read and implement without any royalty or fee (i.e., they are free [of trade] to use, share, and modify. An open standard is free from legal or technical clauses that limit its utilization by anyone. Simply, an open standard refers to a format or protocol that is:

1. Subject to full public assessment and use without constraints in a manner equally available to all parties.
2. Without any components or extensions that have dependencies on formats or protocols that do not meet the definition of an open standard themselves.
3. Free from legal or technical clauses that limit its utilisation by any party or in any business model.
4. Managed and further developed independently of any single vendor in a process open to the equal participation of competitors and third parties.
5. Available in multiple complete implementations by competing vendors, or as a complete implementation equally available to all parties.

Open standardization ensures that technology is accessible for everyone, irrespective of business-model, size, or exclusive rights portfolio.

1.5.3 What is a "voluntary" standard?

Voluntary standards are standards established by any organization, and that are available for use by any other person or organization, private or government. The term includes what are commonly referred to as "industry standards," as well as, "consensus standards." In the market-State, it may become mandatory for the regulatory-enforcement authority system.

Different licensing practices have been developed in order to overcome the issue of patents essential to standard implementation. For example 'royalty-free' (RF) licensing and 'fair, reasonable, and non-discriminatory' (FRAND) licensing. Take note here that FRAND terms are incompatible with Free Software.

1.5.4 Patents in standards

Sometimes, the standard specification includes technical solutions that are needed in order to implement the standard. In the market-State, these technical solutions can be protected by patents. Whoever wishing to adopt and implement the standard in a relevant jurisdiction has to, therefore, acquire the appropriate licence from the patent-holder.

1.6 Standardization in the market

In the market, there are competing standards development organizations. Some of the competing standards organizations are called “de jure” organizations, because they have particular credentials in State jurisdictional (national or international) settings. Some governments have laws that make it very difficult to use standards that do not come from de jure organizations. ANSI, ITU, and ISO are examples of de jure organizations while groups like the W3C, OASIS, and the OMG are usually just referred to as consortia. Sometimes a standard produced by a consortium will be submitted and accepted (“blessed”) by a de jure organization to make it more palatable for government procurements. Of course, de jure organizations, like all standards groups, must be very careful what they publish (“bless”) because they have reputations for quality and relevance that they hope to maintain.

Consortiums have a formal governance structure wherein a consortium governs the standard. Typically, a consortium comprises key members and contributors, either from commercial or non-profit organizations, or being individuals. Consortium members are elected or appointed to a binding by law.

In the market, certification marks and logos “prove” they have been certified to certain safety standards. In the market, compliance with standards is often a jurisdictional issue. The brand/logo is to “prove” to the customer that the supplier has produced an item that conforms to the standardization. In the market, jurisdictional law enforces compliance to standards; thus, the necessity for the mixture of technical and legal documentation under market-State conditions.

1.7 What is the difference between a specification and a standard?

A specification is the result of (i.e., strictly bound to) the requirements. A standard is something that is consistent until new information is learned (i.e., what is probably optimal, contextual). A specification is a communicated [or communicable] design.

1.8 What are technical interoperability standards?

Technology interoperability standards are specifications that define the boundaries between two objects that have been put through a recognized [societal] decision process. In community, the decision process is supported, transparent, and open; in the market-State, the decision process may be a formal de jure process supported by national standards organizations (e.g. ISO, BSI), an industry or trade organization with broad interest (e.g. IEEE, ECMA), or a consortia with a narrower focus (e.g. W3C, OASIS). The standards process is not about finding the best technical solution, and codifying it, but rather to find the best value-encoded (“consensus driven”) solution with which all the participants can live well and optimally. Whereas market implementations of interoperability standardization can be highly challenging, community application of interoperability tends toward system integration as the interoperable standard of priority. Market implementations are expected to benefit customers, by enabling choice in a marketplace. Alternatively, a global habitat-service standard specification enables the effective and efficient functional (and quality) design of a global access service system for all of humanity.

> **INSIGHT:** *A system which is optimally interoperable is open to unifying (and not, trading).*

In the market, instead of one unified and cooperatively developed standard, there are [often] multiple separate competing standards (and hence, product designs), which generates the market-based need for an interoperability standard. In Community, interoperability is the norm, because the information system is openly unified by a population of cooperating human contributors. Collecting data in community is simple because interoperability is designed in-to the system’s design, and it is not an afterthought (or externality) of the result of market-State organizations developing socio-technical systems on their own, or in secret. Collecting data from lots of different sources, expressed in lots of different ways, is a result of proprietary (market-based) standards, and it is a waste of human energy and resources, because interoperability is being considered “after the fact” (i.e., after the standard has been developed, or a product has been produced). In the market, companies often implement a particular function in ways that do not build on current open standards. They might do this because no standard exists to meet their needs, because they decide to implement the same function without relying on standards for business reasons, or because they are unaware a standard exists. When there is competitive advantage in a global socio-technical system, then there is the need for additional layers of unnecessary, abstract, potential hurtful relationships (Read: licenses to engage State (i.e., the coercion and violence of the State) against a competing entity in the market-State; “jurisdiction”).

When every body can view the standard, then everyone can follow the standard, then intercommunication (and sub-system interconnection/-ability) have the potential of being optimized in the next iteration.

In the market, by using interoperability standards, software and hardware systems made by different market-State organization can nevertheless communicate in a high level way that does not depend on the underlying implementation details. This means we don't all have to buy our computer hardware from the same vendor and we don't all have to use the same operating system and applications. In this sense, interoperability is the open source value applied between vendors, but it is not integration. It is the result of not having integration to begin with.

In the market, standards enable interoperability, compatibility, and consistency across markets.

1.8.1 System [service] interoperability

> **QUESTION:** *What, fully described and explained, visualized, does 'service' mean?*

Interoperability is the ability of systems to provide services to and accept services from other systems and to use the services so exchanged to enable them to operate effectively together." A more precise definition of interoperability would require at least two steps: (1) identifying the vocabulary and syntax of service interfaces, and (2) defining interoperability mathematically. In this paper, I address the first requirement. Preliminary results of an ongoing debate suggest that the theory of institutions (Goguen and Burstall 1992 ; Goguen 2004 (draft)), building on category theory, supplies the necessary formal foundations for the second requirement. The notion of interoperability needs to be understood broadly enough, encompassing the interoperation between human beings and systems. But it should also remain precise enough, allowing for a common syntactic basis.

1.9 What is standardization?

Standardization refers to the process of establishing a common, shared model of the criteria, terms, principles, practices, materials, items, processes, equipment, parts, sub-assemblies, and assemblies appropriate to achieve the greatest practicable uniformity of products and practices, to ensure the minimum feasible variety of such items and practices, and to effect optimum interchangeability or interoperability of equipment, parts, and components. The standardization processes naturally create compatibility, similarity, measurement and symbol standards. Standardization can help to maximize compatibility, interoperability, safety, repeatability, or quality.

> **NOTE:** *Socio-technical organizations have the potential to become more efficient through standardization.*

The four levels of standardization (in the context of interoperability between sub-systems in a unified system) are:

1. **Compatibility** - the sustainability of products, processes, services for use together under specific conditions to fulfill relevant requirements without causing unacceptable interactions.
2. **Interchangeability** - the ability of one product, process, or service to be used in place of another to fulfill the same requirements.
3. **Commonality** - the state achieved when the same knowledge, procedures, or equipment are used. Standardization of measurement and symbol standards.
4. **Reference** - the state of having the ability to trace information back to an evidence base.

A short history of standardization might be:

1. Philosophic and tribal standardization
2. National [market-State] standardization
3. International [market-State] standardization
4. Planetary [community] standardization

1.9.1 What is an asset identity code?

An asset identity code is a collection of mandatory standards, which has been codified by an information control system, and thus, has become part of the informational decisioning framework represented by that materializing system.

1.9.2 What is laboratory accreditation?

Laboratory accreditation is the formal determination and recognition that a laboratory has the capability to carry out specification tests in accordance with prescribed procedures.

1.9.3 What is harmonization?

Harmonization is the process whereby two or more habitat service systems (or, nations or standards bodies) reliably replicate and explicate ("agree on") the content and application of a standard.

1.9.4 What is meant by design decision standardization?

Design decisions are controlled to ensure design standardization as the adherence to specifications, tasks, standards tests, or other requirements. For example, a high-level design decision standardization is that of the requirement and specification for an network of integrated city systems. The majority of the planetary population live in a network of integrated city systems. The integrated city systems are a standardized, repeated, and sub-service bounded populated geoinformatic environment.

1.9.5 What is meant by validation (conformance) assessment?

Validation (conformance) is the state of having satisfied the requirements of some specific standard(s) and/or specification(s). Validation (conformity) assessment is the procedure by which an operation, product, process, service, or system becomes recognized in the decision system as accepted solution to the user's issue(s). Validation (or conformance) is used with respect to voluntary standards and open specifications, whereas compliance is used with respect to mandatory standards and regulations.

1.9.6 What is a service ("certified") product?

A service ("certified") product is a product that has been inspected, evaluated, tested, or otherwise determined to be in conformance or compliance with applicable or specified provisions of referenced standards, codes, or other requirements and certified by an authority which is recognized or has the legal power to grant such certification. Certified products imply a guarantee or warranty of product conformance and that the product is under the test and surveillance procedures of a specified certification system.

Information service standards for service fall into three categories (Read: the domains of software interoperability):

1. Data formats - A data format is how information is represented and structured.
2. Protocols - A protocol wraps up the data format with additional data necessary for transmission, so it can be moved reliably from one computer to another.
3. Interfaces - The interface is the exact specification of how you tell a service to do something, whether it is a query or an action to be performed.

All together, these three things describe how you talk to a service and how they talk to each other.

1.9.7 How do I locate standards?

Most standards developing organizations have search tools to locate and order standards that they develop. The SES web site provides links to most of these organizations. There are also several databases and websites that provide searches across standards developers at the national, regional, and international levels, including but not limited to:

- NSSN: A National Resource for Global Standards of the American National Standards Institute at [nssn.org] contains over 250,000 references to standards from over 600 standards developers worldwide.
- Standards Store of the Standards Council of Canada at [standardsstore.ca] contains over a very large listing of standards from hundreds of standards developers worldwide.
- Stanford Libraries Standards Reference Guide. [library.stanford.edu]
- The web site [standards.gov] maintained by the National Institute of Standards and Technology provides useful links to many databases worldwide that can help locate standards.
- The U.S. Department of Defense Acquisition Streamlining and Standardization Information System (ASSIST) database at [assistdocs.com] helps locate military and federal specifications and standards that can be downloaded free of charge.

1.9.8 Who are the globally known standards setting bodies?

In early 21st century society, the significant, globally recognized standards organizations are numerous; versus community, where there is one unified and optimized standard. Some of the most well-known are relevant standards settings bodies to global technological knowledge in general, include but are not limited to:

> **CLARIFICATION:** *Some organizations produce multiple standards and have no unified standard. Other organizations produce one unified standard, within which there may or may not be multiple sub-standards.*

1. Auravana.
   - *One unified standard (many sub-standards).*
2. Electronic Industries Alliance (EIA).
   - *Multiple standards.*
3. International Organization for Electrical Engineering Standardization (IEEE).
   - *Multiple standards.*
4. Council on System Engineering (INCOSE).
   - *Multiple standards.*
5. Institute of Electrical and Electronics Engineers (IEEE) .
   - *Multiple standards.*
6. International Electrotechnical Commission (IEC).
   - *Multiple standards.*
7. International Standards Organization (ISO).
   - *Multiple standards.*
8. Project Management Institute (PMI).
   - *One standard.*
9. National Institute for Standards and Technology (NIST).
   - *Multiple standards.*
10. American National Standards Institute (ANSI).
    - *Multiple standards.*

In the early 21st century, there are an incredibly large number of professional and useful socio-technical standards-issuing organizations throughout the world; the following list only identifies some of the more well recognized standards organizations at a global level. Note that not only do non-profits and governments produce standards, but corporations often develop their own standards also. Some corporations contribute to/ participate in the working deliverables of major national and international standards bodies also (there may be financial and other relationships in these cases)

A list of common standards setting organization may include:

- American National Standards Institute (ANSI). [ansi.org]
- American Society of Civil Engineers (ASCE). [asce.org]
- British Standards Institution (BSI). [bsigroup.com]
- German Institute for Standardization (DIN). [din.de]
- International Code Council (ICC). [iccsafe.org]
- International Council on Systems Engineering (INCOSE). UK Chapter. [incoseonline.org.uk]
- International Electrochemical Commission (IEC). [iec.ch]
- International Standards Organization (ISO). [iso.org]
- Institute of Electrical and Electronics Engineers (IEEE). [ieee.org]
- National Aeronautics and Space Agency (NASA). [standards.nasa.gov]
- National Institute of Standards and Technology (NIST). [nist.gov]
- National Academies of Sciences Engineering Medicine. [nap.edu]
- MITRE Corporation. [mitre.org]
- The Open Group. [opengroup.org]

1.10 What is a unified standard?

A unified standard is a single standard developed through the cooperation of a whole population who have an interest in participating in the coordinated development and/or use of the standard. Existence as a standard requires that all views and objections be considered, that reliability, objectivity, and certainty are available to everyone, and that an effort be made toward the resolution of all potential issues into a more optimal organization of useful information for the whole population. Unified implies more than the concept of a simple majority, opinion agreement, or consensus, but not necessarily unanimity. At the societal level, a standard requires reason and evidence for reliability, because it represents the optimal, and hence, safely reliable, way of doing anything in society, even regenerating society itself (Read: the societal information system specification).

Because society is an information system, it can be designed in a way that works better for everyone. There is a choice between openness in which information is shared by all, or we can have a closed model in which information is exclusively owned and controlled by competing interests. And, that choice gives very different worlds. If we choose open, then we have a world of access and fairness and fulfillment, and on the other side, 5he closed side we end up with digital dictatorships, in a world where the few dictate and dominate, whether that is online or shaping and controlling designs in ways that they choose and threatening or just excluding competitors and those seen as untrustworthy to their competitive advantage. In an open world. Viewing the societal system as fundamentally informational is key.

Open standards are open to the contribution of all (voluntary), open to usage by all (habitat), and evolve over time to more greatly fulfill all individual human beings.

There are two possible (at least, diametrically) constructions of an information-based society:

1. **Information symmetry** - open source, global cooperation (Read: the community).
2. **Information asymmetry** - closed source, competition, the artificial boundaries of the market (Read: the "market" and the "State").

There are two construction transparency phases:

1. **The transparency of the result:** The release of an operational, real-world, moneyless, access-based, open-source [code], integrated city-society.
    A. Is the result, global access (an open-source society); regardless of scale?
2. **The transparency of the development:** The open source development of the city and larger society.
    A. Does transparency of development matter (e.g., closed source), if the result is likely global access (e.g., open source)?
    B. **Open development** (e.g., open source projects, and global access licenses, transparency events and decisions).
    C. **Closed development** (e.g., NDA agreements, employment contracts, secrecy events and decisions).

1.11 Who uses standards?

Standards are useful, and sometimes essential, for anyone constructing anything at any level of socio-technical design, where information has previously been integrated into a standardized knowledge set of how to know and do something well and with intelligence. Where there is materialization (and hence, visualization), there is the potential usage of a standard to benefit the whole using population.

Every socio-technical society is built on written down standards. What is written down, documentation and visualization, is of primary importance for understanding, for coordination, and for adaptation. What is written down is useful information for all users, and essential information for workers (to varying degrees, with coordinators expected to be the most familiar with the unification of the standards). Standards are the description, explanation, and standardized way of working together in an understandable, ordered, and formalized manner, in an efficient manner. Without written socio-technical standards nothing of socio-technical value can be produced at scale. Without an understanding of socio-technical standards (their existence and content) it is not possible to coordinate a socio-technical society in the 21st century and past. Coordinators require a high-level understanding of the standards to effectively complete their project role; because they must both (1) know where to communicate, and (2) know in what alignment (with the existing standards) is the communication. In this second way, they are integration facilitators, and to integrate without contradiction, error, or bias, there must be a high-level understanding of the system's unification. In the early 21st century, this requires reading and visualization, particularly on the part of coordinators of teams/groups. In a team structure, this means coordinators must have Here, it is important to recognize that this is an engineering hierarchy, which is capable of safely bringing into existence new social creations; conversely, an authoritarian hierarchy brings coercion and competition into socio-technical creation. Coordinating leaders are accountable for a knowing the content of the societal standards.

> **NOTE:** *In the future, an AI may be trained on these standards and assume the functions of human coordination using software.*

1.12 Why are standards used at the societal level?

At the societal level, standards are used for many reasons, one of the most important being construction of the information and global habitat service systems. A societal systems specification is a standard that varies based upon the data and the intention of the population with access to the data. In society, there are standards for information infrastructural interfacing, for pesticides, for food processing and storage, etc. Safety standards provide an additional layer of safety in order to fully control and monitor water and air quality.

> **INSIGHT:** *By working together to develop planetary human societal standards, organizations from different industries are able to implement standards that benefit humankind, everywhere across the planet.*

1.13 What is a societal standard?

A societal standard is a standard that uniformly generates a socio-technical, societal, materialization. And, the intention for the standards creation is to generate optimally, given the integration of all that is known. The standards is the first knowledge set (wherein, data precedes knowledge, and structure precedes data, pattern precedes structure, intention precedes pattern). In the market-State, failure to comply with a mandatory standard usually engages enforcement, which carries out sanctions, competitors (civil) or State (criminal) penalties, or loss of money and ability to continue to profit. In the market-State, standards exist in this context, and they are developed by organizations embedded into this context. Here, standards may be used as a competitive advantage: if all other factors are equal, the market entity that can prove compliance to the applicable standard will have advantage over another that does not meet the requirements. Standards can be used by companies to avoid sanctions and penalties. Monitored compliance to standard adds trust to market competitor relationships. Because of the complexity of the market-State, the labeling and numbering of everything, including standards documents is highly confused. In community, the most well-known standard is the unified, global societal systems [standards] specifications. These documents specify past, present, potential future, and executed future standardized ways of constructing together in a common real-world environment. A societal standard provides a harmonized, stable and globally recognized framework for fulfillment of human individuals through the use of common resources and technologies. A standard that encompass multiple possible habitat service system configurations, customized to the intentions of their inhabitants.

> **QUESTION:** *Is the unified [societal] information system that holds all project information openly visible to everyone, and available for any to better (given, societal InterSystem protocol access)?*

1.13.1 What are human access standards

> **A.K.A.,** *Human well-being standards.*

A human access standard (a.k.a., human societal standard) identifies, given what is currently known, the lowest common denominator and highest common denominator of a standard of living among the population. The population exists within a network of locally integrated habitat service systems. A human access/societal standard identifies the presence of a universal, irreducible and essential set of material and informational conditions (really, conditional life-cycles) for achieving basic human well-being, along with indicators and quantitative thresholds, which can be operationalized for society based on local preferences. Humans have a set of material and informational, experiential requirements that are essential for human flourishing. A human access/societal standard identifies the set of material and informational conditions that everyone has the fundamental (basic, absolute, required) opportunity to access. These requirements are essential pre-conditions to meet basic needs, or provide central capabilities. A global human access standard specifies the extent to which, and how, such identified for everyone specified in documentation, and where preference processes would have to take over to reach the level of specificity required for their full operationalization. It is possible to coordinate for a universal set of material services, objects, and conditions that individuals, habitats, and the biosphere require, at a minimum, and maximum, for enabling flourishing for all.

1.13.1.1 Human access standard indicators

Indicators of an understandable level of human access, that is mutually desirable, includes, but may not be limited to:

1. Physical well-being:
    A. Nutrition (food, cold storage).
    B. Shelter (sufficient, safe, comfortable, hygiene).
    C. Living conditions (sufficient, safe, comfortable, hygiene).
    D. Clothing (sufficient, safe, comfortable, hygiene).
    E. Medical care (accessible and adequate).
    F. Air and atmosphere quality (accessible and adequate).
2. Social well-being:
    A. Education.
    B. Communication.
    C. Information and computation access.
    D. Mobility (access to transport, if required).
    E. Autonomy (personal space, freedom to contribute and participate).

1.14 What are a societal-level projects documentation requirements?

The project's societal-level documentation suite consists of (note that some of these are overlapping views):

1. Socio-technical documentation set - A set of socio-technical references for building and operating a socio-technical system.
2. The overview documentation set - Provides the reader with a top-level overview of the project and its proposal, a guide to the technology, a roadmap to the technology documentation set,
3. The online interface set - An overview of the project's web site. This document is aimed at the entire global audience.
4. Training materials documentation set - A set of instructional material, as well as a set of review/test questions with answers, that can be used to ensure understanding of societal concepts and systems. This documentation set is aimed at trainers/trainees.
5. Marketing materials documentation set - A set of materials that provide a high-level overview of the project and its products, as well as a brief synopsis of the society-related work of the societal contributors and partners. These are used at conferences, demonstrations, and briefings as handout material. This documentation set is aimed at senior managers, project managers/system engineers, and operators/users.

Wherein, there are sub-domains:

1. The Synthetic Environment Domain - Provides background information on the creation and use of synthetic environment databases required to understand the problem that society (as community-type) solves. This document addresses the "why do we need Community" question. Additionally, the terms/technology that the reader needs to know to fully understand the synthetic environment domain problem are introduced and defined. This document is aimed at senior InterSystem Team Coordinators, operators/users, and trainers/trainees.
2. Technical Reference Set - Provides technical guidance to members of the data provider and data consumer communities. Provides explicit "how-to" information for the development of new Auravana products, as well as the use of existing products. Due to its size, this document is divided into many stand-alone "volumes". Volume 1 provides a detailed description of the contents of each individual volume contained in Part 4. As necessary, each volume of the reference set provides technical information covering all hardware platforms supporting the product. This reference set is aimed at developers/contractors, operators/users, and trainers/trainees.
3. Tools and Utilities User's Guide Set - Contains multiple stand-alone volumes that provide "how-to" information for the use of each Auravana software tool and utility. As necessary, provides specific instructions for each hardware platform supporting a tool. This document is aimed at developers and contractors, and trainers and trainees.
4. Procedures and Processes Manual - Provides a series of procedures and processes used to manage the project. It addresses configuration management, the FTP site, and the development process for core software, among others. This document is aimed at project coordinators, system engineers, and developers/contractors.

1.15 How do 'standards collaborations' differ from 'open source collaborations'?

Society is an open source, standards project, and therein, there are standards that are developed and maintained as open source sub-projects. In a market place, standards collaboration and open source projects are seen, generally, as different socio-economic tools in with different goals, outcomes, and processes. As Stephen Walli explains:

1. Standards take longer to develop and change. Whereas open source projects can develop quickly, standards encourage multiple implementations and tend to enter a market with some maturity and competition. Standards and specifications don't change quickly, so they are developed with the expectation that they'll need to last for longer periods of time. For example, moving from HTML1.0 to HTML5 standard took about 18 years, and we've had TCP since 1981 with few changes.
2. Standards are consensus-based compromises. Open source projects are driven by contribution and meritocracy.
3. Standards define useful predictable boundaries. Well-run open source projects are the building blocks of rich, varied ecosystems.

1.16 In terms of standards, what does this project propose?

This project proposes the world's first globally workable, unified societal systems standard. An open source project-based organization that forms a bridge between the potentials (e.g., Community and market-State sectors) by publishing the first societal-level information systems standard, and doing so, openly under a trade-free license.

The mission of the project is to create a unified, global societal information standard, and to promote the development of societal standardization and related activities in the world with a view to facilitating the global access fulfillment of all individuals to common heritage services. The mission should lead to the development of highly cooperative spheres of intellectual, scientific, technological, and social activity, which materializes (given that which is known) into a network of highly-automated, free-access, integrated city systems.

The project will realize (and materialize) a unified and global standard information-decision-materialization protocol of societal development and operations, which is disseminated as a published, globally accessible (transparent), unified (integrated) societal standard. To realize this goal, the project supports collaboration, development, and adoption of this standard across the globe.

Other names for the type of standard (and standards organization) this project proposes, are:

1. Planetary societal standard.
2. Planetary societal specification.
3. Human societal standard.
4. Societal specification standard.
5. Human life standard.
6. Universal community standard.
7. Planetary societal standard.

This is a global standards setting project (SDO; body) composed to realize, continuously a community-type societal standard for a planetary-scale human population. The development of a unified societal standard that "works" for all individuals among humanity. A standard is a medium of integrated alignment, a communications structure and protocol between people.

A community-type societal system is fundamentally based on the existence of openly developed standards. Open standards are a foundation of a community-type society. Open standards let people and organizations set up new services and make them available across the rest of the human network without permission. A good example of this is the World Wide Web, which was developed—without permission from anyone. The next example will be a societal-level information system. These standards are key to allowing information, services, devices, and applications to work together across the global network of habitat [city] service systems.

> **NOTE:** *A globally cooperative societal system must to the greatest extent possible have a de-personalized and de-commercialized societal standard.*

1.17 [Standard] Linguistics

Like most spoken languages, English is full of words that have multiple definitions and which evoke subtle nuances of meaning. The presence of multiple definitions and subtle nuance can lead to confusion and unhelpful disagreement when it comes to specifying and interpreting systems and their meaning.

A good tactic for reducing ill-definition and misinterpretation is to standardize the language used to express meaning (concepts). Appropriately standardized language optimizes communication by reducing the likelihood of confusion. Strictly defining terms, and adhering strictly to definitions, will not only reduce conflict and confusion in interpreting communication, but through its universal practice, all of society will "save" time and reduce the likelihood of conflict in developing systems that serve human fulfillment. In other words, linguistic standardization allows for efficient and effective communication and development between individuals.

In the context of this project, it is optimal to include a section dedicated to linguistic clarification accessible toward the beginning of the plan. This section defines exactly how certain terms will be used within the project itself, and how they should be interpreted (i.e., "read" or input).

Herein, precise language makes the meaning of the directive clear to the user (of the standard). There are different linguistic standards used globally for directive statements.

ISO, for example, uses:

1. **Shall** - requirement. When specifying a requirement, use the word shall.
2. **Should** - recommendation.
3. **May** - permission.
4. **Possibility** or **Capability** - can / can not.
5. **Must** - an external constraint (e.g., jurisdictional/ legal).

The following are some common and globally definable directive statements:

> *Note: The use of 'Shall' is used frequently throughout this document as a specification sets out clear absolute requirements. Recommendations, permissibility and possibilities are expressed as 'Should', 'Can' and 'May'.*

1. **Shall** - is used to express requirements of this standard.
2. **Must** - is used to express a previously decided decision or denote likely negative consequences if not followed.
3. **Should** - is used to express recommendations.
4. **May** - is used in the text to express permissibility (e.g., as an alternative to the primary) recommendation of the clause).
5. **Can** - is used to express possibility (e.g., a consequence of an action or an event).

Other organizations use different terms and definitions:

1. **Must/will** - requirement.
2. **Might** - recommendation, best practice, guideline.
3. **Could** or **Able** - can / can not.

1.18 [Standard] Semiotics

Semiotics refers to the axiomatic structuring of all language by consciousness, given the ability to influence a real-world, physical environment. In communication among a social population, semiotics facilitates linguistic standardization by acting as a refer for the creation of commonly meaningful structures, through:

1. The study of the communication of existence.
2. The study of how to most accurately represent a potential, and a real, world existence.
3. The production of models for understanding.
4. The production of models for additional capacity realization.

The current semiotic model is sub-composed of the following three inter-related conceptions, which enable communication and safe realization [of society] among a population:

1. **Semantics:** meanings, propositions, validity, truth, signification, denotations. Semantic means unambiguous. This is the semantic web. At the semantic level, the words, the technical and non-technical terms, and the things referred to in the conversations must be understood by the two people. The sentences and the contents of the conversation must make sense to both of them.
   A. Meaning - a 'sign' (as a unit of semantic, meaning) is normally considered as a relationship between a 'sign' as a unit of language and what that unit of language refers to a 'sign' denoted denotatum (real-world shaped surface). All real-world meanings have a reference in the shapeable real-world. Under this definition of meaning, there has to be a 'reality' assumed, a datum, so that signs can be mapped onto objects in the 'reality'. Meaning is a logic function mapping words to reality in some way useful to consciousness.
   B. The social system analogue - There exist individuated units of consciousness with the ability to sense an environment and open resolvable decisions spaces that have material consequences to the individually social environment. In other words, there exists a social population of individuals with the ability to sense an environment and integrate information through an open resolvable decisions space with material consequence to the individual and social environment.
2. **Syntactics:** formal structure, language, logic, data, programs, software, files, categories, functions, etc. Communication must follow the same grammatical-procedural rules to be shared. Syntactics is the aspect of semiotics concerned with structure. At one level it concerns the structure of sentences, claims, or procedures in or through a language. At another level it concerns the models as the instantiation of entities in relationship, patterns, algorithms, etc.
   A. The decision system analogue - There exist a calculated computational space where decisions may be resolved and designs may be compositionally solved as solutions. There is a

logical procedure [for referencing resources].

3. **Empirics:** pattern, variety, noise, entropy, channel capacity, redundancy, efficiency, codes, and the technical infrastructure to fulfill needs.
   A. Physical world - Humans have needs within a socio-technical environment. This environment is observable. The observation of a conception is to sense something which is technically understandable as appearing in the common, socially experience[-able] environment. Here, conceptions can be unified and when sensations are common sensed and communicated, then technical service system have the potential to arise into materiality to fulfill human needs as intentionally communicated to one another within the unified societal system.
   B. The material system analogue - There exists a real-world material-physical environment that is shared by our individually embodied consciousnesses.

1.19 [Standard] Unifying language

The Unified Modeling Language (UML) is an axiomatical-purpose, developmental, modeling language in the field of engineering ("creation" and "operation") that is intended to provide a standard way to visualize the design of a 'system'. UML is simply a diagrammatic, visual notation based on the system method.

> **NOTE:** *Modeling is the unifying language. Modeling is visualizing, and visualizing together requires technical modeling alignment on the part of all communicating entities.*

1.19.1 [Standard] Unified modeling language (UML)

> *A.k.a., Systems modeling language (SysML), unified requirements modeling language, (URML), and unified operations modeling language (UOML).*

Unified modeling language (UML) is the semiotic representation of conceptual information in visual form as purposeful communication between consciously processing entities (e.g., humans). UML is a communications standard, a set of rules for visualizing relationships between objects that exist, or may exist, in the real world. Information expressed through the rules of UML appears as an integrated set of diagrams forming a unified visualization, as a model, for the "network" of objects and relationships. UML could be considered the first element of a systems-based communications (i.e., visual) protocol between processing entities for arriving at a common understanding. Concept models are the most simplistic form of visually modeling objects and relationships. Concept "network" models are more complex descriptions, models, of objects and relationships.

> **CLARIFICATION:** *Note here the conceptual difference between a 'description' and an 'explanation'. The description is the visualization itself, which is perceived by the senses of the conscious processing entity. The explanation is the reason processing itself, which is processed by the cognition of the conscious processing entity. From explanation, more than one conscious processing entity can construct and share a common visualization. In communications, there can be description and not explanation. To have explanation and not description would be to not have a unified visualization language between consciously communicating entities.*

In order to create and operate any system in the real world there are correct alignment relationships that must be expressed (enacted). Conscious entities with the intention to operate together, to cooperate (co-operate), a common visualization rule processing structure is required. UML fulfills the requirement for that common visual-rule processing structure. UML was developed (discovered, naturally expressed) to allow system engineers (developers and operators) to visualize together, to co-operate, which is necessary in order to specify a possible design [for both entities], and construct that possible design [for both entities].

A specific visualization of a real world system (existent or not) is shared through a UML-based 'design-operation package', which is otherwise commonly known as a visual system specification document (an information set, or in digital storage, a 'file'). That 'design-operation package' file is shared between engineers co-operating (either as developers and/or operators). The 'design-operation(s) package' is the set of visual information (diagrams) for understanding (self), selecting (together), constructing (together), and operating (together) a real world system.

UML is a coherent and complete system visualization language applied cognitively (i.e., used to process information) that can account for the individual and the social. However, as a tool (i.e., a method, technique, process, etc.) its application by consciously processing entities may not always necessarily be so [at the societal level].

In the process of creation and operation, the UML represents a set of rules 'engineers' (the consciously processing entities expressing action) may use successfully to model large and complex, real world, systems. The UML is a requirement for developing system-ware (i.e., hardware and software, real-world interfaceable systems).

When expressed through a digital information system, the UML appears as graphical notations applying some set of semiotically coherent rules. To the graphical notation, there may, or may not be textual notation. All constructable and constructed 'design operation packages' are developed and operated through 'projects'. 'Projects are a sequence of operation's objects (action) and relationship's links (communication) that exist concurrently (together in 'time', sensory experience) between conscious processing entities.

Using the UML, project participants (team) communicate, explore potential designs, select a single design, create that design, verify that design, operate that design and test-study-learn from that design.

1.20 [Standard] Applied language

> **NOTE:** *The linguistic standardization of the two information sets necessary for intentionally re-creating a different sensible-experienceable-observable, real-world, physicalized environment. Here, coordination involves the consciously-unified sharing of information useful for a "peak-state" (Read: optimal state) of [required, given conditions] fulfillment.*

The Project and Engineering information sets are unified at the societal level, there is only a single, unfed information set, which can be viewed from two perspectives, that of the coordination (control and communication of resources; projects-tasks) and that of engineering (en-/ab-lization or en-/dis-ablization given a solid, materially-density constrained, environment). The common physicalized environment that consciousness en-habiting human form experiences changes through this process; where, individual can take the change, and groups of individuals can come together to cooperate to take the change. The Intersystem Team consists of Engineers who follow openly sourced rules, procedures, in their following of each new instruction. The instructions originate from the resolution of unique decision spaces in the given (common) information system to be executed by the InterSystem Team.

In the market-State, all humans are have some probability of being in competition with each other for the fulfillment of their human requirements (where, some people therein, cooperate). In other words, people are pitted against one another with some organizations of people pitted against one another having more control over the next instantiated iteration of the given material-physicalized environment (the State of regulation).

1.20.1 The systems language

> **APHORISM:** *It becomes very difficult to make progress when the lexicon (vocabulary) is not agreed upon.*

Modeling and designing complex, societal service systems requires a language capable of explaining services and describing their components by users who are also the service's creators. The language must produce a shared understandability to deal with the individuality of users and contributors. The language must integrate the autonomy of individuals and component parts, so that the creation is adaptive. That language must be able to represent a real common world in some degree of falsifiable alignment (levels of conceptual alignment) to deal with complexity (networks), context (situational issue), and nuance (common human need and individual histories).

In the information technology discipline (IT) there is a service-oriented architecture (SOA) standard that allows for the effective and efficient design and operation of human [service] systems. A service-oriented infrastructure is the integration of a wide divergence of components into a specific unified system to fulfill a purpose (Read: a service the application of socio-technical information for a purpose). A service-oriented structure provides users (who may also be contributors) a common interface and set of protocols for them to communicate, through a common process (sometimes called a 'service bus'). With the recognition that there exist the potential to design a service, exists the potential to design a societal organizing structure oriented around human need as the organizing form of service fulfillment.

To approach language systematically, definitions have to be criticized before explanation are evaluated (i.e., before someone expects another to adopt their theory). If definitions cannot be critically examined, then reasoning is irrational. If explanations cannot be critically examined, then [human initiated] constructions from those explanations are unlikely to produce optimal [human] environments.

1.20.1.1 Systems language applied to complex societal organization as simplified use-case scenario

A user - is going to 'drink' a 'cup' of 'coffee' under an 'umbrella' from the 'sun' and in a 'pleasant' - environment". In order to do, to produce, a consumable coffee in a nice location, the user and producer need to bring together many bits of information and shapes of material resource (from coffee beans to machines, and human effort). Some common platform must be designed for all these "things" to interoperate and deliver the final service, optimally.

In common practice, the service-oriented structural systems method associates sub-elements (parts) as delivering a service, which may be a:

1. Function (output as service process itself).
2. Object (output as shaped material).
3. Condition (output as state of processing shaped materials).

To the user (higher system need) there is the experience of a service, which does or does not meet the need [by the user for the services purposeful existence].

In the market there is something called "service autonomy" where market services run by business and States operate as black boxes with subjective interfaces. Note that the market concept of "service autonomy" plays no role in a unified human service system, and it's application is reflective of a dis-unified societal configuration where user and developer entities are competing against each, and, one another. When users are developers then services aren't "discovered by consumers through a market", but are instead, 'designed' and 'developed' by a 'community' of 'contributing users' who are discovering more about themselves and their world while living.

In community, services may or may not still be "broadcast" as being available; the decisioning is different in the market-State.

In market-based systems service terminology there is the concept of "loose coupling" to the whole system, which means that employees and employers, can be changed out easily, including by consumers, all of whom maintain their independence.

In community, "loose coupling" could mean individual contribution and freedom to access all the opportunities that all availabilities provide, because anyone is contributing. From a contributors perspective, a service is an internal adherence to a communications agreement as defined by one or more service description documents, and practiced as a protocol by teams of humans and hard-/soft-ware systems.

A unified service structure (unified service architecture) allows for the unified provisioning and de-provisioning of resources to sub-systems to optimize the overall service system. Here, unified means that all resources are accounted for.

> **NOTE:** *In the market all services are designed to eventually generate money (income), otherwise the service would not survive in the market (without philanthropist money support). In the market, services are not axiomatically independent of the market. In community, services are not axiomatically independent of human need, because the service providers are the users.*

Systems language is a language that visibly applies at all known levels of socio-technical scale, from the micro to the macro. A standard (generic) language that can be used to describe all the components in the system and their service. Interfaces translate between their local functionalities into the global language, which are given descriptors (Metadata tags) to describe the components functionality, availability, access protocol, conditions, and various other parameters to its coupling and service provision. It is possible to create a societal 'service bus' (a habitat service system) to integrate functional societal components into a complete [habitat] service system, and an interface for the end-user to interact with the services they need.

In a sense, service-oriented design (service-oriented architecture) is the selected structure for doing systems integration within complex engineered systems. It provides a formal language with the ability for abstracting to different levels [of abstraction] as required by the entity using it in any particular application.

At an individual level, having systems thinking allows for the autonomy of thought. A method for accurately modeling and aligning with the natural world is required if real-world individual fulfillment is the goal. If the real world can't be conceived of without serious error then all manner of environmental influence will be having all manner of negative network effects in the human system of autonomously fulfilled individuals. No one individual human is feeding of moving for another human individual unless there is some dis-ability present.

Insight: Just as someone can stop eating and moving in a healthy manner, so too can they not think in a healthy manner. Thinking can be out of alignment with the nature of their mental fulfillment, just as diet and movement can be out of alignment with the nature of their physical fulfillment, and to complexity the situation and make it 'real', each dimension of experience influences the other (because thought is being expressed through matter). The only language currently know of to express this complexity is systems language, which has carries the ability to self-correct (adapt alignment) and scale correctly (model coherence). Without the ability to model coherently, self-correction will likely be out of alignment with stated intentions, and without the ability to accept and integrate sensation a coherent model will likely not be developed.

A unifying system of language, systems language, is required:

1. A system has a given environment, by an interface.
2. A system has coherence, among its internal parts.
3. A system can self-correct, if it is living.
4. A system can be optimized, when it is unified.
5. A system can be designed (planned) and operated (executed) by life.
6. Life has requirements.
7. Life that uses 'systems' language can evaluate its service designs as 'systems' for purposefully completing life requirements.
8. The completion of life requirements may be optimal or sub-optimal.

1.20.2 Knowledge

Knowledge is the significant independent variable that will decide whether or not society moves forward into a community-type of society. The involvement of the global population ("masses") is necessary, but not sufficient. The masses have to know what and how to create a societal-level community, and in order to know that information, knowledge is required.

> **STATEMENT:** *If you gently read this document, you will receive unique insights that will assist your human minds development. But, this comes at the expense of being able to read dozens of pages at a time.*

1.20.3 Optimization

A unified societal system may be optimized when all core structures are accounted for:

1. An event-driven structure that represents temporal systems. (event-driven also means task, activity, etc.)
2. A positional-driven structure that represents spatial systems. (positional-driven also means material, physical, shape, etc.)
3. An intentional-driven structure that represents conceptual systems. (conceptual-driven also means semantic, meaning, purpose, etc.)

Here, a given system may be optimized by analyzing from, and synthesizing with, a unified structure. A unifying societal systems structure includes a unified, real-world model, which is structurally sub-composed of an event-oriented structure, a positional oriented structure, and a conceptual-oriented structure. It is through these data structures (information structures) that a transparent set of societal sub-system specifications are built (project, social, material, etc.). These categorical data structures may be applied as information constructors (by users) to combine data (previously existing and newly collected) into patterns (packages) of usability information for other societal sub-system. These data structures structure data in the social system that outputs into the decision system, when decisions are executed there are affects (some predictable, some not) in a material world that have consequence to consciousness, which inputs data in a variety of forms as feedback and design.

1.20.4 Simplified societal design for humanity

QUESTION: *What would society look like if it were arranged to complete human need?*

It is possible to analyze the composition of a societal design that works for all of humanity:

1. The whole unified societal human system
2. Has a whole unified information system
3. Expressing a whole unified habitat service system
4. Contributed to by whole unified individuals
5. For the human need fulfillment of all individuals.

It is possible to synthesize the composition of a societal design that works for all of humanity:

1. Whole unified individuals have a requirement for human need fulfillment.
2. Human need fulfillment may be contributed to by individuals who know what is needed.
3. Humans have a need to control (socio-technical state) a portion of their total habitat to develop and use complex socio-technical service systems.
4. To control (to decide the solution to) complex systems, information is required.
5. To control complex systems in alignment with a given intentional direction, then a sufficient amount of information is required (to ensure the solution is 99% predictable may be the highest level of information completeness).
6. Decisioning can have complete (sufficiency) or incomplete information in its database to determinedly resolve the execution of a decision in a complex control system.
7. Information in the determination of a decision can be unified (given access to all that is potentially shareable) and/or sufficient, or it can be incomplete.
8. To coordinate a complex societal system a unified information system must be as completely accessible as possible for human need fulfillment.
9. When all structures are modeled coherently, then individuals among society can more objectively account for why society is the way it is, and how society could be differently configured tomorrow to adjust for greater human individual need fulfillment.

NOTATION: *Is an individual's 'mood' the feeling someone has when following natural genetic programs, and the feeling comes from having those needs 'feel' fulfilled or not, 'suffer'. Whereas 'mood' is instinctual, 'emotion' is the conscious or sub-conscious drive, and the 'feeling' is the conscious feeling from the complex systems mixture.*

2 [Standard] Working group

A.k.a, Workgroup, working-group, work group, working party, task groups, or technical advisory group, the project integration working process, intersystem team working groups, working group conferences, solutions inquiry team.

The execution of solution design and integration is likely to involve working groups and workgroup conferences. Workgroup conferences are integration points for the team. In concern to the societal systems model and information system [article set], the result of societal engineering working group conferences are updates, sometimes, to the societal system. The concept model for the societal information system is resolved currently through these workgroup conferences, whose results are accepted or not and integrated via a larger management (or InterSystem Team). Organization of people and machines.. This/these individuals should be the most knowledgeable about that subject area since their names are listed as those who last developed the content. Life circumstances may complicate the issue of accountability. Former content developers are logged and removed. Generally, new iterations to the information sets come from workgroup conferences regularly/cyclically pre-scheduled, some of which may lead to changes, and others not. The results are accepted by the affiliates as the results of a transparent decision.

Working groups are self-directed organizations of skilled and motivated individuals who are working on the articles of standardization of one or more aspects of a community type society. Working groups are composed of those who are sufficiently motivated to contribute and sufficiently informed to understand (or some mixture thereof). Working groups are composed of informed and capable individuals (the term “experts” connotes wrongly here that only those who have put in 5-10,000hrs can make contributions, and is thus replaced with, ‘informed’ and ‘capable’).

The coordinator structures information and material flows between the developers (“experts”), and schedules conferences where appropriate.

Market-State organizations generally form working groups by time, technology, or territory. The weakness of this is that boundaries interfere with the desirable sharing of knowledge and experience, and so, learning suffers and work becomes less optimal (efficient and effective). Self-directed and self-regulated groups do not require supervisors to manage the boundaries of the group (e.g., ensure the group has adequate resources and coordinate activities with other groups) and foresee coming changes.

The responsibility for work on standards begins in a working group. Standard[ized] operating procedures facilitate the effort of working group participants and the deliverable by establishing the necessary framework for a workable organization. These [standard] operating procedures outline the orderly process of work by the working group.

A common working group procedure is, for example:

1. Working group personal and sub-group work.
2. Working group meeting/conference for discovery presentation and integration [draft integration].
3. Public comment period: October 9, 2019 through December 9, 2019
4. Working group meeting/conference for integration primarily [final integration].
5. InterSystem Teams implement and/or apply new societal standard; teams conform information and material environment to the standard.
6. All working groups are live streamed. All working documentation is public except for personal notes. All comments are transparent, and generally, accountable.

Working group standards information flow involves:

1. Pre-conceptualization.
2. Conceptualization.
3. Discussion.
4. Writing, modeling, simulating.
5. Implementation.

2.1 Technical working groups

Technical working groups discover, integrate, and develop socio-technical systems. By forming a technical working group (TWG), high-level practitioners working in on the same article of the systems composition can coordinate activities and align resources to better work toward common objectives in their sector or area of focus. Collaborative development leads to more efficient use of resources.

Working group deliverables, the community specification standard is the main deliverable that the Project publishes. However, there are other sub-societal deliverables that technical working groups may publish, including but not limited to:

1. Technical reports (TR) - cannot contain requirements.
2. Research reports (RR).
3. Publicly available specifications and standards (PAS) - can contain requirements. Free and open source specifications by other organizations.
4. Technical specifications and standards (TSS) - draft and sub-societal specifications.

2.2 Working group conferences

A.k.a., Technical working group sharing and integration events to produce standards.

Technical working groups (TWGs) come together at a working group conference to learn and decide. At a working group conference, articles that compose the societal standard are developed. When appropriate, groups split off into smaller sub-groups to work on different sub-sections (sub-problems or solutions) of a total article. In general, working groups develop standards under standardized ("approved") scope.

Working group core members focus on models, clauses, drawings, simulations, coding and coordination. If deliverables are developed and approved, then the names of those who attended and approve the deliverable output are assigned to the new article of their contribution.

In a working group conference. A decision in the form of "consensus" is the resolution of serious objections sufficiently for the coordinator to effectively move forward with the effort of the working group. At decisions points there must be sufficient information to resolve the decision such that there are no serious objections sufficient for the coordinator to prevent the forward movement of a working group or prevent conflict.

In a working group, from the submitted modifications, the members decide to accept or not the. If the group thinks the modification will benefit, he will choose the best code from all of the submittals and incorporate it into the updates.

Coordinators may sign off that there are no significant remaining objections. "Consensus" is general agreement (90% and above), characterized by the absence of sustained opposition to substantial issues by an important part of the concerned interests and by a process that involves seeking to take into account views of all humans concerned and to reconcile/integrate any conflicting arguments. If voting is required, then a 90% threshold is required to move the project forward. Sustained opposition means sustained opposition on the part of another working group member of the same working group (and not another working group of member of the public).

Working group conferences can be exhaustive exercises, and so the work must be checked post conference by at least the contextual coordinator. When the next publication is ready, new content and names will be published. If the next publication won't be ready for some time, then workgroup results can be published temporarily as addendums, waiting for the next iteration of the complete publication.

Content scheduled for presentation at the workgroup conference, should in general, be sufficiently complete and open that it can be worked and reworked into the next iteration of the system by sub-teams of the whole population of workgroup attendees the workgroup works with the prior and new (should be easy to work with) information to produce a better ultimate design and/or understanding. Workgroups should be of an appropriate size to complete work effectively. The term working group or work group conference can be confusing at first. What happens is people do work before the conference, this is their personal work which they may or may not have made public to everyone. They then get their work sufficiently reading so that it can be worked into other work by a team of workers. They then attend the conference with their sufficiently completed work. Teams first learn about the new work. Then teams integrate, as possible, the new work into the old, all the while working on achieving greater understanding. This whole process may last a few days, or weeks.

This whole process generally occurs with most of the attendees together in the same physical space so that communication and work is real-time. Remember, this is a process of integration, most of the discovery was done earlier by those who presented their work at the working group conference.

Some conferences have nothing produced in terms of changes to the actualized or described system, and instead only personal learning and greater understanding occurs for conference attendees.

Workgroup conferences are populated by their specific Intersystem team members, and by significant contributors who are presenting their discoveries or their significantly complete (to be workable) work. Coordinators generally, though not always, try to unbiased themselves from the events of the workgroup, acting as a peer reviewer of the output and not participating work working group re-working teams precisely.

There is no formal rule against this though. It is just a potential flag of bias for when the open source commons public has the opportunity to view the new workgroup content and its peer accountability reviews. There could be bias here, which everyone should be aware of. Yes, workgroups are where work occurs, but most of the work should be done ahead of time. The result of a conference may just be an article of work for researchers or workers outside the conference. A working group conference can produce many outputs, some types of which will lead to changes to the core kernel.

2.2.1 Standards publication

Every societal standard is a continuous living document (and visualization); it is updated continuously over time. Published versions of the societal standard for a community-type society represent snapshots in time. Frequently updated standards will likely be published more frequently by the organization (i.e., every quarter, as opposed to once a year or two). The most up-to-date version of a standard may be published in digital and/or physical print formats.

The Auravana Project has the following protocols in concern to publishing:

1. If there are no updates to a specific standard, then there is no need to publish again.
2. If there are more frequent updates, then the standard should be published more frequently.

3. Draft articles in a standard are publishable with newly updated standards if they maintain a base level of integration without significant contradiction. These draft articles will carry the following statement in all capital letters:

IMPORTANT: *THIS IS A DRAFT DOCUMENT ONLY AND HAS NOT BEEN FULLY DEVELOPED AND INTEGRATED INTO THE STANDARD. THIS DRAFT DOCUMENT MAY NOT BE RELIED UPON.*

2.3 What is an open-source societal standards setting working group (workgroup)?

There is a specification/model of society that incorporates a series of articles that together represent the societal standard(s) system. The specification as a composition of articles is the decided upon standard for information-spatial processing in society. These adaptive standard-articles change how the societal system itself is understood and also lead to changes in the informational-materialization of society. In this later sense, the standard articles represent the specification for the society as explained and to be actualized upon. Any given socio-technical society is made up of standards. A society, uniquely, can compose these standards into the form of a unified specification for the next optimal iteration of the society itself. Workgroups can be composed to discover and decide the societal standards, which are described and explained in text and visualized spatially. The societal specification articles could be viewed as articles of specification for a community-type society. Each article represents a standard[ized] as understandable and intended element within that society.

The articles that compose this document and the whole societal system specification (social, decision, lifestyle, and material) include all operative (at a Habitat InterSystem Team level) standards in society. The currently decided articles are the current standard for society. Each article represents the composition and reasoning for a sub-construction of the whole societal system. Standards, sub-composed of articles, adopted by working groups, forms the specification for the design of a societal-level operating system.

The standards societal system specification sub-composed of articles must be adopted:

1. Adoption of [articles of] societal standard for city-network and nations.
   A. Working group 1 (e.g., ISO37101, System Management) - This standard sets requirements, guidance and supporting techniques for sustainable societal development among all sub-communities. It is designed to help all kinds of sub-communities coordinate their sustainability, smartness and resilience to improve the contribution of communities to sustainable human development and self-performance progression.
2. Adoption of [articles of] technical standards for cities, operations and usage, and interoperability.
   A. Working group 2 (e.g., ISO 37120; ISO TC 268 WG 2, City Indicators) - This standard sets requirements, guidance and supporting techniques for sustainable technological development among all sub-communities.

2.4 Community-type society workgroup sub-composition

In a community-type society, there are:

1. The intersystem spatial teams (people doing socio-technical, material things to sustain the population as life, technical, and exploratory).
2. The intersystem information teams (people taking decisions and integration determinations as individuals, team contributions, algorithms, and [accepting and developing a] information system).

A working group (a.k.a., working group, work group, working party, task groups, workgroups, or technical advisory groups) standards setting body (higher level), community of practice (lower level). is a group of knowledgeable individuals working together to achieve specified goals. Working groups are domain-specific and focus on discussion or activity around a specific subject area. A working group can be disciplinary or interdisciplinary.

The lifespan of a working group can last for years or only a few months. Work groups that extend over years have the tendency to develop a quasi-permanent existence when the assigned task is accomplished;[citation needed] hence the need to disband (or phase out) the working group when it has achieved its goal(s). It is imperative for the participants to appreciate and understand that the working group is intended to be a forum for cooperation and participation; the working group exists for those who want to contribute work, only related to the groups work.

Characteristics of a work group:

1. A work group may be ad hoc or exist continuously.
2. A work group may be team-oriented, team-centric, or non-team affiliated (note: team here refers to InterSystem Team).
3. A work group may be a formal standard setting body, conference, event, or some other point of integration
4. A work group may produce a formal specification iteration.

5. Generally, a work group conference is the point of common integration and production for a working group.

Examples of common goals for working groups include:

1. Creation of an informational document.
2. Creation of a standard.
3. Resolution of problems related to a system or network.
4. Continuous improvement.
5. Research.

Real-world working groups may be:

1. Social - workgroup teams.
   A. Social service teams carrying out informational processes.
   B. Social information work groups.
2. Decision - combination, and computation.
   A. Decision support service teams carrying out decisional processes.
3. Material - habitat service teams.
   A. Habitat service teams carrying out operational processes.
   B. Habitat information work groups.
   C. The habitat life-planning operational process team work group.
   D. The habitat technical-operating operational process team work group.
   E. The habitat exploratory-discretionary operational process team work group.
   F. A habitat service system has a set of operational process teams (planning, operations, discretionary). Each habitat service system has a work group. All operational systems have actively accountable teams.
   G. In the case of the decision system algorithm, the kernel, the decision system work group conference iterates, and habitat operation process team oversees the systems operation.

There are effectively three levels of designation for the societal system from a work group view:

1. **Exploration work group.**
   A. The societal information system workgroup, and many sub-workgroups. Development of the total information system itself.
2. **Kernel integration work group.**
   A. The societal decision system algorithm workgroup. The procedural algorithm itself.
3. **Habitat service team operations work group**
   A. The habitat operation process teams. Teams that follow procedures have a continued interest in those procedures.

What are the open standards requirement for society?

- Which sets forth a number of criteria to ensure that specifications can be implemented under open source licenses. The OSR will be used by the working group as a set of guiding principles and best practices.

The Open Source and Standards Working Group will:

1. Explore current SSO understanding of OSI approved licenses, and more generally, open source software, development, and projects;
2. Educate SSO in current principles and practices widely excepted by open source communities of practice;
3. Support authentic engagement across open source communities (i.e. implementers, contributors, projects, foundations) to ensure alignment with best practices in open source licensing, development and distribution, and;
4. Produce reference resources (educational materials, professional development activities, expert opinions, consulting services, etc.) to address gaps in understanding, support current practices, and increase the recognition of OSI approved licensing and the OSI License Review Process.
5. Encourage SSOs to request and maintain formal peer relationships with OSI. The Working Group will act as the formal Correspondent.

> **NOTE:** *Working group proceedings may be hosted on Github, a collaboration platform especially well-suited for open source projects.*

2.5 Workgroup decision criteria

A.k.a., Decision criteria, workgroup criteria.

Criteria is the plural form of the word criterion, which means a standard, rule, or test (ideally with reasoning) on which a decision (determination, selection, evaluation, etc.) can be based. In application, criteria are used for the *evaluation* of probables and *selection* of a singular [solution]. A criteria for the selection of a solution will lead to the ranking of potential solutions. The application of the criteria to some information set lead to the ranking of solutions; wherein, solutions are inquired into, and are ranked, according to the criteria.

> **NOTE:** *Workgroups and algorithmic decision processes resolve decisions (in part) through criteria.*

A threshold may exist beyond which a solution is acceptable and/or is not acceptable [to the complete, 99%, resolution of the inquiry cycle]. A criteria may be used to determine this threshold [at which a particular solution, from all the many probable solutions, is selected to be executed upon].

> **NOTE:** *Thresholds require a resulting value against which to compare. The resulting value is sometimes known as a "score", and in such an analogy, the threshold would be the "goal".*

More technically, a criteria for a newly incoming set of information lead to the ranking of its processed outputs. From an information systems perspective, a criteria is an information search and resolution program. The criteria is pre-selected. New information comes into content with the criteria. If the new information is absorbed, then the system that established the criteria can run calculations on the results to discover-learn more about the information environment.

When a criteria for a design [project] is decided/determined, it is then used to evaluate the success or failure of the design (as an inquiry, a solution to meet an inquiry, and/or, a project). Criteria is something that may express (or, result in) an evaluation. For example, a set of criteria for buying a new television may be location shape, visual quality, sound quality, battery life, cabling, or brand name (market only).

Analyze solutions problems to evaluate them against a set of criteria that match a completely (decision system acceptable) set of pre-determined criteria for selection of one solution [to materialize and feed-back into ourselves].

Among the population of an organism, the most essential criteria for survival and thriving is that of moving toward the satisfaction of life needs.

Among a global population, it is essential to transparently reason (i.e., justify) 'why' every action has been taken (i.e., to explain with some evidence).

The inquiry resolution protocol (i.e., markers, examiners, etc.) will constantly look at (inquire into) the product/system or environment that that is being produced as a solution for the evidence of its intended physical- or informational-oriented objective. In the case of a team, inquiries will look into the application of skills, application of your research and application of the results of experimentation, testing, and integration. The validity of the work is evidenced by the application in the system of the designing [specification]. The work is valid because the experience of the 'what' works as expected. The 'how' requires materials and technical knowledge.

2.5.1 One of the more simplest workgroup decision criteria

Each team or workgroup member may provide a final score based on an equal weighing in each of the following four criteria as well as a set of short comments (risks and biases must be noted for each criteria):

1. Clarity of vision - quality of visualization or writing in understandableness (comprehensibility).
   A. Is there a visualization?
   B. Can it be understood?
   C. Can it be integrated?
2. Past performance - given what has occurred, what is most likely to occur?
   A. Is there a predictably less beneficial likelihood of current trends continue?
   B. What changes can be made to make alternative potentials most likely?

3 Technical "peer" review

A.k.a., Peer review, technical review, socio-technical review, engineering review, merit review, work review, challenge review, critical review.

In order to ensure accurate, up-to-date, and safe system design, development, and operation, socio-technical articles go through a review process. Review (peer-review, technical-review, etc.) is the name given to any judgment of technical merit by others working in or close to the field in question. Reviews should consist of a critical analysis, and should include careful reasoning, citation, and conclusions.

A [peer] review is a documented, critical review performed by technically competent persons ("peers"). A technically competent person is a person having technical knowledge and/or skills in the subject matter (discipline) to be reviewed (or a subset of the subject matter to be reviewed) to a degree at least equivalent to that needed for the original work. Reviewers can be part of a working group, part of the a larger team, or part of the public. In the strict case of "peer-review, the reviewers are generally expected to be independent of the work being reviewed. The peer's independence from the work being reviewed means that the peer, a) was not involved as a participant, supervisor, technical reviewer, or advisor in the work being reviewed, and b) to the extent practical, has sufficient freedom from funding considerations to assure the work is impartially reviewed.

Technical design reviews occur during the system engineering lifecycle. These reviews can be supported by peer reviews, which are deeper technical reviews by technical experts in the subject matter to be reviewed.

Note here that in some cases, there are different terms of the sub-types of review. In general, a review is an in-depth critique of some combination of knowledge, synthesis, assumptions, calculations, extrapolations, alternate interpretations, methodology, acceptance criteria, results, and of conclusions and content written, drawn, or modeled. An engineering peer review can be a resource for a product team to find potential defects, design weaknesses, or implementation flaws as early as possible in the development process. A peer review tends to fall along the lines of improving quality, aiding decision-making, ascertaining that objectives and/or requirements are being met, and/or providing validation. Such reviews, conducted by a team of peers, bring the system team a broad experience base and lessons-learned from previous operations, without which design oversight can be missed. Sometimes, reviews (generally, "peer reviews") confirm the adequacy of the work. Sometimes the term "technical review" refers to a review to verify compliance to predetermined standards or requirements. Other times the term "technical review" means a confirm the adequacy of work. Different disciplines may use similar terminology to refer to different types of review. Additionally, most organizations restrict the term "peer review" to only those technical reviews conducted by independent, external [technical/peer] experts. Reviews conducted publicly can enhance credibility by increasing confidence in the process. Also, the identification of peers can help to identify interdependencies between disciplines.

Critical review analyses are generally structured by means of concern levels, where issues that the reviewer observes are assigned a level of concern. Concern levels include:

1. Yes, high concern.
2. Yes, medium concern.
3. Yes, minor concern.
4. No, not a concern.

Alternatively, the categories (with their associated impact level) could be:

1. High/critical - critical failure.
2. Moderate/major - major failure.
3. Low/minor - failure that does affect overall system stability or functioning (in the short term).
4. Negligible - unaffected.

The impact level refers to the consequences that could occur if the issue isn't solved.

Note, these issue levels could relate to the engineering [design through to construction] life-cycle, or they could refer to the scientific [research] life-cycle.

The technical "peer" review process involves the following steps:

1. Step 1: Author writes and submits article to working group and coordinator.
2. Step 2: The editor/coordinator sends the content to technical (expert) personnel to review and evaluate quality of content, research, writing, and conclusions.
3. Reviewers return content to editor/coordinator with suggested changes, as well as a recommendation to publish or not publish the content.
4. Editor/coordinator reviews suggestions and returns the content to the author for revision (if necessary).
5. Author revises and resubmits the article to the editor.
6. Step 6: The article is published in the journal/standard.

Technical/peer review is a system based on knowledge, improvement, and appropriate coordination. Effective and rigorous technical peer reviews provide quality to a product realization process. More specifically, peer review is a process in which an article is evaluated by a group of technically competent people in the same field (or related field) to make sure it meets the necessary standards and quality for acceptance and publication. Therein, technical peer reviews involve a well-defined review process for finding and fixing defects, conducted by a team of peers with assigned roles. Technical peer reviews are carried out by peers representing areas of life cycle affected by material being reviewed (usually limited to 6 or fewer people). The reviewer(s) must give an honest and impartial evaluation of the article.

Review processes can be carried out by:

1. Documentation coordinator.
2. Subject matter expert (technical expert).
3. Technical support representative.

> *Note: For the current standards, a peer/technical review is quasi-optional, and each working group can design and select a review process according to its needs. The review is quasi-optional because of the present size of the working group team and the fact that the coordinating editor, who is technically competent already, must conduct a review of the content.*

The goal(s) of peer review processes may be to:

1. Verify whether the work satisfies the specifications.
2. Identify any deviations from the standards or knowledge base.
3. Ensure standard engineering/scientific rigor has been completed.
4. Ascertain that the methodology and/or science underlying the conclusions and/or technology is well-understood (and does not have contradictions, flaws, errors, or biases).
5. Provide suggestions for improvements.

Responsibilities of the reviewer:

1. Provide a prompt, thorough, and impartial review of the content.
2. Ensure the content is without errors.
3. Give constructive feedback with reasonable suggestions and professional tone.
4. Avoid suggesting the addition of irrelevant or unnecessary references.
5. Alert the coordinator to any suspected moral/ethical issues.

Responsibilities of the author:

1. Accurately (and without bias) report research findings and/or knowledge content.
2. Ensure the content is without errors, and correct errors if present.
3. Describe methods and materials with enough detail that the work can be reproduced.
4. Cite only articles/content that are directly relevant to the submitted article.
5. Ensure the content meets all publication requirements standards.
6. Revise the content as per reviewers' suggestions (or give a reason why not).

Responsibilities of the coordinator:

1. Select, invite, and coordinate reviewers.
2. Ensure an accountable, useful, unbiased, and speedy peer review process.
3. Ensure the content is without errors.
4. Synthesize disparate peer review reports and arrive at a final decision.
5. Any questions from authors or reviewers about the peer review process should be directed to the coordinator.

In concern to item #4 in the list directly above, content may receive one of three possible decisions:

1. Acceptance: The content will be integrated and published without edits. "You" may be asked to upload final files or to sign a copyright form.
2. Acceptance with revision: The content will be accepted after suggested/required edits by the reviewers are finished. "You" will be asked to provide a revised version.
3. Rejection: The content will not be integrated and/or published.

Table 28. *The difference between useful publications: peer-reviewed and non-peer-reviewed publications.*

	Peer-reviewed	Not-peer-reviewed
	Scientific/scholarly journal	Trade journal/ magazine
User	Scientists and experts (researchers and professionals)	Scientists and experts (members of a specific discipline, business, or organization)
Author(s)	Technically qualified personnel	Technically qualified personnel
Editing	Peer-review process; 2-3 technically qualified personnel	Editor/coordinator of publication
Review	Technical peer reviews are a well-defined review process for finding and fixing defects, conducted by a team of peers with assigned roles	Well-defined review process for finding and fixing errors, conducted by coordinating editor
Content	Research projects, methodology, theory, results, etc.	Trends, products, techniques and organizational news, etc.

Sources	Sources cited in bibliographies and/or footnotes	Sources mentioned occasionally with bibliographies
Purpose	To share facts.	To share the latest information and news

Book references (non-cited)

- *How to write standards*. (2016). ISO Standards. ISBN 978-92-67-10686-1 https://www.iso.org/files/live/sites/isoorg/files/archive/pdf/en/how-to-write-standards.pdf

Online references (non-cited)

- Hornung, A. Krivosheev, G. et al. (2006). *Standards Wars.* University of Washington. CSEP 590A: History of Computing; Autumn 2006. https://courses.cs.washington.edu/courses/csep590a/06au/projects/standards-wars.
- Lucas, G., Hatcher, L. Introduction to standards and specifications for design in mechanics or Strength of materials. Penn State College of Engineering. Accessed: December, 2019. https://sites.esm.psu.edu/courses/emch13d/design/design-tech/standards/specs_8.pdf
- *Quality Resources*. (2019). American Society for Quality. https://asq.org/quality-resources/standards-101
- Rakesh, Vanya. (2016). *Adoption of Standards in Smart Cities - Way Forward for India*. The Center For Internet & Society. March, 19. https://cis-india.org/internet-governance/blog/adoption-of-standards-in-smart-cities-way-forward-for-india
- *Standards development*. (2019). International Electrotechnical Commission. https://www.iec.ch/standardsdev/
- *Standards: What are they and why are they important*. (2005). NPES Standards Bluebook. http://www.npes.org/pdf/Standards-WhatAreThey.pdf
- *The Standards Development Process*. (2019). The Open Group. https://www.opengroup.org/standardsprocess/standards-dev.html

Approach: Opening

Travis A. Grant,

Affiliation contacts: *trvsgrant@gmail.com*

Version Accepted: 1 April 2024

Acceptance Event: *Project coordinator acceptance*

Last Working Integration Point: *Project coordinator integration*

Keywords: openness, the open approach, the open source approach, the participative approach, the voluntary approach, the collaborative approach, the socially cooperative approach, the sharing approach, the free approach, the cooperation approach. openization, contribution, open-source, open standards, open licensing, copy-left, patent-left, open-patenting,

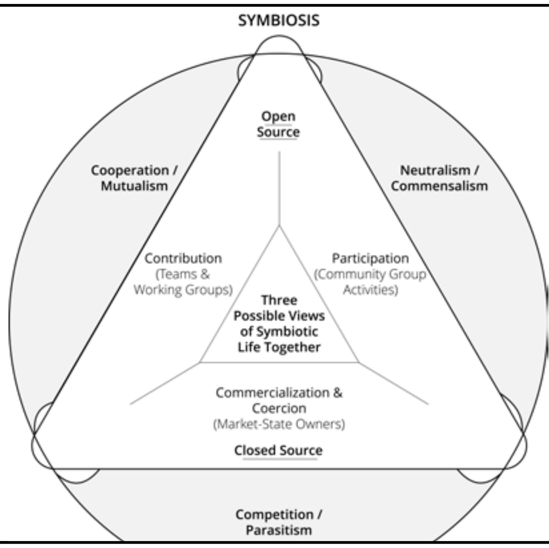
Abstract

This article delves into the transformative potential of open and left licensing frameworks in facilitating the transition of society towards a community-based operational model. At the heart of this transition lies the concept of contribution, characterized by work driven by intrinsic motivation rather than the pursuit of trade or tangible extrinsic rewards. Such contributions thrive within open information environments, spaces that are inherently "free," "open source," and "left." In these environments, the essence of open source is manifest; it democratizes access to the source code, enabling collective participation and innovation across community projects. This paradigm shifts away from conventional market-driven approaches, emphasizing a royalty-free license to use that embodies the true spirit of "free" - operating without the constraints of trade or currency.

The article explores how, within community projects, contributors engage with open-source systems and standards, laying the groundwork for a collaborative ethos that transcends traditional proprietary restrictions. Open-source licenses serve as the backbone of this collaborative potential, ensuring that all participants have equal access to modify, improve, and distribute the collective intellectual output. Meanwhile, left licenses play a crucial role in safeguarding these contributions within the commons, ensuring that redistributions adhere to the principles of community benefit and shared value, rather than being co-opted for private gain.

Graphical Abstract

Figure 8. *It is possible for humanity to work together to meet one another needs by means of open source design and freely contributed effort. Simplistically, there are three possible approaches to completing work at population scale: together fulfillment, apart fulfillment, or neutral fulfillment.*



1 Introduction

Simplistically, in order for individuals in society to have trust and certainty in their society, there must be transparency and contribution to society's formalization, construction, and operation:

1. **Openness and transparency** (facilitates *trust with high certainty*): Everyone has access to the information and materials necessary for doing the best work. When these information and materials are accessible, humanity can build upon each other's ideas and discoveries. Humanity can make more effective decisions and understand how decisions affect one another. Humanity can resolve solutions more effectively. And, human can more efficiently use resources.
   A. What is being transitioned to is a coordinated information commons.
2. **Contribution** (facilitates *trust with high certainty*): When humanity is free [to participate], anyone can enhance another's work in beneficial ways. When we can modify what others have shared, humanity "unlocks" new possibilities [for individual fulfillment and freedom]. By initiating new projects together, humanity can solve problems that no one can solve alone. When humanity implements open standards, every individual is enabled to contribute to the present and the future.
   A. What is being transitioned to is a coordinated [physical commons] contribution service system.

1.1 Openness policy

A.k.a., Opening strategy, objectives and procedures, open access approach, transparency approach, trust approach, open-source approach.

When any project or organization (including, government or corporation) wants to increase transparency, one approach is to institute an openness policy. Open source is the global categorization of a policy of openness. Open source increases commons access and creates socio-technical standards and technologies without a profit or coercion bias. Fundamentally, community designs systems that are as open as possible, as restricted as necessary, and always safe (and secure). Habitats in community are open source creations and operations, by requirement. Open source should pertain to all sources of project content:

1. Open-source data repositories should be created/used to find a common language for data sharing.
2. Open-source licenses should be created/used to find a common language for entering content into the commons. Here, persistence licensing is valued in its ability to maintain content in the commons.
   A. Software should be open-source licensed (i.e., open-source software, open software designs).
   B. Hardware should be open-source licensed (i.e., open-source hardware, open-hardware designs).
   C. Information should be open-source licensed (i.e., open-source copyright, open access journals, open standards).

2 Market-State property ownership

In the market-State, there is property ownership; there is property and there is the legal [entity] person that controls the property (Read: the owner of the property). Therein, property must be defended [by those who own the property and by the State] against those who seek to use, but do not legally own, the property. All property in the market-State necessitates an organization that exists to enforce the "rights" of the legal owner of the property. In a market-State (i.e., environment with property-market and State-enforcement) where there is private intellectual property, then there is the coerced and State-enforced systematic underutilization of information. In community, we have the systematic full-utilization of information. Property is harmful to everyone and it holds humanity back from its adaptation to an optimized state of fulfillment.

> **INSIGHT:** *Property is a "right" against the rest of the world.*

The flow of propertization generally follows the following steps:

1. **Identification** of types of things that can be owned or otherwise registered as property.
2. **Claim** of property ownership by someone or some organization.
   A. Claim of property ownership submitted to property licensing authority (i.e., State).
   B. Acceptance of property ownership by State; property licensing by the State.
3. **Inspection** of property [for compliance] by property licensing authority.
4. **Conflict** about who is authorized to own the property.
5. **Punishment** and censorship of those who are not authorized by the State to use the property.

2.1 Property ownership (property law-enforcement)

> *A.k.a., Ownership, property rights, property law, property license.*

When property is the law, then is ownership enforcement. Property ownership is created and accounted for at the State level in the form of property law-code. A property ownership law is any law that includes the idea of private and/or State-separate-Public (i.e., no commons) property. The idea behind all property law is the belief in property itself as a that is reified to be transferable [between legal persons] beyond the information and/or physical object itself. The property itself is the item (physical and/or informational) owned by some legal [property owning] person.

The owner of "property" (is a *concept*, *not object*) is the owner of the exclusive "rights" (is a *concept*, *not object*) granted by the owner who creates a:

1. **Civil contract** (contract initiated by [private] property owner).
   A. **Court of civil matters law-suit processing**, who resolves contract conflict in terms of prior trade and access agreements.
2. **State contract** (contract initiated by territorial [State property] owners):
   A. **Physical property law** (integrated into the State through "lawful" constitutions, statutory and regulatory codes, and defended by all (employees, employers, and consumers).
   B. **Intellectual property law** (integrated into the State through "lawful" constitutions, statutory and regulatory codes, and defended by all (employees, employers, and consumers).
      1. The owner of a *copyright* is the owner of the exclusive "rights" granted by "copyrighting".
      2. The owner of a *patent* is the owner of the exclusive "rights" granted by "patenting".
      3. The owner of a *patent* is the owner of the exclusive "rights" granted by "trademarking".

In the market-State, everything is someone's property, or someone's potential property:

1. **Private property** - property that is owned by one or more legal property owners.
2. **State property (a.k.a., "public" property)** - State "public" property.
   A. All land in the territory of the State.
      1. Some land in the territory of the State is rented out to legal property owners as private property real-estate.
   B. Some objects in the territory of the State (i.e., State buildings and government materials).
3. **Not yet anyone's property** - so, anyone's potential property.

Market-State property rights (as those rights defensible with State power) categories include, but are not necessarily limited to:

1. Information property rights:
   A. Copyright property rights.
   B. Patent property rights.
   C. Trademark property rights.
2. Object property rights:
   A. Land property rights.
   B. Land-fixed property rights.
   C. Movable object property rights.
3. State property rights

A. Job authority rights.
B. Public access rights.

There are two general categories of private property in the market-State:

1. **Intellectual property (a.k.a., information property, intangible property law):**
   A. Copyright.
   B. Patents.
   C. Trademarks.
2. **Physical property (a.k.a., personal property, tangible property law):**
   A. Real property (a.k.a., immovable property).
      1. Land.
      2. Objects fixed to land.
   B. Chattel property (i.e., objects not fixed to land).

A more complete description of the two types of property is as follows:

1. **Information property (a.k.a., intellectual property)**:
   A. **The "right" of privatization:**
      1. **Copyright property** - A copyright gives a legal person the ability to stop other legal persons from freely using one's productive information content.
      2. **Trademark property** - a right to prevent others from using one's organizational identity mark(s).
      3. **Patent property** - A patent gives a legal person the ability to stop other legal persons from freely using one's productive/useful invention. Patent rights refer to the control of the following aspects of production (by property owners):
         i. Manufacture.
         ii. Usage.
         iii. Sale (commerce).
   B. **The "left" of commonization/openization:**
      1. **Copy-left property.**
      2. **Patent-left property.**
2. **Physical property (a.k.a., land and objects):**
   A. **Real property (immovable property) -** real-estate landed property, usually only refers to land and land-fixed property. Real property is, the land and other objects. The building is "attached" to the land (by being built on it) and therefore, for legal purposes, becomes part of the land. Structures fixed to the land (and structures fixed in those structures fixed to the land) become real landed property. The house is legally inseparable from the land (unless it can be moved). Real property is also territorial property because it is property fixed on the land within some State's territory. Real property is created and licensed by means of (i.e., proof of ownership comes in the form of): titles, deeds, and other contracts.
   B. **Chattel property (movable property, personal property) -** usually only refers to tangible movable personal property. Cars and pens are choices of possession, or chattels. "Chattel" is the technical name for property someone can touch, pickup and hold, which is not land, and is not something affixed to the land, such as a houses. Chattel property is created and licensed by means of (i.e., proof of ownership comes in the form of): titles, purchase receipts, and other contracts.

There are several axiomatic forms of [private] property:

1. **Informational property** (a.k.a., intangible property rights, incorporeal property rights).
   A. **Information other than money as property:** Information about function, identity, documentation, and culture.
      1. *Private information property.*
   B. **Money as property:** Information about a universal trade/token accounting.
      1. *Private bank account property.*
2. **Physical property** (a.k.a., real property rights; tangible property rights).
   A. **Objects other than means of production as property**: Objects that consumers use.
      1. *Personal private property.*
   B. **Means of production as property:** Objects used to produce the objects consumers use (a.k.a., machine/resource capital).
      1. *Business property.*
3. **Human property** (a.k.a., labor property rights).
   A. **Humans as labor for other humans:** Humans used to produce the objects consumers use (a.k.a., human capital).
      1. *Employee property.*

There is informational property, just like there is physical property. The "copyright" is like the "deed/title" to a house. It says "you" own the house. If "you" want, "you" can rent the house out to someone, and that rental agreement is the 'license'. Copyright is different than a "deed" - it concerns information only - in that it is possible to license the material in different ways, to different people, all at the same time. Like a "deed", though, "you" can sell ownership of the property to someone else, and that would be called a "copyright transfer".

In society, there are two market-based population dimensions in concern to copy protection (i.e., copyrights and patents) and licensing (i.e., licensee and licensor):

1. The producer-user dimension:
   A. Producer - the legal property rights of owner (i.e., licensor).
   B. User - the legal people/organizations that want to use the property (i.e., licensees).
2. The economic production sector dimension:
   A. Copyrights and patents - Works of artistic, engineering, and exploratory expression.

2.1.1 Property rights

A.k.a., Proprietary rights.

Under market-State conditions, there are "rights" granted to property owners [by other property owners and by the State]. Property rights refer to "control of" some thing directly, and/or, control of another's freedoms. Where there is property [ownership], there is the right to engage a larger force to defend one's right to exclude another from using one's property. In a community-type society there is no tradeable property. However, in societies where there is property, and profit is derivable from property, then individuals are incentivized to withhold and restrict potential advancements and other useful products for their own selfish gain. Intellectual property, copyright, plagiarism, and even many cases of cheating, are reflective of an environment where there is little global cooperation and little facilitation of intrinsic motivation. In the market, property rights are privileges given from authority for some prior work.

A user/owner can have access to and/or control over the following potential freedoms:

1. See (is it secret?).
2. Perform, run, or use.
3. Copy.
4. Modify.
5. Distribute (including commercial).
6. Display.

Once someone has the "rights" of control over a property, they may then grant the "rights" of control over the property to another as a trade (i.e., they may contractually "license" some or all "rights" to another legal entity). In general, the State grants "rights" to the producer and to the consumer, such that if there is a legal "rights" violation, then legal "rights" actions can be taken. In this way, the State has the ultimate "right", because it creates and presides judgement when there is conflict.

"Rights" are not objects; they are a social construction. Copyrights and patents are choices in action - to engage in legal-State action against someone who takes more freedom than permitted by the "rightful" [proprietary] property owner. As choices of action, property rights are equivalent to a debt - the copier then owes a debt to the producer for taking more freedom than allowed; whereupon the property owner can engage legal property proceedings (using State resources for conflict resolution of the property-based social conflict) in hopes of acquiring financial damage and/or an injunction on continued copying.

The idea of property "rights" (in a market) provides users (among the population) two sets of consumer product "rights:

1. **The "rights" to purchase "rights of title"** to the product (and use per various State-overseen agreements; e.g., patents, copyrights, etc.).
   A. Producers can sell the product for a one-time (or multi-payment fee) and forget it; it becomes the users (with State-overseen "rights").
2. **The "rights" to purchase rented access to some of the "rights of title"** to the product (and use per various agreements; e.g., terms of service, patents, copyrights, etc.).
   A. Producers get continued fee compensation for a users continued access to, and/or the producer servicing of, the product.

2.1.1.1 Property rights durations

A.k.a., Entering the public domain.

In the early 21st century, most copyright and patent laws set a fixed number of years dedicated to the "right" of private ownership of information. Given current copyright laws, all copyrights and patents (intellectual works/labor) will eventually enter the common public domain in some fixed number of years after their creation. In this way, the "rights" are said to be turned over to the public (Read: public domain) for the public good of innovation and growth. Works in the public domain (P0, CC0) are not protected by copyright acts (i.e., copyright laws). Anyone can freely use them (in a copyright sense) without obtaining permission or paying a copyright fee. Anyone can even edit, adapt and republish these government/public works without permission. Anyone can adapt them and release them under a restrictive (non-commons) copyright license.

The time period for copyrighted material to enter the public domain fluctuates by country and by the politicians and corporations in power at any given time. In the United States, for example, copyright extensions have been increased approximately eleven times over the past forty years. Specifically, the Sonny Bono Copyright Term Extension Act of 1998 (SBCTEA) extended copyright protection for present works and all future works in the United States by twenty years. However, in the United States, material published prior to 1923 is entirely in the public domain. Please be aware that there is no single go-to reference guide for identification of public domain works. If such a list were generated, it would constantly be changing because copyright standards, rules, and laws are in a constant state of bureaucratic flux.

Today copyright laws are partially standardized through international and regional agreements such as the Berne Convention and the WIPO Copyright Treaty. Although there are consistencies among nations' copyright laws, each jurisdiction has separate and distinct laws and regulations covering copyright. National copyright laws on licensing, transfer and assignment of copyright still vary greatly between countries and copyrighted works are licensed on a territorial basis. Some jurisdictions also recognize moral rights of creators, such as the right to be credited for the work. Depending upon jurisdiction, copyright law still applies when copyrighted material are used in educational settings. The fair use of copyrighted material in educational settings is known as educational fair use doctrine and permits limited utilization of copyrighted material without the owner's permission for use in education and research settings. In order for Fair Use to apply, an educational institution and their learners must be using the material for non-commercial, educational-only purposes.

Note that there is one notable exception to "rights" of ownership not entering the public domain after a fixed number of years. The Italian State has a Cultural Heritage and Landscape code, which grants public institutions in the country who own works of cultural heritage the ability to request concession fees for, or outright bar, commercial reproductions of important artworks, regardless of their copyright status.

When intellectual property expires, or there is no patent/copyright at all, then that opens up the production so that anyone else can copy, sell, and adapt and re-privatize an invention or documentation/record. When a patent expires, the information enters the "public domain", where there are no "rights" [granting private property ownership].

Of additional note, to acquire public domain content, it is typically necessary to acquire that content from a valid public domain repository. Note that in the 21st century, there are businesses online that take public domain content, and then, create higher resolution versions of it, and index the new versions on their servers, whereupon they claim copyright over the "improved" formerly public domain content now on their servers. This technique is typically legal, but has also been named "copyfraud". These businesses do not claim that they own the copyright of the public domain versions, but they do claim copyright over their versions.

The property rights in a market-State economy involve:

1. **Personal (individual & family) property rights (family property rights and law)** - owned by a legal person or family. The power of "invitation".
2. **Civil (organizational) property rights (contract property rights & law)** - owned by a partnership of legal persons.
   A. **Market organization (i.e., business, partnership of legal individuals and families)** - individuals and families as legal property owners of a partnered (Read: partnership) organization.
      1. What do competing entities in the market own, and what do the do with what they own survive and win [profit] with trades?
   B. **State organization (i.e., governmental)** - owned by some partnership within the territory, such as: owned by a political party, owned by a democratic participating public and political parties, owned by faith, owned and coordinated by members of community, etc.
      1. What is the State authorized to do?

The property rights to land (and, buildings thereon) can be either (i.e., the terms of the duration of the "rights" license is either, or):

1. **Freehold** - "you" permanently (qualified by continued State-tax payments) own the property and the land the property sits upon.
2. **Leasehold** - "you" temporarily (qualified by continued State-tax payments) own the property and the land the property sits upon. Once the term [time period] of the lease is complete, its ownership "rights" will return to the original owner, who is either:
   A. Another private property owner.
   B. The State.

2.1.2 Property [rights] licensing

A.k.a., Permitting, permission, invitation, allowing, authority giving property rights, property licensing, proprietary rights licensing, property rights agreement, property rights contracts, property rights boundary restrictions.

A property can have its "rights" licensed to another legal property owner. A license is a permit or allowance of use of some item of property by the property owner. Licensing is the legal term used to describe the terms under which people are allowed to use any property (e.g., from copyright to trademark, and from the driving of an automobile to the installation of an air conditioning unit). Licenses permit or deny the creation, construction, or use of something. Another word for "license" is "permit". Effectively, a license is a permit to do and/or have something. Licenses are gatekeepers to access. Licensing is essentially an agreement between two legal persons. Licensing agreements allow people to control property. A licensing agreement creates a business partnership. It identifies how the partners enter, what all the partners agree to, and possibly, how the agreement can be dissolved. Effectively, property licenses govern how others – besides the originator – can use, modify, or distribute information, software, and resources (or resource compositions) .

For users, proprietary systems (Read: permissively closed; e.g., territory, hardware, software, etc.) generally require purchase of a license to use (by payment of a one-time fee or recurring fees), and the source code (design) is typically hidden from them (i.e., hidden from the users). Proprietary software, for example, is also called closed-source software or commercial software. The copyright limits use, distribution, and modification, imposed by the copyright holder's publisher, vendor, or developer. Proprietary systems remains the property of its owner/creator and is used by end users under predefined conditions (e.g., terms, contracts, etc.) usually defined in a license (for use). Alternatively, open-source socio-technologies are available free of cost to all in community; whereas, proprietary software is generally not free of cost.

Licensing is a market-State verb that means to give or grant permission on behalf of a market and/or State entity. The noun license (American English) or licence (British and many other places) refers to that permission as well as to the document recording that permission. A license may be granted by a party ("licensor") to another party ("licensee") as an element of an agreement (market-State) between those parties. A shorthand definition of a license is an authorization (by the licensor) to use the licensed material (by the licensee). A license may stipulate what territory the rights pertain to , and the length of time the license is valid.

A shorthand definition of "license" is:

1. A promise by the licensor (seller) and licensee (buyer) not to engage conflict resolution services if the property is exchanged as permitted and conditioned.
   A. An indication that conflict resolution will be engaged if the property is used *(by the buyer)*, or service is not provided *(by the seller)*, in some way without permission.
2. An indication of what the seller of the license will and will not do.
3. An indication of what the buyer of the license will and will not do.
4. A debt of payment (if the license has a fee).

In concern to the State, a license may be issued by authorities, to allow an activity that would otherwise be forbidden. It may require paying a fee and/or proving a capability. The requirement may also serve to keep the authorities informed on a type of activity, and to give them the opportunity to set conditions and limitations.

In concern to the market, a licensor may grant a license under intellectual property laws to authorize a use (such as copying software or using a (patented) invention) to a licensee, sparing the licensee from a claim of infringement brought by the licensor. A license under intellectual property commonly has several components beyond the grant itself, including a term, territory, renewal provisions, and other limitations deemed vital to the licensor.

A license is a legal fiction; it is a concept with only meaning, and does not exist in the real world, like a pen-object or house-object. In the market-State, licensing is simply another word for propertization. A licence is a grant of a permission of control over property. Herein, information and objects become property controllable through permissions, which if violated have consequences. In the market-State, technologies (physical and process), as well as land, and significant amounts of information, can become property licensed out to other legal persons.

Let's say someone owns some land. That owner can give permission to somebody to use the land in a legal way and/or subdivide it into a whole share of "lots" for people to habitat, dwell, and work within. The permission given by the owner is known as a license; and a license is written as a contract. The contract need not always be signed and agreed to in order to need to be followed. Websites' Terms of Service contract agreements are one example. Simply accessing a website necessitates compliance (as legal and reasonable) with the terms in the contract.

Licensing can be given in any of the following forms, some are better records than others:

1. Granted verbally (a.k.a., accepted verbally).
2. Granted in writing (a.k.a., accepted in writing).
3. Implied by law.
4. Supported by contractual consideration.
5. Exclusive, non-exclusively or sole.

The most common property license agreements are for:

1. Trademarks (information that conveys identity).
2. Copyrights (information that conveys documentation or culture).
3. Patents (information that conveys function).
4. Trade secrets (information that conveys competitive advantage).
5. Technologies (physical machines).
6. Real-estates (physical land and fixed buildings).
7. State license agreements (supposed to convey public safety).

In the market-State , there are really two dimensions to the concept of a "license":

1. **Market-based licenses (a.k.a., property licenses, civil licenses, service licenses, user licenses, business agreement, terms of service, etc.)** - those licenses given by other market owning property entities (i.e., legal property owners). A property owner can allow other legal persons to use the property in a state permissive/allowed way.

A. If this license is breached, then conflict resolution comes into effect. The resolution may stay local to the business, it may involve a commercial conflict resolution business, or it may involve the State.

2. **State-based licenses (a.k.a., State licenses)** - those licenses given by the State to create, construct, or use anything in a permissible/allowed way. This is effectively the technical process of quality assurance and certified/record of knowledge and skills verification.
   A. Herein, conflict resolution always involves the State.

NOTE: *When any organizations issue a licenses for a limited/temporary period of time (e.g., 1 year, 5 year, etc.), these types of licenses are typically called, "limited term licenses".*

In the market-State there are two types of licenses:

1. There are licenses for property (informational and objects) held by legal persons.
   A. Similarly, in community, there is an [authorized] access profile, which involves decisions about actual habitat service access and the available options for access. The program also shows decisions about past, current, and future potential access, and allows for user participation. In community, there individuals have an access profile with different [access] availabilities during the 3 self-sustained phases of their lives.
2. There are licenses for socially consequential actions held by legal persons (e.g., a license for driving, license for cultivating, license for policing, license for engineering, license for construction, etc.).
   B. Similarly, in community, there is certification for usage/operation of potentially dangerous systems by individuals accessing personal and common usage items (e.g., a car, saw blade, etc.) and accessing InterSystem [Contribution] Team items (e.g., medical center operations, electrical system operations, coordination operations, etc.).

The State licenses (Read: gives licenses to) people and systems, typically to ensure the safety of the public under conditions of competition and incentives of profit. Under the State people and objects may be licensed (i.e., can acquire a license to use, and/or be constructed and operated). Legal persons can acquire licenses, for example, a drivers license. And, objects can acquire licenses to operate, such as a motor vehicles registration, or hazardous chemical facility. The public can acquire a drivers license by certification (i.e., study and examination), showing/proving the ability to operate a motor vehicle safely. State employees often require licensing, which involves the taking of and passing a "public" exam. State licenses may be:

1. Permanent (as in, permanently associated with an object's or person's identity).
   A. Exist for one's lifetime (unless taken away because of an incident).
2. Temporary (as in, temporary permission to do something).
3. Need periodic inspection/review (as in, periodically inspected for quality and quantity).
4. Need periodic re-testing (as in, continued practice and certification requires another test to ensure sufficiently effective operational standards).
5. Need periodic education (as in, there may be new data available which ought to be learned, and/or there ought to be time dedicated to formally facilitated learning practices, for self-improvement).

NOTE: *Only the [copyright] owner (or their agent representation) can initiate a license agreement.*

2.1.2.1 Using licensing to reduce competition

I.e., The cost of oversight reduces access to production.

In the market-State licensing can be used to reduce competition. Licensing in the market is often a way to keep out competition due to the financial cost of the State licenses itself. Sometimes businesses lobby and advocate for regulation and expensive licenses, because they are very likely to be the only ones, or only one of a few businesses that have the finances to afford the expensive licenses. In this sense, there is licensing for two dimensions of societal operation:

1. **Safety** - regulation to ensure safe production and operation of societal systems.
2. **Competition reduction (objective-effect; may also be a safety reason)** - regulation to reduce access to production, by adding costs (financial and otherwise).
3. **Competition escalation** - alternatively, a State could increase competition by specifically setting a low cost for licensing.

In this context, State licenses (with or without a cost to the producer/user) may be required for:

1. Design and development of a product.
2. Manufacturing of a product.
3. Sale of a product.
4. Maintenance service of a product.
5. Quality assurance service of a product.

In general, all of these licenses cost money, and sometimes companies don't have the money or don't want to spend the money to pay for the license. In general, State oversight equates to expensive licensing; because, the oversight costs [a lot of] money.

It must also be noted that releasing content (partially or fully) open source is an often used tactic in competition in order to get a wider audience-adoption of the software on public platforms. The early 21st century Android operating system by Alphabet-Google is one example of this. In order to compete with Apple, Alphabet-Google made the Android operating system they produce open source, so it would be most accepted by all other smart-device producers.

2.1.2.2 Licensing types of property

A license simply means, "permission to use or not use, and punitive consequences for violation". A patent license is simply permission to use a new technology. A copyright license is simply permission to use some content/data. A "licensee" generally pays the [patent] owner for this permission, who tells the buyer of the technology/content what they can and cannot do with the technology/content.

The breakdown of licenses in the market-State follows as:

1. **Intellectual (a.k.a., informational) property** - belief in property; property exists.
2. **Real-property licenses** - belief in license, State/public permission exists.
3. **Licenses with enforcement** - belief in forced defense of property; enforcement.
4. **Businesses partnership** - belief in trade of private physical property, and licensing of materials for profit.
5. **Patent and copyright** - belief in trade of private informational property, and licensing of ideas for profit.
6. **Hardware, machine licenses** - belief in licensing economic production (i.e., habitat service system) objects for profit.
7. **Software, computation licenses** - belief in licensing economic production (i.e., habitat service system) objects for profit.
8. **Citizen license** - belief in license for traveling through different State territories (e.g., "passport" license).
9. **Trademark license** - identity actualization requirement.
10. **Personnel qualification licensing -** ability actualization requirement.
11. **Production partnership** - agreement to work co-operatively and co-ordinated together for production of their own services (and products). Not to be confused with a business partnership.
12. **Privacy license** - Does the project collect data on users? Is the data related to some special category, e.g., health, etc.). Jurisdictions may have compliance regulations for that information. For example, the European Union State GDPR compliance regulations.

In the 21st century, there is pre-transition (closed) and direct transition (open) licensing:

1. **Closed-source** (proprietary, permissioned license restrictive license):
   A. Hardware - patents (all rights reserved).
   B. Software - copyright/patent (all rights reserved).
   C. Documentation - copyright (all rights reserved).
   D. Expressed content - copyright (all rights reserved).
2. **Open-source** (community, commons license "lefted" with reciprocity):
   A. Hardware - open patenting (patent-left).
   B. Software - open patenting (patent-left) / open copyrighting (copy-left).
   C. Documentation - open copyrighting (copy-left).
   D. Expressed content - open copyrighting (copy-left).

In community, individuals have a community access profile.

1. **Community access profile** - profile of access throughout the network to habitat services. Including a habitat residency profile within which a set of habitat rules are agreed to.
2. **Identity license** - identity actualization requirement.
3. **Personnel qualification licensing -** ability actualization requirement.
4. **Production contribution** - agreement to work co-operatively and co-ordinated together for production of their own services (and products) in a coordinated and contribution-based manner.

2.1.2.3 Possible licensing types

Licensing is the process of giving another permission to have and/or use something, wherein the "owner" of the defensible "rights" of the "property" gives (permits) some "rights" to another sub-hierarchical property owner. Technically, all property licenses are permissive, because they, by permission, give "rights" to another [legal property] owner that the [legal property] owner higher in the hierarchy has available to give. Hence, there are the following types of copyright licenses:

1. **Copyright and proprietary licenses (a.k.a, permissively closed licenses; exclusive license, "right" licenses, copy-right licenses, proprietary**

licenses, closed system licenses, closed-source licenses, etc): These are rights granted by law to the creator of "original" works of authorship (e.g., text, music, imagery, software, etc.) that allow control over the use of their "creations". Proprietary or "closed" licenses restrict the use, distribution, and modification of the copyrighted work unless specific permission is granted by the copyright holder. These licenses are not "permissive" in the open-source context; rather, they restrict how the work can be used by others. These licenses impose authority based restrictions on how work can be used. This license is closed and/or private; exclusive to those given individual permissions by the owner in the form of a sub-license [to use, make, sell]. Permission is required to use, make and sell the object or information.

A. Effectively, there is an owner with complete rights (given the contract and jurisdiction) to use State resources to prevent copying, modifying, and redistributing.
B. If there are permissions beyond those necessary for safety, then there is likely an unnecessary boundary of restriction being placed upon the creation and sustainment of community.

2. **Copyleft (a subset of open licenses, not permissively open):** Copyleft licenses ensure that works and their derivatives remain open but require derivatives to be shared under the same or compatible open terms. However, they require that any derivative works are distributed under the same or compatible license terms, ensuring the work and its derivatives remain free and open. In other words, copyleft licenses still impose at least one demand - copyleft licenses require users to distribute derivative works under a license that offers the same, or sufficiently similar, rights as the original work. This requirement does not make them "permissively open" in the usual sense, as they impose conditions to maintain the openness of the work (i.e., they maintain the work in the commons). The term "copyleft" reflects the requirement to keep the work and its derivatives open, contrasting with the term "permissive," which usually refers to open-source licenses that do not have this restriction. Left licensing means that for the duration of the copyright, once something is placed in the commons, the "creator" cannot take it back and privatize it for their own private gain. Contributions made to the left commons cannot be withdrawn. This approach ensures that the deliverable remains freely available for both commercial and non-commercial use under the terms of the chosen copy-left license, so long as the license is maintained. No permission is required to use, make and sell the object or information. However, all users and redistributors are typically required (under the conditions of a copy-left license) to give appropriate credit, provide a link to the license (where applicable), and indicate if changes were made to the original work. Furthermore, if the deliverable is adapted, modified, or built upon, the resulting work must also be shared under the same or a compatible copy-left license, thus ensuring the freedom to use, modify, and share the work is preserved for all subsequent creations. Example of copy-left licensing in terms of creative works is the Creative Commmons By-ShareAlike license (CC-BY-SA), and in terms of software code, there are the GNU General Public License (GPL), Lesser General Public License (LGPL), and Mozilla Public License (MPL).
   A. Effectively, there is an owner with no right to use State resources to prevent copying, modifying, and redistributing.
3. **Permissive open licenses:** Permissive open licenses allow greater freedom with minimal requirements, usually just attribution. No permission is required to use, make and sell the object or information. These licenses, such as the MIT license or the Apache license, allow copyrighted works to be used, modified, and redistributed with minimal restrictions, often only requiring attribution to the original author. They do not require derivative works to be distributed under the same license, making them more "permissive" than copyleft licenses. The Creative Commmons By only license (CC-BY) is an example of a permissive open license. Something distributed with a permissive license can be taken by another person, adapted, and then, privatized.
   A. Effectively, there is an owner with limited right to use State resources to prevent copying, modifying, redistributing, and adding a copy-left or copy-right license.
4. **Public domain (P0) and Creative Commons Zero (CC0):** A public waiver of, or public permissive, license. Works in the public domain are not protected by copyright and can be freely used by anyone for any purpose. Not only does this involve a waiver of copyright, but it also naturally involves a waiver of the commons. The CC0 license is a legal tool that allows creators to voluntarily waive all their copyright and related rights, effectively placing their work in the public domain (commons), and then, taken out and privatized at any time. It represents the most permissive approach, as it removes copyright restrictions altogether. These

works are open to all to do with as they choose given certain societal safety restrictions. A public permissive P0/CC0 license "grants" users the freedom to do anything they want (within societal safety limits, of course). This "license" is not really a license, it is more of an explicit disclaimer of intention to enforce copyright. CC0 (a.k.a., CC Zero) is a public dedication tool, which allows creators to give up their copyright and put their works into the worldwide public domain, which they would enter into anyway given some legally set number of years. Public domain and CC0 are a waiver of market-State (copyright) property rights. Public domain could be considered a type of commons under market State conditions. However, if something is public domain, it can be adapted, and then, its adaptation can have a restrictive copyright placed on it. So, in this sense, something that was in the commons under market-State conditions can be taken and made part of something that is privatized, and State resources cannot be used to prevent that. The content has all its rights [legally State enforceable claims] waived.

A. Effectively, there is no owner and no on has the right to use State resources to prevent copying, modifying, redistributing, and adding a copy-left or copy-right license.

CLARIFICATION: *There is also a separate category of open-source licensing that is called, "permissive licensing". In this context, permissive means the permission to privatize derivations of an open-source original.*

2.1.2.4 License permissiveness

The most permissive license is a free license - the most free (Read: freest) license is the most permissive. Free licenses can be classified in two groups:

1. Free, as in, **not having a financial cost** (no necessary fees, human labor trade, or purchases). Permissions allow free of financial cost access.
2. Free, as in, **freedoms for the users**:
   A. **Closed** (no social freedom) - not open to copy and not open to redistribute without the given permission of the owner.
   B. **Openness freedom** (social freedoms) - open to copy and redistribute without permission. Open-source license that allows the work to be freely used, modified, and distributed.
      1. **Permissive open licenses** (freedom to remove from the commons) - users can privatize future version. Future versions can be privatized by users (ownership freedoms). Permissions allow future exclusion. Permissions may disallow commerce. Permissions may disallow derivations.
      2. **Not permissively open licenses** (no freedom to remove from the commons; a.k.a., left-licenses, "left" freedom, copyleft, share-alike, commons persistent, recursive open-source licenses) - open to copy and redistribution without permission, and future versions cannot be privatized. Permissions requires free future access.

Permissive licenses, such as the MIT License and the Apache License, only refer to the use, redistribution and modification of software. They do not require that redistribution of the software keeps itself free (in the commons; persists in the commons), and it does not require that open-source code be redistributed, which allows free software to become proprietary. Permissive licenses carry on the property market, because they allow future propertization (i.e., to make property) of information. This is a problem because, even if the original code/design remains free, if its subsequent developments become proprietary, in the long run, this can derail its use without purchasing the subsequent modifications. Copy-left only (a.k.a., commons share-alike) licenses apply language that require, in case of redistribution, conditions that ensure the software will keep its original freedoms, acting to prevent that a later version will become closed. Of course, all open projects need motivated contribution.

2.1.2.5 Competitive licensing and cooperative licensing

This system of competitive licensing (Read: Patent and Copyright State Departments) was designed to prevent socio-technical inventions/discoveries and individual media creations from being used or copied without potential for individual profit, and thereby, incentivize and facilitating scarcity-driven, profit maximization, and power-over-others types of behavior. Cooperative licensing moves property into the commons, where it persists in the commons. Cooperative licensing is a transition type of licensing that is likely to transition people and resources into a community configuration of society.

In community, there are no competitive contracts or competitive licensing; there is no extraction from the commons for personal gain and advantage over others. In community, there is no private property, no trade, and hence, no forms of intellectual property, including patents and copyrights (none are written or believed to exist). In concern to the equivalent of trademark in community, individual and group identities are cryptographically secure.

2.1.2.6 Political economic orientations under conditions of private property

A.k.a., The (copy)"right" and (copy)"left". The closed-source (privatization) and the open-source (commons).

The political economic orientations under market-State conditions inclusive of private property presents a two-sided political economic movement:

1. Metaphorical "right" [licensing] movement:
   A. The right is movement toward private property (privatization), and thereafter, permission by an owner.
      1. This is an orientation toward private control through legal State enforced private property.
2. Metaphorical "left" [licensing] movement:
   A. The left is movement of the permissions into an "open" and "common" contribution-usage environment.
      1. This is an orientation toward community service control through a legal State enforced commons.

2.1.2.7 Information property violation

In general, the State-legal justice system's determination of guilt for copyright infringement results in either:

1. Damages paid (forced money transfer to property owner) and/or
2. Injunction (stop using the property).

2.1.2.8 Notice [of license] requirements

Licenses each have their own specific notice requirements; in terms of how the property owner must associate a specific licenses (and its contractual terms) with a specific item. Notices of a license typically include symbolic language (e.g., ©) and/or abbreviated text, as in CC BY-SA. Sometimes notices are required to include the title of the license and other relevant associated data. Technically, if "you" want your content in the public domain, just put it out there without a license.

> **NOTE:** *Sharing represents a truly difficult situation for someone who survives off of the protection of information as their exploitable product.*

3 Information property [law]

> *A.k.a., Intellectual property (IP), intangible property law, privatized information property protection, intellectual regulation, intellectual property regulation, information regulation, information property regulation, information privatization protection laws, private information property creation laws, profitable intellectual property creation laws, anti-community law, etc.*

Intellectual property (IP; a.k.a., information property) privatizes the results of intellectual activities (i.e., privatizes information). In the early 21st century, the expression of intelligence can be privatized (property-creation-ability) and profited from. Intellectual property law exists to create property out of information in order to profit. Intellectual property law exists to perpetuate trade and market competition by using State resources to punish cooperation. Intellectual property law refers to the terms of a copying agreement.

3.1 Intellectual property

What is possible in the information age is in direct conflict with what is permissible [in early 21st century society]. No social order, no matter how entrenched and how ruthlessly imposed, can resist transformation when new ways of producing and sharing emerge. With closed and "secure" content (i.e., "protected content") the "author" of the content is the sole creator and owner of said content. With open content the "participative creator" is in a state of collaboration with those who have come before as well as the community of users of the content. The community of users and the "participative creator" are all creators, and to an extent, accessors (or "owners") of the content. An open system involving openly participative content is a closer approximation to the existence of every living systems (in nature), and closed content goes a long way toward limiting the evolution of a community and causing unnecessary inefficiency (and suffering) in the world. Closed content does not account for the fact that the "participative creator" of the content would have been unable to create the content in the first place were it not for their prior learning, informed by the earlier work of many socially participative others. Fundamentally, information does not have the same [spatial] scarcity potential as materiality, unless imposed by force of violence by other humans. Therein, in order to optimize societal services for all individuals, material resources coordination should not be imposed by force of violence. In reality there is impermanence in everything; to keep a permanence when openness is essential is folly.

If "we" are restricted from sharing, then "we" are effectively restricted from navigating this real world together in common. And with this realization in mind, we ought to ask ourselves, who benefits and profits from the barriers are barbs raised to reduce cooperation?

Possibly the few, though also, possibly no one.

The pervasive culture of turning everything and anything into a commodified piece of property, a "commodity", that can be artificially restricted, bought and sold, is squeezing the space for and awareness of community (and of common access). Exploitation for private gain has systematically diminished the commons. This is happening not only in the case of tangible life support services and natural spaces, but also with more intangible things such as ideas and information, now increasingly referred to as "intellectual property". If a market entity can own an idea, and have that ownership forcibly defended, then the entity can stop progress on that idea and its synthesis into new ideas and new designs. Therein, there is potential profit for market entities in all forms of property. Further, there is profit [for the few] in conditioning the perception that space and time are "ownable".

When there is a claim of ownership, then there is the legally enforceable right to possess. Property is "rightfully" defended. When ownership is rightfully defended, then the idea of cooperative access is not understandable.

Intellectual property (IP) represents the "rightfully" enforceable enclosure and control of that which was designed and discovered, of what is essentially, just information. Intellectual property is claimed to include: patents; copyright; industrial secrets; and trademarks. Intellectual property is the exploitation of an idea for profit or social recognition. The moral claim for intellectual property is that an inventor has an exclusive, enforceable "right" to his/her useful, novel application of an idea, while an author or composer has such a "right" to his/her original work or expression. Those who believe in IP generally insist that what is owned is not an idea, per se; but, it's hard to make sense of that assertion since an application or expression of an idea is itself an idea. Hence, in the real world, IP is about the ownership of ideas, which are equivalent to thoughts, which are also, just information.

> **INSIGHT:** *The provenance of an idea is completely irrelevant to the evaluation of its rationality and/or truth. And in fact, in social discourse, often times the provenance of an idea can bias critical examination.*

The term "intellectual property" itself is a marketing term; it is ownership jargon created by powerful States and market entities; it has no actual meaning when critically examined. Intellectual property is the doublethink encoding of the idea that the intangible thought of a design, itself, can be property. For all practical purposes, the term "intellectual property" is identical to the statement "thought is property" (or, more precisely, "some thoughts are property"). Yet, there is no scarcity in thought -- thought moves through our minds and we can replicate it with our minds. Logically, how can there be exclusive control over, and access to (Read: "property" to), something intellectual? There can't, it's mental (herein, "mental" is a double entendre).

"Intellectual property" isn't even "property" in the traditional market philosophy sense of the concept. For example, two or more people cannot use the same pair of socks at the same time and in the same respect, but they can use the same idea—or if not the same idea, ideas with the same content. Ideas can be multiplied infinitely and almost costlessly; they can be used non-rivalrously. When someone articulates an idea in front of other people, each now has his/her own "copy." Yet, the "original" articulator retains the idea. In fact, one could go so far as to say that there was even productive effort on the part of the attendee who had to do the work of listening and integrating the idea, which was simply projected into an environment.

At the level of an information system, [digital] information isn't depleted or consumed by usage. When shared openly, [digital] content is added to over time. [Digital] information is non-zero, it provides benefit to more people without taking anything away from the composer.

Patents create legal monopolies. Historically, patents originated as royal grants of privilege. Copyright originated in the power to censor. One of the reasons someone might take a patent is to collect royalties. Therein, something renewable by its very nature (i.e., information), is now made non-renewable, externally controlled by its "owner" with the right to protect its property backed up by political property enforcers (e.g., the police & military).

From the perspective of "property rights", and in practical terms, when one acquires a copyright or a patent, what one really acquires is the power to ask the government to stop other people from doing harmless things with their own property. Hence, intellectual property is inconsistent with the "right to property".

Intellectual property does not stimulate innovation and it does not reward innovators. It is important to remember here that it is the owner of the idea (being an abstract piece of property) itself, who is rewarded, not the individual(s) who designed or discovered it - sometimes they are the same, and sometimes they are not. Intellectual property can be bought and sold, and often times companies write 'intellectual property clauses' into employment contracts, which give the company rights to works created inside, and sometimes outside, the scope of employment.

Intellectual property is a form of State-market protectionism. Intellectual property prevents others from using ideas that could benefit everyone. Fundamentally, information is a financial asset to the business that owns it. Some States even go so far as to have "culture reproduction laws". These States have code entitled something akin to, "Cultural Heritage and Landscape Code", which grants the State (a.k.a., "public institutions") in the country the ability to request concession fees for—or outright bar—commercial reproductions of important artworks, regardless of their copyright status.

In the market, "downstream" discoveries, namely marketable products, often depend on "upstream" discoveries in basic research. Yet the former can be more easily patented than the latter because they are more tangible, and so companies that operate downstream may be able to benefit financially from discoveries made by not-for-profit institutions upstream. And, much of the upstream research is government subsidized through threat (i.e., "tax").

Also of note, to some degree the patent system skews money and research toward things that are patentable, while limiting research on things that are not patentable and profitable, but would still help humanity. In other words, the system skews research priorities. The patent system also causes entities to hide or otherwise sit on research for competitive advantage. Abundance enabling technologies are not welcome when scarcity is useful for control and for profit. Software, for example, is reproducible at almost no direct financial cost, and hence, without property rights software would essentially not have a price. Price is only secured through government monopoly of force and the derivation of rights therefrom.

Copyright is the type of intellectual property that protects fixed, expressive works (novels, movies, songs, sculptures, paintings, programs, maps, charts - "creative works" as a fixed and original expression of authorship). Copyright is a restriction on freedom given from those of privilege. Sometimes individuals have to use other peoples words to make their points or visualizations because those most precisely meet objectives; copyright takes from an individual (and humanity as a whole) the ability evolve and adapt to the extent copyright to restricts sharing. Copyright is a government granted privilege by those themselves who have privilege to be authorities. Copyright restrictions exist to defensibly protect some peoples competitive economic positions in the world (i.e., copyright protection); they are a restriction on others backed up by violence. When a copyright is enforced, freedom of behavior is artificially restricted by the value of violence; because, the enforcement is enforced (i.e., backed up by violence). Copyright is a strong negator of the value of freedom [of expression], because it gives some human or organization the legally enforceable ability to control everyone else's actions by inhibiting the publishing or re-publishing of information...without the prior consent of the "copyright" owner. Copyright, intellectual property, etc. are all forms of relationship based on power-over-others; wherein, one individual or some group has the power to restrict the sharing of others, and even punish them if they do share.

Imagine a situation where some group or individual has a patent on a technology (e.g, energy technology) or copyright on a design that could move all humanity forward, and they choose not to use it, because they have other (energy) investments that they want to continue to make money on. Conversely, all of humanity becomes the beneficiary when useful information is shared. When the requirement for a monopoly on force is removed from the conception of government, then there may arise a structure to facilitate the coordinated sharing of information and controlled operating of services for the highest potential benefit of everyone in society.

The world's first copyright law, the Statute of Anne, was enacted in England in 1710. Exercising its power under the newly adopted Constitution to secure the rights of authors and inventors, Congress passed an act almost identical to the Statute of Anne as the first United States copyright law in 1790. In the United States, copyright emerged in 1790s, and one year later the authorities ratified the United States Constitution. The same people who ratified the constitution also passed the first copyright act. That act had 1308 words. In 2014, the act has approximately 79602 words. If all the statutes administered by the United States copyright office were examined then there are over 130000 words, not including all the various circulars and regulations the copyright office issues.

In early 21st century society, "creative works" are registered when financially and otherwise possible [with an authority] or through a very special mark (e.g., "©", which is supposed to signify something meaningful). What does registration or marking imply? In the intellectual property system, holding a patent or a copyright means you hold an enforceable, violence-based, and artificial monopoly over that property for some duration of time. From the encoding of IP into a socioeconomic system, consumers get [at least] all of the following:

1. They have to pay monopoly prices.
2. There is reduction of choice.
3. The sharing of information is artificially limited.
4. Progress on an idea or technology is blocked.

Owners get all of these benefits because other market entities cannot use and improve upon the creative idea [without payment and/or permission].

The neologism "creators rights" are a slap in the face against those who create for the joy and appreciation of the creative experience itself. "Creators rights" are not creators "rights" at all, but the "rights" of business and State entities toward maintaining social power and economic profit.

Intelligence seems to involve the intellectual accumulation of something, and almost every concept we come across is an intellectual accumulation. We realize that we have all "stood on the shoulders of giants" to accomplish what we have accomplished. Knowledge that has come before us has permitted us the opportunity to understand that which we now experience and create that which we create. We are all benefactors of others efforts, of others learning. For example, the knowledge that led to the 'car' was developed over/by thousands of generations of discoveries, not by a single individual. The argument that anything which can be manipulated becomes property is an unfortunate and inaccurate one. It's like saying, "We made this car, but because I painted it, it now belongs to me". An industrial manufacturer is simply adding paint to the work of others and claiming ownership. In truth, no one "invented" anything, all creations are a series of discoveries and arrangements/ modifications.

When a robot constructs and pieces together a car, then there is no longer human labor involved. If someone wants to argue that the output of an automated system is property, by extension, then it must be asked, "What about everyone else who contributed to it along the way, why are they not part owners as well?" This leads someone to the conclusion that we are all owners or not-owners at all. Anything in-between is a contradiction.

The very idea of intellectual property is a detrimental social construct. And yet, intellectual property is not just a particularly destructive and unjustified form of property, all "rights" to property are destructive and unjustified as is argued elsewhere in this document. (Tremblay, 2010)

Fundamentally, the encoding of the idea of intellectual property into a socio-economic system is highly likely to orient society in a direction opposed to human fulfillment.

In reality, ideas live in an intellectual commons where no one needs the permission of another to access and apply such information. The idea that ideas and replicable creations are property, and that using and building upon on others' ideas always requires permission, is insane.

In the real world, "intellectual property" is fraud and coercion. "Intellectual piracy" is not stealing (Read: not theft); why do you think they call it 'file sharing'. Sharing is real life. Sharing is synergy. Sharing is a means of life coordination. If sharing is piracy in a pejorative sense, then doublespeak is present and such a society is a criminal-society at its foundation. Therein, "anti-piracy" is likely to mean, in fact, the enacting of harm and obstruction against those who share and cooperate for mutual benefit. And, where there is violence done to reduce and obstruct sharing, then there is likely to be found equivalent exploitation and enterprising profit. In such a society, censorship and inefficiency become profitable. In truth, sharing is an issue of freedom and the use of violence to protect profit or reputation is the domain of tyranny (of law and government). Yet, there is the acknowledgement that sharing in the market is difficult when you have to live and survive by market rules (and principles).

When circumstances rob you [of that which is common], sometimes you have to rob it back. In a monetary system there will always be people looking to monetize information. There is no secret to health and fulfillment. Claiming information is "yours" is an ego-reward, while growth and competition lead to "ecological egocide". In community we free our minds from attachment identifications with our creations so that our creations may benefit everyone. When the sharing of knowledge and entertainment becomes a wrongful act and "defendants" are claiming great and "irreparable" injury, then something is wrong with fulfillment in that society.

If intellectual property does not exist, then what is an 'idea'?

- An 'idea' is a new combination of old elements. An 'idea' is the capacity to bring old elements into new combinations, which depends largely on the ability to see relationships. In the market-State, it also depends on education and financial purchasing power, as well as motivation.

Producing new ideas is a process of combining items already known and understood, in new ways.

> **INSIGHT:** *In reality, copyright is nothing less than tyranny, plagiarism is nothing at all, and intellectual property advances the special interest groups of that property. Today, ideas are exchanged at rates that no one, not even some just 30 years ago, could have imagined. We are fundamentally entering a more 'thought responsive' environment. Protectionist paradigms of thought, such as intellectual property, copyright, and even plagiarism and cheating are anachronistic to this new way of living.*

3.1.1 Protectionism and repression

> **INSIGHT:** *When there is secrecy, there is possible conspiracy, behind which there is possible malice. Secrecy enables corruption.*

In 2014, the message appearing on file-sharing websites censored by French telecommunications read: "You cannot access this website because it infringes on others rights". This message is doublethink - there is an entity out there (a server on the Internet) and "you" are not permitted to freely communicate with it because it is infringing on others rights. Fear has unfortunate ramifications. A fearful society sets limits on sharing, cooperation, and total progress. Censorship in access to information is hindering human progress at the very least, and is totalitarian at the worst. By artificially inhibiting access to available information and claiming said access infringes on others rights, then the question must be asked: Is there not a greater infringement of rights going on?

At a fundamental level, we as individuals learn [in part] by copying (or mirroring) one another, by adapting and modifying the works of others. Sharing is compatible with human fulfillment, copyright and patents are not. There is no way to enforce copyright in the non-commercial sense without abolishing a great many "human rights" -- the only way to dictate what two consenting people choose to transmit to one another is to remove their ability to communicate privately and freely. Hence, copyright considerations as a violation of another's "rights" are either voluntary on an individual basis, or completely unacceptable for a society oriented toward human fulfillment. There is no middle ground to be found and there never was. The entire concept of "copyright", in a world which includes the Internet, is a concept of financial-monopolization and protectionism that revolves around the idea that a market entity can prevent individuals from sharing with one another. Because, in the end, that's what ctrl+c to ctrl+v does.

The encoding of the idea of 'copyright' cannot serve society. Its encoding principally serves State-commercial industry -- if it is applied, it must be applied society wide, and when it is applied society wide, it inhibits society-wide change. It inhibits systematic social change and transparent economic change -- useful information is artificially restricted in its distribution and re-modification; it becomes locked up with elements of culture, privatization, fear, and threat.

3.1.2 Property and the commons

Ideas, information, and understanding are emergent and are an accumulation of that which has come before (i.e., all knowledge and understanding are serially developed). Almost everything we come across is an intellectual accumulation. Ownership of knowledge is thus illogical because we have all "stood on the shoulders of giants" to accomplish what we have accomplished. Knowledge that has come before us has permitted us the opportunity to create that which we now create. We are all benefactors of others efforts regardless of our beliefs.

Social and economic rules that restrict the sharing and evolution of knowledge limit humanities evolvement and individuals' betterment. If individuals are not permitted by an authority to make use of the knowledge they have acquired, due to external exclusive ownership involving threat of force, aggression or coercion, then that is akin to exclusive external ownership over elements of a being's internal cognition as well as their self-directed freedom in the material world. All claims to external ownership over another are an illusion.

Intellectual property could properly been seen as "property over mind" and "property over ideas", which leads quickly to an economic system that re-conditions (or "takes over") the minds of individuals. The word "intellectual" in the term "intellectual property" is really just there for obfuscating the encoded purpose of the concept. In other words, property over mental ideas, abstractions and thoughts (or "intellectual property"), is in fact a form (or possibly, the form) of mind control. The belief in "intellectual property" is, conceptually and metaphorically speaking, an economic system re-encoding itself into the minds of individuals in its society in order to perpetuate its own principles [at a more refined level]. A socio-economic system that encodes "property" in general, and "intellectual property" in particular, will find the economic system taking precedence in the social lives of individuals wherein the society as a whole is not oriented by social concern and well-being, but by abstract economic principles and power-oriented leaders.

The idea that someone might have useful information in his/her head (i.e., information that may be of benefit to oneself and others), and cannot use that information because it is defensibly owned by an "entitled" entity, is tragically absurd. Quite possibly, the growth and persistence of "intellectual property" comes from years of social and cultural indoctrination [of a belief system].

Quite predictably, "intellectual property" furthers the vanity, prestige and protectionism that are involved in coming up with (or "arriving at") an idea. Conversely, in community, we are pleased when our ideas are past around and shared, for it means that others have possibly benefited as a result.

> **INSIGHT:** *Non-disclosure agreements are all about the maintenance of a competitive advantage under a state of competition.*

3.2 Closed[-source] intellectual property agreements over real-world systems

> *A.k.a., Privatization, proprietary systems, proprietary licenses, commercial licenses, private property licenses, closed source, "right" source", etc.*

Proprietary systems (information and software) generally requires purchase of a license to use by payment of a one-time fee or recurring fees, and the source code is typically hidden from users. Proprietary systems (software) are also called closed-source systems (commercial software). Another term for a proprietary systems license is a commercial license. The copyright limits use, distribution, and modification, imposed by the copyright holder's publisher, vendor, or developer. Proprietary software remains the property of its owner/creator and is used by end users under predefined conditions usually defined in a license (Techopedia 2016). OSS source code is available free of cost to all, whereas proprietary software is not (Crooke 2016).

3.2.1 Closed [proprietary] licenses

Closed-source means some degree of:

1. Other humans are forbidden to adopt, adapt, or distribute, because of "your" personal decision about "your" personal property.
    A. Therein, through "licensing" there is property made out of work, wherein, it is possible to permit (or not, and/or charge a fee to) other humans to adopt, adapt, and redistribute it.
        1. Financial licensing in the market is a way to profit off of the labor of other humans using common heritage resources.
2. In the labor market, it is common for businesses and State organizations to have employees sign an IP agreement that gives the owners of the business or State enterprise some control of the employees current and future projects, whether at the business/State or with another organization.

3.3 Closed-source and open-source

In the market-State, Open/closed source refers to a legal [licensing of property] status. Open and closed source are particular ways of implementing and distributing something, enabled by jurisdictional legal language that gives a range of permissions for what people may do. Open source encourages the development of the commons, collaboration, and interoperability (among different market-State entities). Open source ensure no one has a monopoly over knowledge and others community freedoms. This also means that no one is prevented from attaining knowledge.

> **INSIGHT:** *When there is only open source and free sharing, there is no need to police every computer user for "pirating", life and the State are more efficient.*

Whereas open source means transparency and cooperation, closed source means competition, secrecy, and trade. When the condition of secrecy, of competition, is present, then individuals and organizations will withhold useful (or potentially useful) data for their own benefit. If you are the only person who has the data in a state of competition, you are highly likely to keep it secret.

"Open source" always means:

1. **Transparency of access** - Open-source means contributions are publicly observable.
2. **Contribution** - Open source is the application of the idea that it is possible to contribute to the whole (self and social) as a value, simultaneously.
3. **Free of cost** - Open source means "you" are giving away information and technology for free.
4. **Ephemeralization** - Open source fits with allowing the free social evolution and development of ideas.
5. **Economic efficiency** - Open source fits with efficiency in providing shared access to optimal fulfillment, by not creating artificial limitations on access, use, and development.

"Closed source" always means:

1. **Secrecy of access** - The source is private and owned by someone.
2. **Unnecessary duplication (economic inefficiency)** - Closed source efforts necessary entail duplication, because not everybody can be aware and involved in the closed source effort.
3. **Distrust** - Closed source efforts necessarily entail distrust, because not everybody can be aware and involved in the closed source effort.

In concern to software, for example,

1. When someone sells closed-source software, they only give the buyer the pre-compiled binary - the actual 1's and 0's that the computer actually understands. In general, executable (or, ready-to-run programs) are identified as binary files and given a filename extension such as .bin or .exe. Programmers often talk about an executable program as a binary or will refer to their compiled application files as binaries. Technically you could try to reverse engineer it but it is a challenge and not precise.
2. When someone releases open-source software they usually give you the pre-compiled binaries AND a copy of the source code (ie, the code that the programmers actually typed out in some form of programming language).

> **NOTE:** *Digital technologies have enabled open source, and many of the tools and infrastructure behind the Internet are open source.*

In a university context, open source is useful:

1. For both public sector and private organisations, open source makes good use of money, promotes freedom of choice and helps customers avoid becoming 'locked in'.
2. Open source makes it easy and most efficient and effective:
   A. To use and reuse software solutions, pooling efforts to create services that are interoperable.
   B. To add features where desired to open source software, the benefits of which are freely shared with anyone and for any purpose, so that everyone can benefit.
   C. There is a closer connection (no profit) between the users and creators.
   D. To increases efficiency.

3.1 Open[-source] intellectual property agreement over real-world systems

> *A.k.a., Open source, left-source, open innovation, open science, open society, open data, open standards, de-privatization, open-ness, commons access, "left" source, etc.*

An open source license means to give permission so that anyone should be able to view and modify the source code/design of a piece of software or hardware technology. Releasing content under an open source license, will limit the ability of the worker/organization-of-workers to assert their patent/copyright "rights". Open source licenses effectively mean that there are no longer proprietary "rights", only human fulfillment "rights" to common heritage resources.

Open-source is a value-action agreement set (Read: license) that may be applied to [the means of] production in the context of information/data, to the following effect:

1. On the demand/user side there is:
   A. No price/cost or restrictions on accessing the information (except for safety).
   B. No price/cost or restrictions on using the information (except for safety).
   C. No price/cost or restrictions on copying the information (except for safety).
   D. No price/cost or restrictions on adaptation and re-distribution of the information (except for safety).
2. On the production side there is:
   A. Must provide the source code/design file.
   B. Must maintain the same openness level of license of the information.

The idea of a "commons" relates at a fundamental level to what can be done with the two [consciousness applicable] states of the world (i.e., concepts/information and objects/matter/materialization:

1. **What can be done with concepts (information):**
   A. The *identifi-ability (a.k.a., identitification)* of the information.
      1. The *read-ability (a.k.a., observation)* of information. Note that to read something, it must first be identifiable.
   B. The *use-ability (a.k.a., application)* of information.
   C. The *copy-ability* of information.
      1. The *distribut-ability (a.k.a., distribution, re-distribution)* of information. Note that to [re-] distribute something, it must first be copied.
      2. The *alter-ability (modification)* of information. Note that to alter something, it must first be identified.
2. **What can be done with matter (materialization):**
   A. The *interface-ability (a.k.a., connection)* of matter.
      1. The *sense-ability (sensation)* of matter)
         i. The *touch-ability* of matter. Touch-ability is object-to-object contact.
         ii. The *EM*-ability of matter. EM-ability is object-to-energy-to-object contact by means of one object torquing the electro-magnetic ropes connected to another object.
            1. The *sight-ability* of matter. Sight-ability is object-to-energy-to-object contact by means of one object torquing of the electro-magnetic ropes connected to another the eye of an organism.
   B. The *use-ability (a.k.a., application/functioning)* of matter.
   C. The *re-configur-ability (a.k.a., re-configuration, re-working)* of matter.
   D. The *transfer-ability (transportation)* of matter.

In concern to 'readibility' in particular, there are typically three categories, in both the market and the State, which are:

1. Human readable *(real-world)* - has meaning to a human.
   A. Can a human understand it?
2. Legal readable *(a social construction)* - can be performed by the State (conflict resolution process).
   A. Can a conflict resolution authority understand it?
3. Machine readable *(real-world)* - can be performed by a digital machine.
   A. Can a machine understand it?

There are multiple domains of potential openness in society, including but not limited to:

1. **Open source (open-source):** is content, documentation, software, algorithms and calculations, and hardware that is publicly accessible so that anyone can see, modify, and distribute it as they see fit.
2. **Open data (open-data)** is:
   A. Publicly available data.
   B. Structured data that is machine-readable, freely shared, used and built on without permissive restrictions. Open data is, therefore, about freely available informational products.
3. **Open standards (open-standards):** are documented information that is findable, freely accessible, redistributable, adaptable, and reusable.
4. **Open science (open-source science):** is a commitment to the open sharing of software, data, and knowledge (algorithms, papers, documents, ancillary information) as early as possible in the scientific process. The principles of open-source science are to make publicly funded scientific research transparent, inclusive, accessible, and reproducible. The idea of open-science involves free availability of research information to encourage all-source contributions (as in, contributions from all available sources).

Open source requires the source to be distributed. The source [code] is kept visible and open to all. Open source does not reserve special "rights" to property owners; it only reserves the "right" to possible attribution. Open source is global cooperation. Items licensed under open source licenses grow the community commons and increase interoperability and integrability. Open source means the ability to use works in the commons together, usually in the form of adaptation, without legal property and personal restriction barriers. Open source means free for everyone; open source is a part of transparency. Open source software exposes all source code, features and functions for free.

> **CLARIFICATION:** *Open and transparent information environments are generally referred to as 'free', 'open source', and/or 'commons'.*

Open source is self-explanatory in its title -- it means that everyone gets to share [openly] in the source [code] - everyone has the opportunity to participate in a[n open source] system's innovation. In the market, open source means a royalty-free license to use. And, free means without trade or currency (without the market). Open source encompasses two related concepts regarding the way systems are developed and "licensed". They are codified in the "free xyz" (e.g., free software, public domain) and the "Open Source" definitions. "Free and Open Source" refers to systems that have been made available under a free market-State "license" with the rights to run the system for any purpose, to study how the system works, to adapt it, and to redistribute copies, including modifications. Open source is where anyone can see, re-use, and redistribute all or part of the source code of some thing's construction or operation. Fundamentally, an open source orientation allows for safe operation of a population wide control system.

If a design is released with any restriction other than attribution, then it cannot be classified as open source (actually free):

1. If it is non-commercial, then it is not open source.
   A. Some rights are reserved to the property owner(s), specifically, commerce.
2. If it does not allow for derivations, then it is not open source.
   A. Some rights are reserved to the property owner(s), specifically, derivations
3. If it cannot be re-distributed, then it is not open source.
   B. Some rights are reserved to the property owner(s), specifically distribution.

> **CLARIFICATION:** *If there are any special rights of access and usage by a property owner only, then the work is not open source.*

A design is open source if anyone is free to share it (commercialize it as a trade, or not), and adapt it. To facilitate transition, the design must be something akin to Share-Alike (SA) license; wherein, any change to the design must carry the same openness license requirement, same as the original. In an open source context, anyone who works with the design may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.

Open source works when a group of people all embrace a set of shared human goals (e.g., the fulfillment of human need) and establish an organization/platform for sharing based co-operation (which is, in part, based on trust). Open source allows for self-direction and self-organization, because it isn't restrictive of others access to and usage of the information to better themselves and the organization of which they are a part. Here, trust enables cooperation. The sharing of goals creates a reason for people to participate in the open-source project. Community design is a common interest, and therefore, its design must be open source and transparent to all.

Note that anything in the public domain (CC0, P0) can be modified and then copyrighted restrictively. The same goes for the CC-BY license. To maintain an open copyright, a Share-Alike conformant license must be used. CC BY-SA is intended for general sharing of documentation and "cultural works". CC BY-SA allows for the sale and redistribution of the "work" by others as long as the work is licensed in the same way. Alternatively, the GNU Free Documentation License (GFDL or GNU FDL v1.3) was made with the main purpose of being used for software documentation specifically.

The idea of an open-source community transition license (a.k.a., "left" license) is a license that allows others to do all of the following:

1. Use, modify, distribute and reproduce the content (e.g., source code) provided the content (e.g., source code) be kept open and available to all (a.k.a., the public).
   A. To reproduce means to create (i.e., produce and make).
   B. To use means to operationalize.
   C. To modify means to change (Read: adapt/mix).
   D. To distribute means to transfer a copy of the work from one legal person to another.
2. All derivatives must be transferred with the same free (community migration) license that came with the original work.
   A. Left licensing prevents the appearance of personal permissive restrictions being placed over a derived or modified work. Note here that citation ("attribution") is a global coordination process and is not considerable as a personal restriction.

The open-source licensing of information comes with several qualified freedoms (all together to be open-source, copyleft):

1. Freedom 0 - observe and study.
2. Freedom 1 - Use (a.k.a., adopt).

   A. For study.
   B. For personal use.
   C. For commercial use.
3. Freedom 2 - Share (a.k.a., redistribute, copy, publish, display, communicate, etc.).
4. Freedom 3 - Copy (a.k.a., duplicate).
5. Freedom 4 - Modify (a.k.a., change, adapt, mix, etc.).
6. Freedom 5 - Distribute modifications (a.k.a., redistribute).
7. Control 0 - Cannot have personal restrictions attached and cannot convert to private, closed license (i.e., share-alike, SA).

> **NOTE:** *Information, hardware, and resource access freedoms can be extended to societal as a whole. For instance, there are freedoms that every individual in community (as a type of society with software, hardware, and user) should have, and that no user should have restricted.*

The producer-freedoms side of an open-source, commons-oriented license involves the freedom to:

1. The freedom to share ["your"] changes.
   A. Note this freedom in terms of the GNU GPLv3 license is written as, The freedom-ability to share the changes ["you"] made.
2. The freedom to not have ["your"] productive work on the system, privatized out of the commons, ever.
   A. Note this freedom in terms of the Creative Commons license category, Share-Alike (SA).
3. The freedom to not have common heritage physical resources, where not essentially necessary for economic re-production, sold out of the commons.
   A. Note this freedom in terms of licensing, this clause is often written as, the freedom-ability to not have resources ["you"] configured and traded out of the community.

When a society offers all of these freedoms, it is sometimes called, a free society. When a software program offers all of these freedoms, it is sometimes called, free software.

Hence, after a full community transition license has been applied, the property owner no longer has the ability to choose a license type for the adaptations of their work other than a community one, which is a protocol for community standards.

The open-source licensing of objects comes with several qualified freedoms:

1. Freedom 0 - Contribution of a resource input or human effort to development and operate society.
2. Freedom 1 - Access as a team member - Habitat operations via habitat service teams.
3. Freedom 2 - Common access to community services and objects - common access to habitat services.
4. Freedom 3 - Personal access to community services and objects - personal access to habitat services.
5. Control 0 - Must reasonably operate an integrated decision system and reasonably follow its determined results.

3.1.1 Free and open source license

> *A.k.a., Freedom license, tradeless license, moneyless license, priceless license, etc.*

Each open source license states what users are:

1. Permitted do with the system components.
2. Their user obligations.
3. What users cannot do as per the terms and conditions.

> **NOTE:** *There are over 200 open source licenses available with a complex of permissive variations.*

Free and open source systems (hardware, software, etc.) is the common name for systems/software that is available under a licence that grants (gives permission to; is permissive to) the recipient the "right" to:

1. Use it,
2. Modify it, and
3. Distribute it (either the original or the modified version),
4. Free of charge or royalty, and
   Free of necessity to be Inclusive of the source [attribution].

> ** A key point here is that the source-code for the software remain open and accessible as the software is copied and adapted over time.*

As part of the principles of open-source, all "open-source" licenses permit commercial use. To restrict commercial use is to restrict the potential spread of important knowledge and technology required for human fulfillment.

> **NOTE:** *Free and Open Source Software (FOSS) – As the acronym suggests, FOSS refers to free and open source software that is provided to the user to copy, exchange, share, and use. Free/Libre Open Source software (FLOSS) – FLOSS is similar to FOSS but allows more freedom to edit/modify and distribute the software in original or modified version without any restrictions. FLOSS emphasizes the value of freedom, that is, with few or no restrictions, and it encourages the modification and redistribution of the source code.*

That something is open-source only means that the source code is accessible to everybody; it does not mean that the software is free, though usually it is. One of open source's biggest advantages is that access is usually free of cost, although some features and technical support may have a financial cost. Also, because the code is available to anyone who wants it, public collaboration can fix bugs, add features, and improve performance within a relatively short amount of time, if there is the motivation to do so. If there is a financial royalty to be paid because of any form of use or copy, then it is not a free access license.

Free access may means (no cost):

1. Access (use, copy, redistribute) without 'trade', without 'price', without royalty (royalty-free), open source.

'Free access' may mean (open source):

1. The code (project file) is open and available for study, modification, and redistribution.

'Free access' may, or may not, mean:

1. Without 'contract' (e.g., public domain, open source access license,).
2. With 'contract' (e.g., end-user license agreement, "Creative Commons" licensing, and the like).

> **NOTE:** *A license can be written as royalty-free, but still demand attribution.*

In the early 21st century market-State, royalty-free use/service licenses generally state that a royalty (price) fee does not need to be paid to use the content regularly. However, the license may state that the consumer pays a one-time fee in exchange (membership) for the right to use a photograph (or some other work protected by copyright, patent, or trademark) according to agreed upon terms, with no ongoing license fees due for further use. In this case, the term "royalty free" has come to mean membership cost, and not free of all cost, including that of membership.

In terms of cultural works, credit (attribution, citation) should be something "you" a user of societal resources, chose to do if "you" want:

1. To be nice to someone. Here, there is no one forcing any other to attribute/cite. There is no monopoly of force that can be used to stop another modifying and redistributing without citation. Here, there is flexibility of citation.
2. Are part of the InterSystem Team and are expected to follow citation protocols. Here, there is protocol, and potential consequences for violation of protocols. Here, there are protocols for citation. The team is accountable for logging and recording events, actions and decisions, and with concern to information, there is appropriate referencing between information sets (documents), appropriate identification of working group members, and appropriate identification of agreements and approvals.

3.1.2 Open-source licenses and patent provisions

A.k.a., Open patenting, open licensing, open copyrighting, etc.

Some open-source licenses (e.g., GPLv3, Apache 2, etc.) include stated patent license provisions, which grant recipients a license to any patents covering the software product. Other open source licenses (e.g., BSD, MIT, GPLv2) do not include such patent provisions.

> **INSIGHT:** *Proprietary software developers have the competitive advantage of money-over-other; free system developers need to cooperate-for-fulfillment of each other.*

3.1.3 Open-source license persistence

A.k.a., Non-persistent open-source, non-copyleft licenses, etc.

Generally speaking, open[-source] licenses can be either permissive or be copyleft licenses -- open source licenses can be divided into two main categories based on whether or not future copies of them must remain in the commons (i.e., persist), or if they can be privatized and traded after being placed into the commons (as in, CC-BY, CC0, P0, etc.). With copy-left licenses, the property is licensed so that derivations and copies can be shared equally into perpetuity (or, whenever a copyright expires), after which they become commonly open for integration into private property.

> **NOTE:** *Copyleft licenses are said to follow the "reciprocal effect", in that those who have benefited from the content are expected to reciprocate by sharing the content alike (i.e., in the same way, via the same copyleft license) by which they received the content.*

Hence, the two forms of "open/commons-based" licenses, based upon the licenses persistence (until copyright expiry) are:

1. **RECIPROCAL LICENSING (COPY-LEFT LICENSING) - persistent commons licenses** *(a.k.a., copyleft licenses, persistent open licenses)* require the sharing of derivations only with same license, share-alike (SA, reciprocity). These licenses "guarantee" that the licenses will remain open.
    A. These include, but may not be limited to: CC-BY-SA.

2. **PERMISSIVE LICENSING - non-persistent commons licenses** *(a.k.a, non-persistent open/common licenses*) do not require the sharing of derivations to only occur under the same license, share-alike (no requirement for reciprocity). These licenses do not "guarantee" that the licenses will remain open.
   A. These include, but may not be limited to: CC-BY, CC0, P0.

   NOTE: *This division is based on the requirements and restrictions a license places on users. With few exceptions, all licenses eventually stop persisting and the content enters the public domain.*

The only difference between copyleft and permissive is that copyleft licenses are persistent (share-alike) since the same license applies to all the works that are a result of it. On the other hand, permissive licenses are not persistent. Also, copyleft carries a 'viral effect,' which means that when a derivative work is made by using two different licenses, out of which one is copyleft, the derivative work is governed automatically under the terms of the copyleft license. The same doesn't hold for permissive licenses.

A permissive open-source license is a non-copyleft open source license that guarantees the freedom to use, modify, and redistribute, while also permitting proprietary derivative works. Permissive open source licenses are often referred to as "Anything Goes Licenses", which place minimal restrictions on how others can privatize open-source components. That means that this type of license allows varying degrees of freedom to use, modify, and redistribute open-source content, permitting its use in proprietary derivative works. In some cases of permissive licenses, the license is essentially equivalent to the public, requiring nearly nothing in return in regards to obligations moving forward.

In concern to the transition of property over to community, there are commons reciprocity licenses (i.e., copy-left commons, open-source licenses): :

1. Hardware - open patenting (patent-left).
2. Software - open patenting calculations (patent-left) / open copyrighting code (copy-left).
3. Documentation - open copyrighting (copy-left).
4. Expressed content (film, audio) - open copyrighting (copy-left).

Conversely, closed-source (proprietary, permissioned license restrictive license):

1. Hardware - patents (all rights reserved).
2. Software - copyright/patent (all rights reserved).
3. Documentation - copyright (all rights reserved).
4. Expressed content - copyright (all rights reserved).

3.1.4 Common commons licenses

Creative commons is one of the most well-known commons (copyrighting) organizations with a licensing structure (and organization) designed for producing a legal contract that makes it permissible to share documentation and cultural works.

Commons licenses make claims about the openness of licensing. A fully open license grants a number of rights, as statements that, "recipients can":

1. Use the work or run the software (for a licensed purpose, any purpose, commons purpose, etc.).
2. Obtain the source code in order to study it.
3. Share and/or sell source code.
4. Share and/or sell work or software.
5. Modify, adapt, and improve sources to specific needs, making and sharing, and selling, derivatives.
6. Share the information alike (copyleft), or not.

The Creative Commons license is used for opening information creation:

1. Creative Commons [market-State identified] license - Free, easy-to-use copyright licenses provide a simple, standardized way to give the public permission to share and use your creative work — on conditions of your choice. CC licenses let you easily change your copyright terms from the default of "all rights reserved" to "some rights reserved." Creative Commons licenses cannot be revoked once issued. In concern to creative commons, it is in the re-sharing that restrictions are set.
   A. The Auravana Project has selected the Attribution Share-Alike (CC BY-SA) license. The Attribution CC BY-SA license lets others distribute, remix, tweak, and build upon "your" work, even commercially, as long as "they" credit "you" (*"a nice to have"*) for the "original" creation, and carry the license forward in their adaptations and copies.

Licenses similar to Creative Commons, which are also used for design and information creation of an open source nature, are:

1. GNU General Public License - modify, distribute, and charge people (with a few rules). GPL is a copyleft license. This means that any software that is written based on any GPL component must be released as open source. All code in a single program must be either be subject to GPL or not subject to GPL. To be clear, if a developer were to combine GPL code with proprietary code and redistribute that combination, it would violate

the GPL. Whenever someone conveys software covered by GPLv3 that they've written or modified, they must provide every recipient with any patent licenses necessary to exercise the rights that the GPL gives them. In addition to that, if any licensee tries to use a patent suit to stop another user from exercising those rights, their license will be terminated. What this means for users and developers is that they'll be able to work with GPLv3-covered software without worrying that a desperate contributor will try to sue them for patent infringement later. With these changes, GPLv3 affords its users more defenses against patent aggression than any other free software license.
2. BSD License - modify, distribute, and charge people with no restrictions on charging people.
3. MIT License - lets you do whatever you want, you just have to include license with software being given away.
4. Apache License - Able to use on copyrights and patents and doesn't expire. The Apache License allows you to freely use, modify, and distribute any Apache licensed product. However, while doing so, you're required to follow the terms of the Apache License.
5. The Microsoft Public License - a free and open source software license released by Microsoft, which wrote it for its projects that were released as open source.

The following are license selection relevant questions to facilitate determination of the optimal license for a project:

1. Will the project be used as a dependency by other projects?
   A. It may be best to use the most popular license in your relevant community. For example, MIT is the most popular license for npm libraries.
2. Will the project appeal to large market organizations?
   A. A large business, for example, will likely want an express patent license from all contributors. In this case, Apache 2.0 has you (and them) covered.
3. Will the project appeal to contributors who do not care if their contributions are to be used in closed source systems.
   A. For example, it may require a permissive license so that the company can use your project in the company's closed source product. In this case, Apache 2.0 has you (and them) covered.
4. Will the project appeal to contributors who do not want their contributions to be used in closed source systems?
   A. GPLv3 or (if they also do not wish to contribute to closed source services) AGPLv3 will go over well. This project may have specific licensing requirements for its projects.

Table 29. Contribution Approach > Market-State Licensing: *Licensing requirement comparison table. Superscript references: (1) Application needs to be licensed under GPL if redistributed with the GPL asset. (2) Library code modifications need to be licensed under the same license as the originating asset. (3) Usually requires a commercial license from the copyright holder. (4) Although much more permissive than an OSI license, some BSD based licenses, such as Apache V2, still have some copyleft materials..*

Capabilities (without	GPL	Dual-GPL	LGPL/MPL	Apache/ BSD
1) Download	Yes	Yes	Yes	Yes
2) Evaluate	Yes	Yes	Yes	Yes
3) Deploy	Yes	Yes	Yes	Yes
4) Redistribute	No[1]	Yes[3]	Yes	Yes
5) Modify	No[2]	No[2]	No[2]	Yes[4]

3.1.5 The best license for simulation-related content

The safest option when looking for images, music, models (objects), and code for social media marketing and simulation development are CC0 public domain (P0) licensed content. This licensing avoids the attribution/citation requirement of all (or, most) commons licensing. When developing a complex distributed simulation, BIM and other object metadata information is essential, but the identity of someone or some partnership that made some texture, model, or code, is potentially helpful, but not essential information. In fact, more often than not, it is irrelevant information that complexifies an already complex development process. Simulations require so much effort and resource that collecting irrelevant references can make development more challenging and time intensive than necessary. Of course, it is possible to include CC BY content (including CC BY-SA, but not CC BY-NC), if that content's source is mentioned in an attached document.

3.2 Information property agreements types

A.k.a., Intellectual property agreement types.

Intellectual property agreements restrict the sharing of information and progress among a population. Intellectual property (IP) is a legal tool wielded in competitive battle for profit through market advantage. Intellectual property builds protection around business-owned content and business-owned technology. Patents, copyrights, trademarks are aspects of the same thing -

information property "rights" held and traded by legal persons in an enforceable contract system managed by the State-authority.

There are four main intellectual property (IP) codes that allow for regulation of systems and service:

1. **Patent law (physical exclusivity rights)** regulates the market on behalf of producers of functional systems that are "novel" and "non-obvious", after the producer applies for protection from the a Patent & Trademark Office. Patents are monopoly protection for systems that have real-world functionality. Patents are packets of information about production put into public vision (likely, eventually, public domain), and they exist in large part, so the State knows what it is protecting, and who it is to enforce the "property rights" of. Patents enters into the public domain at the expiration of the term of the patent. As part of the terms of granting the patent to the inventor, States publish patents into public vision and eventual public domain. Except for secret patents. National patent secretes are patents without the transparency, without the patented specification showing up on the register. The fact that a patent's description is in the public vision does not give others permission to manufacture or use the invention during the life of the patent without permission from the inventor. A patent gives the owner the right to exclude others from potentially making, using, and selling the claimed invention (patent). A patent is a legal method for the owner of an invention to control how others use the invention. All patents are explicit licensing" in that they must be submitted in writing to the State, and approved. Patent law offers private property holders the right to State protection to forbid usage and copying without permission/trade by the owner; this protection extends to the "original works of authorship" which is "fixed in written/visual form/ medium representing a tangible physical creation" by the "State-private partnership" as a "functional technological creation". Note here that all things with functionality are "born" free -- patents are not received automatically when something is created. Creator interaction with the State must take place and a set criteria for approval must be met. No one can patent anything that is already in the public domain, or was published before.
    A. The requirement that functional inventions be "novel" and "non-obvious" are high legal bars that few inventions meet. Additionally, patents are very expensive to obtain and the process is quite complicated, usually requiring help from specialized lawyers. You must take affirmative steps to obtain patent protection for your hardware.
    B. An open patent is a patent that is freely shared with others under a copyleft-like license.
2. **Copyright law (informational exclusivity rights)** regulates the market on behalf of producers of "original works of authorship" which are "fixed in a tangible medium", such as books (literary), music, paintings, photographs, artistic things, engravings, models, and architecture. Copyright law "protects" against the dissemination of a work on information networks without permission or remuneration. Copyrights enters into the public domain at the expiration of the term of the copyright. A copyright is a legal method for the owner of some expressed content to control how others use the content. Copyrights may be implicit assumed (Read: implicit licensing) when a content creator doesn't explicitly identify a copyright. Copyrights may also be identified with licensing and associated symbols that explicitly (explicit licensing) identify permissions. Copyright law offers private property holders the right to State protection to forbid usage and copying without permission/trade by the owner; this protection extends to the "original works of authorship" which is "fixed in a sensible and communicable form/medium" (e.g., music, software, etc.), and "representing a privately tradeable expression of creation" (market, trade) by the "State-private partnership" (law; legal-State). Often, small alterations to public domain content can be re-licensed in a proprietary ("end-user" license) out of the public/commons domain and into restrictive permission licensing.
    A. While certain hardware elements might be creative, the creativity is often constrained by functionality, which prevents most physical aspects of most hardware from being protected by copyright. For example, the way in which parts of a 3D printer's extruder work together is governed by functional concerns. That means that it cannot be protected by copyright law.
    B. An open copyright is a copyright that is freely shared with others under a copyleft license. It is relevant to note that copyright law means that any of this-type of expressible content is created, by default, closed (proprietary); it is "born" closed.
3. **Trademark law (identity exclusivity rights)** regulates the market on behalf of producers with "source identifiers", which may include any brand names, product names, logos, or even the design and packaging of your product. Double check that a

market-State project's name does not conflict with any existing trademarks. If an organization uses its own trademarks in a project, check that it does not cause any conflicts.

A. While trademark law may protect the names, logos, and other elements that signal who the producer of the product is, in most cases trademark law do not protect the physical object itself.

4. **Trade secret law (business exclusivity rights)** - The primary objective of trade secret law is to protect a business' decision to maintain a valuable business secret from which it derives a competitive advantage in the market. Generally, a "trade secret" refers to information that derives competitive economic value (competitive advantage) from being kept secret, and is subject to reasonable efforts by the business to maintain its secrecy. In contrast to patents and trademarks, trade secrets do not require registration, never expire, and never become public (unless independently discovered by others or misappropriated). If, however, a competitor reverse engineers a business' trade secret, or independently develops the process, the original business with the trade secret has no recourse to prevent their use of the (formerly) secret information. Consider whether there is anything in the project that the business does not want to make available to the general public.
   A. Note that in some states trade secret laws include "negative know-how". Negative know-how refers to information discovered during development about what does not work. Therein, an employee who resigns from a business and joins a different business can be liable for not repeating the mistakes and failures of his or her former employer in the development of the same thing.
   B. Common trade secrets include, but are not limited to:
      1. Ingredient mixes (a.k.a., proprietary blends).
      2. Manufacturing methods.

CLARIFICATION: *Where functionality starts, copyright ends in patents. Copyright-based licenses don't apply to hardware as hardware is mostly functionalities. Within the functional domain (patenting), there is still copyright-based licenses for the documentation + design files = the source > of the hardware*

Copyrights and patents intermix in concern to software. Copyrighting software code protects the actual code itself, but would not stop someone else from creating their own code that implemented the same calculation method used in the copyright protected code. The calculation method would need to be patented (separately from the claim of copyright) to protect the property owner of the method of calculation.

To the extent that hardware may be regulated by one or more of these intellectual property (IT) codes, properly applying an open source license to the project ensures that downstream users can use the product within the bounds of the license. These regimes will not protect every element of hardware. Purely functional elements of hardware are not generally protectable by copyright. Other types of protection such as trademark and patent usually require creators to take active steps in order to obtain. As a result, the hardware for many functional open source hardware products will not be protected by any kind of right at all. Protection will begin to attach to hardware as decorative and aesthetic elements are added. While this protection will not extend to the functionality of the hardware, in some cases this protection will effectively control reproduction of the entire physical product.

INSIGHT: *Copyrights and patents are commodities that can be bought and sold like any other property – a house, a car, a pen.*

In the early 21st century, the following types of information may be privatized (Read: made into property):

1. **Hardware designs** - are patented (function and look).
2. **Hardware quasi-functional designs** - copyright, such as the hull of a boat.
3. **Software designs** - are copyrighted.
4. **Calculations** - are a patentable processes.
5. **Socio-technical processes** - are patented.
6. **Software language code** - is copyrighted.
7. **Images, text, audio,** and **video** - are copyrighted.
8. **Architectural drawings** - patentable in some jurisdictions and copyrightable in all.
9. **Logo and brand name/image identifiers** - are trademarked.

In the market-State, legally enforceable copy restrictions by State action include the following as possibilities:

1. **Hardware license, hardware usage and copy restrictions:**
   A. **Patent for function** - can license function, cannot copy/use without licensing the function.
   B. **Patent for design look** - can license design, cannot copy/use without licensing the design.
2. **Software license, software usage and copy restrictions:**
   A. **Patent for calculation** - can license algorithm, cannot copy/use without licensing the algorithm.
   B. **Copyright for [source] code** (software, text,

images, and animation) - can license [source] files, cannot copy/use without licensing the source files (i.e., files the product was created with; means of production of final product).

3. **Copyright license, communication (messaging) usage and copy restrictions:**
   A. **Copyright for expressed content (Read: messages)** - can license all sensed forms, including: text, image, audio, or animation.
4. **Identity license, identity usage and copy restrictions**:
   A. **Identity (trademark) usage and copy restrictions:**
      1. Trademark for preventing and resolving identity conflicts over one or more organizational-specific identifiers.

3.3 Patent law [for profit through property]

> **INSIGHT:** *Notice how, in the market, human lives, opportunities, and access are always discussed in terms of cost/benefit, rather than individual freedom and fulfillment?*

A patent is an issued license by a State authority granting right to restrict others usage. A patent, if issued by a State, allows the owner to prohibit others from selling and/or using a patented invention. A patent "protects" the property owner and their ownership "rights" over new inventions, processes, and compositions of matter (e.g., medicines, machines). Patents must be applied for at the State-level, by means of the submission of a proposal for review, which is either accepted or denied [by the State]. Importantly, ideas cannot be patented (because they are too general) - the invention must be embodied in a process, machine, or object. A patent is a government granted monopoly to use some system. Patents exist to make a profit and to control technology usage/transfer for private advantage. Patents must be applied for. Patents holders are the only party allowed to bring the product to market, and may license its use to others to collect royalty fees. A patent provides the "inventors" of new items with a source of ownership-profit by preventing others from making, using, or selling the invention for a specified amount of time. As a government granted monopoly, patenting grants the right to use the force of government to exclude others within the government's jurisdiction from:

1. Making (just making, or making for sale?).
2. Using (just using, or offering for use?).
3. Offering for sale.
4. Selling.
5. Importing.

There are effectively three types of patent licenses the government can issue (utility, design, and organism):

1. **UTILITY PATENT** - specific design functionality. Utility patents" are granted for "original" functions. Utility patents are issued for a useful, novel, and non-obvious method, device, composition, or system. Utility patents may be granted to anyone who "invents" or "discovers" any new and useful process, machine, article of manufacture, or compositions of matters, or any new useful improvement thereof. A utility patent provides protection for the way an object works and is used. This includes patents for new and non-obvious compositions, formulations, methods of use, and manufacturing techniques. Effectively, a utility patent provides profit for the way an object works and is used. Most filed patents are utility patents.
   A. **A utility patent represents the creation/abstraction of property:** *How something functions becomes property; utility becomes property.*
   B. **Calculation patent** - For software, the patented invention is often a method of calculating something. A calculation is a utility item.
      1. **A calculation patent represents the creation/abstraction of property:** *A method of calculation becomes property; calculation becomes property.*
   C. **Composition patent -** For chemicals, the patented invention is a specific composition of ingredients/chemicals.
      1. **A composition patent represents the creation/abstraction of property:** *A mixture of chemicals becomes property; chemical mixes become property.*
   D. **Synthesis patent** - For materials (including, minerals, genes, organisms, and biological processes), the patented invention is a synthesized material.
      1. **A synthesis patent represents the creation/abstraction of property:** *A new material becomes property; materials become property.*
   E. **Secret patent (national invention secrecy orders)** - specific design functionality that is too dangerous to make public. Technologies related to sensitive military applications are often made a State secret under secrecy orders. The patent application and all details become a [national security] secret, guarded under sensitive secrecy orders. This could be considered a temporary State-national public defense and safety issue. States have State secrets for: (1) competitive advantage; and (2) public safety. State-level public-safety technology secrets may be used licensed to State-defense certified organizations and personnel (i.e., licensed to those with a

"security clearance").

2. **DESIGN PATENT** - specific look and feel. Design patents are granted for "original" designs or articles of manufacture. Design patents may be issued to anyone who "invents" a new, original, and ornamental design for an article of manufacture. Effectively, a design patent provides profit for the way an object looks.
   A. **A design patent represents the creation/ abstraction of property:** *The look and feel of something becomes property.*
3. **PLANT PATENT (A.K.A., ORGANISM PATENT)** - this type of patent may be granted to anyone who "invents" or "discovers" and asexually reproduces any distinct and new variety of plant or other organism. Effectively, an organism patent provides profit for creation of a life (i.e., an organism).
   A. **An organism patent represents the creation/ abstraction of property:** *The code for an organism becomes property.*

NOTE: *A* **Provisional patent** *is given when a patent application has been submitted, but acceptance not yet complete.*

3.3.1 State patent license

Whereas copyright is an automatic right, a patent right must be applied for. A State patent license grants the property owner the ability to claim a legal suit of "patent infringement", which occurs when another person uses one's innovation without consent in a country where the innovation has been registered as a patent. Patent infringement generally has larger potential financial loss consequence than copyright infringement (because the State analyzed and issued the patent license).

A State patent [license] is requested by filing a written application at the relevant patent office. Every patent application must contain one or more "claims", or detailed definitions of precisely what is being patented. Simply, patents can cover technologies, materials, methods, and aesthetics.

3.3.2 Civil patent licenses

A.k.a., Patent-right licenses, right patent licensing.

A patent license is an agreement that lets someone else commercially make, use, and sell your invention for a specified period.

3.3.3 Open-source civil patent license

Open source patent licensing is the practice of licensing patents for royalty-free use. Collaborative innovation (is the same as "market innovation", and it) flourishes within communities of independent people that choose voluntary to cooperate.

3.3.4 Patent-left [open-source] licenses

A.k.a., Left patent licensing, left-patent licensing, patent left licensing.

Patent-left is the practice of licensing patents for royalty-free use, on the condition that adopters license related improvements they develop under the same terms. Re-distribution is allowed, but only under equivalent licensor terms. The concept of "left patenting" is not standard terminology in intellectual property law. However, it is possible to write an open-source left patent license, where a patent is made available for free use under certain conditions, similar to the principles of copy-left in software, such as writing in a condition requiring improvements to be shared similarly.

3.4 Copyright law [for profit through property]

In the early 21st century market-State, any media displayable work (e.g., text, image, video) that anyone creates is automatically protected by copyright (as permitted by the State). No explicit copyright notice is required; the copyright comes into existence because the work came into existence. If "you" want others to re-use and build upon "your" work, "you" - as the copyright holder - have to give others an explicit license (permission). A copyright, regardless of registration with the State, allows the owner to prohibit others from using the content (except for educational and other exempt purposes). Copyright exists to make a profit and control textual and image usage and transfer for personal advantage. Copyright is an automatic right that comes through the invention of some [piece of] property.

CLARIFICATION: *Copyright effectively means that others are forbidden to adopt, adapt, and redistribute that which is copyrighted without the permission of the copyright owner.*

Copyright gives a legal person who created text or image content the ownership ability to decide what others can do with the text and images after they observe it (with specific exemptions, such as education and critique). Copyright is designed, typically, to prevent text, images, and audio from being copied by creating a legal method of punishing those who do. Copyright "protection" extends to a description, explanation, or visualization of an idea or system, assuming that the requirements of copyright law are met. Copyright is designed to create and protect literary or pictorial expressions created by an "author". However copyright law does not give the copyright owner the exclusive rights to the idea, method, or system involved (if those are sought, then a "patent" is necessary). Copyrights are separate from patents, which is made clear by Section 102 of the United States Copyright Act (title 17 of the U.S. Code) clearly expresses this principle: "In no case does copyright protection for an original work of authorship extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, ..."

> **CLARIFICATION:** *Suppose, for example, that an author writes a book explaining a new system for food processing. The copyright in the book, which comes into effect at the moment the work is fixed in a tangible form, prevents others from copying or distributing the text, illustrations, audio, and videos describing the author's system without the author's permission. But, it will not give the author any "right" to prevent others from adapting the system itself for commercial or other purposes, or from using any procedures, processes, or methods described in the book. If they "author" wants to prevent others from using the food processes without paying a "licensee" fee, then the author needs a patent.*

Copyright is the exclusive legal right to use, copy, and distribute a documented or creative work. A copyright is a legal [State authority] process used by someone to create and protect their property and to control distribution of their product. Copyright is the exclusive and assignable legal right, given to the originator for a fixed number of years, to print, publish, perform, film, or record literary, artistic, or musical material. One can't use it without permission of the owner. A copyright infers that any further copying or sharing of someone's initial work may only be done with their permission. Copyright is the right given to the creator/s of books, audio cassettes, video cassettes, journal articles, music scores, DVDs, computer software, etc., to determine when and how their work will be used for a specific length of time.

A copyright "protects" the property owner and their ownership rights over "original created" works. Anyone can copyright by just creating. A copyright is effectively issued when anything new is created. In publication of text and images, copyright may be attached as metadata to inform others of one's ownership and identify what permissions and restrictions the owner grants them. In the United States, along with publishing works, it is possible to proactively register with the US Copyright Office. Once a copyright is registered, it is active for the rest of the registers life, plus an additional 70 years (for the inheritors).

Types of State information privatization protection laws (i.e., laws of competition and scarcity induction) include:

1. **Content copyright**- is copyright protection for the property owner of any original content, which extends to all of the "copyrightable" expressions embodied in the content.
    A. **Software copyright** - is copyright protection for the property owner of a computer [software] program, which extends to all of the "copyrightable" expressions embodied in the program. The copyright law does not protect the functional aspects of a computer program, such as the program's algorithms, formatting, functions, logic, or system design. For these to be proprietary, a patent must be applied for.

3.4.1 State copyright licenses

Whereas copyright is an automatic right, a patent right must be applied for. Copyrights can often be registered with relevant State authorities as future, efficient proof of ownership. However, copyrights do not typically need to be filed for the property to have been created.

3.4.2 Civil copyright licenses

A.k.a., Copy-right licenses.

A [civil] copyright license is an agreement that lets someone else use, and/or sell "your invention of property" for a specified period of time agreed under contract.

3.4.3 Copy-left [commons-reciprocal copying] licenses

A.k.a., Open-reciprocal copying, copy left, left copyright, copyright left licensing, left licensing, persistent open-source licenses, persistent commons licenses, open-source licenses, etc.

All copy-left licenses are also classifiable as open-source licenses. Copyright is a law that restricts the right to use, modify, and share creative works without the permission of the copyright holder. Copyleft gives users' freedoms, copyright takes away users' freedoms. Information can become the intellectual property of its creator. Copyleft prevents proprietary derivatives. When an author releases a program under a copyleft license, they make a claim on the copyright of the work and issue a statement that other people have the right to use, modify, and share the work as long as the reciprocity of the obligation to keep the work in the commons (Read: open-source) is maintained. If a future user adapts the program, they are using a component with a "left" kind of open license, then they too must make their code open for use by others as well. Hence, copyleft[ed] software is still actually copyrighted (with a terms of contract shown), but instead of using those rights to restrict users, like proprietary/closed systems do, the rights are used to ensure that every user has freedom. During transition into community itself, the goal is, "use and contribute back". The goal is not, "use and privatize" or (use and create proprietary derivatives).

> **NOTE:** *Copy-left licenses allow/permit others to adopt (copy), adapt and remix (modify), and redistribute, under the same license.*

Copyleft is the legal technique of granting certain freedoms over copies of copyrighted works with the requirement that the same rights be preserved in derivative works. Copyleft is a strategy of utilizing copyright law and licensing to pursue the policy goal of fostering and encouraging the equal and inalienable "right" against State intervention to copy, share, modify and improve creative works of authorship. Copyleft (as a general term) describes any method that utilizes the copyright system (in whole or in part) to achieve the aforementioned goal.

> **CLARIFICATION:** *Copyleft effectively means that others have been given permission by the copyright owner to adopt, adapt, and redistribute, as long as the original copyleft license is maintained.*

Obviously, because of market-State conditions, copyleft/open-source licenses exist within the legal structure of property rights. Copyleft licenses may be used to restore freedom to users, and this facilitate a transition to a community type society. Technically, however, copyleft doesn't just allow freedom; it requires freedom. Share-alike licenses ensure that copyleft freedoms remain even in derivative works.

In community, the population wants to guarantee that it is able to incorporate modifications (derivations, adaptations), updates, improvements, and additions by other people, always. A "left" license guarantees reciprocation with some clause like the Creative Common organization Share-alike (SA) qualification. Here, SA stands for share-alike; meaning, maintain the same commons level of access going forward. The specific license clause is called the "share-alike" clause.

> **CLARIFICATION:** *Copyleft (commons perpetuating) and public domain (commons marketable) are different. Copyleft is not the same thing as public domain. Public domain means that nobody owns "rights" to a particular work and anybody is free to do whatever they want with it. Hence, public domain content can be adapted/modified, and then, distributed/sold under a less permissive and more restrictive license. For example, MIT-licensed source code can be modified and then released under a stricter license.*

A core concept related to community transition licensing is that of copyleft (Read: copy freely and share-alike). Copyleft licenses state that users have the right to freely use, copy, modify, and distribute works however they want, with one crucial clause: all derivative works must offer the same freedoms to users (a.k.a., the share-alike clause). Any derivation made by anyone must give distributed in a way that permits anyone else to modify and distribute the work, and so forth (Read: reciprocity).

Hence, copyleft licenses are defined by two main aspects:

1. The freedom for users to modify and distribute derivative works.
2. The "share-alike" clause that maintains freedom in derivative works. Share-alike license clauses offer protection for designs/information entering society from being made proprietary, and/or their adaptations being made proprietary.

Copyleft is an arrangement whereby a work may be used, modified, and distributed on condition that anything derived from it is bound by the same condition. Copyleft is used to describe a copyright that requires anyone distributing a copy or derived copy to allow redistribution of their code. Copyleft is an approach that grants rights to others to use, but in order to do copyleft the worker (author) has to have and retain copyright. Copyleft provides a method for software are or documentation to be modified and distributed back to the community.

Copyleft software licenses require that if someone distributes the code or any work based on the code, they must provide recipients the source code under the same copyleft license terms that it was received under—with the same requirement applying to all downstream recipients of the code or any work based on the code.

The requirement that the license apply to or infest other software based on the code, is why these licenses are also sometimes referred to as viral in that the creator will potentially be required to: (1) distribute the source code for any proprietary code; (2) not charge a license fee or impose your own license terms for your proprietary code; and (3) grant to the public a license to the entire software patent portfolio. These requirements typically get triggered by distributing open source code.

The requirement that the license apply to or infest other software based on the code, is why these licenses are also sometimes referred to as viral. Proponents of copyleft licenses don't favor that moniker, by the way. As you could imagine, just keep going with this metaphor, this infection can have major implications for companies. For example, depending on how you integrate open source copyleft code with your proprietary code, the license may require you to (1) distribute the source code for your proprietary code; (2) not charge a license fee or impose your own license terms for your proprietary code; and (3) grant to the public a license to the entire software patent portfolio. These requirements typically get triggered by distributing open source code.

Copy-left is an open source licence wherein the license becomes attached to every replication/adaptation that incorporates the property. Effectively, copyleft exists to transfer information into a growing, permanent collaborative [open-source] commons. Copyleft is a process of moving information, through licensure, permanently into the commons (for a fixed number of years, whereupon given jurisdictional information property laws, it may become privatizable. Remember, copyrights (and patents) expire after a fixed legally set amount of time. So, even if something is share-alike licensed into the commons, it is still considered copyright, and hence, after some time, the copyleft license with the share-alike property disappears and is replaced by the "public domain" where all rights are waived and/or no longer exist (because they have expired). Share-Alike type of clauses in copy-left and open-source licenses prevent adaptations from being privatized.

> **NOTE:** *Open-source copy-left licenses always give permission for both non-commercial and commercial use, as long as the free license remains in place. There are commons-oriented licenses that are non-commercial, and these would thus, not classify as open-source or copy-left.*

Most work in the early 21st century is licensed to take away the users' freedom to share and change the work. There are, however, also licenses worded/intended to guarantee users' freedom to share (redistribute) and make changes (adapt). And also, to ensure work can remain "free of charge" (i.e., free of trade) to its users as it is evolved and optimized. Herein, to not have to trade or pay a price for something is also a type of freedom.

3.5 Trademark law [for private property]

A trademark protects the name of an organization for use by others. Trademarks include: short slogans, or logos. Trademarks protect market and political party identities (a.k.a., brands). A trademark is a word, phrase, design, or symbol that identifies and distinguishes one business' products and/or services from another. Unlike patents, trademarks don't expire and don't have to be registered (because of common law right). However, registering gives some rights advantages since it's a public statement of claim of ownership to a particular mark (symbol of identity).

3.5.1 Trademark licenses

A trademark license is an agreement that lets someone else commercially make, use, and sell a representation of your identity, for perpetuity. Unlike patents and copyrights, trademarks do not expire after a set period of time. Trademarks will persist so long as the owner continues to use the trademark.

4 Open source systems

> **INSIGHT:** *A population can use collaboration (Read: open source) to speed up the arrival of a solution.*

Open source systems are systems whose [source] code is published and made available to the public, enabling anyone to copy, modify, and redistribute the source code without paying royalties or fees. This definition includes two elements:

1. Actual disclosure of the [source] code from the system;
2. The intellectual property rights license, which includes copyright license and, where applicable, patent licenses that can be used, modified and distributed without the payment of software license.

In concern to ware (software/hardware), open source refers to systems [source] code is freely available to users for reference, debugging, modification, and/or extension. Here, open means that the source code must be distributed with every copy of an executable [application] and every recipient must be allowed to modify and distribute the source code freely to subsequent users.

Open standards are, typically, specifications (formal descriptions). Open signifies that the standards process is open to participation and that the completed standards are available to everyone. In concern to societal production, an open societal system is a system to which contribution is possible.

> **NOTE:** *Open source creates a community of designing and contributing users.*

Note that working documents and drafts may or may not be kept private to the individual contributors or issuing organization sub-groups, until released in some more finalized form. Open standards organizations may have membership fees, but any person or company may participate as a member at a meaningful level. Open standards organizations give copies of their standards away for free and the right to implement a standard is typically also free. At a fundamental level, open source means to use without regard to permission and other artificial restrictions on social and technical progression (effectively, self and societal progression). Open source is the turning over of [the concept of] property to the [the concept of] commons.

Open source, functional hierarchies are based on contributed competence involving the presence of knowledge, and the ability to formulate problems and solve them. Some hierarchies are predicated on power and authority, and mostly the pathological ones.

Open source has two principal trust benefits:

1. Transparency = Trust.
   A. Social trust through transparency.
2. Many potential viewers = Trust.
   A. Social trust through networked contribution - there are more observers and contributors to the system (e.g., more people looking at the code such that bugs are discovered more quickly and can be fixed more quickly; hence, the objective/code is achieved/improved.
3. Sharing = Trust.
   A. Open source (sharing) means avoiding having to rebuild fundamental components from scratch.

Because the source code is publicly available, individuals can concentrate on developing the elements unique to their current task, instead of spending their effort on rethinking and re-writing code that has already been developed by others. Code re-use reduces development time and provides predictable results.

Open source systems are considered less likely to fork when there is an accepted and transparent organizational structure, contribution is open, and there is long-term contribution potential; transparency eliminates the economic motivations for fragmentation.

Take Linux for example: Ninety-nine percent of Linux distributed code is the same. The small amount of fragmentation between different Linux distributions is good because it allows them to cater to different segments. The small amount of fragmentation between different regional and local habitat service systems is good because it allows them to cater to different preferences. Users benefit by choosing a Linux distribution (or community-type society distribution) that best meets their needs.

In the corporate model, individuals or small groups of individuals develop systems in isolation, without releasing a version before it is deemed ready. In contrast, the open source (and working group) model relies on a network of volunteer contributors, with differing styles and agendas, who research, develop and debug the system in parallel and serial. Open source allows anyone who is curious or suspicious or critical to take a look for themselves; there is transparency and they can do their own due-diligence.

> **APHORISM:** *Copying is the most sincere form of flattery.*

4.1 Source type and safety

> **NOTE:** *The more accurate information we know, the more capable and likely we are to explain higher mutual life fulfilling intentions.*

When a closed source operation (a business) write code, "we" simply do not know what is in it. A community of users and developers must be able see the source code, for their own safety. Open source means that the functioning is entirely transparent to any user, who may also be a contributor to the systems continued development. Open source is foundationed on the logic that the highest freedom (or, best security) comes from allowing anyone to inspect its code and suggest (or enact, depending on context) improvements.

> **STATEMENT: "***We" have to keep our work open and transparent if "we" are going to thrive. Humanity is likely to discover, resolve, and integrate more rapidly and safely when its societal system is globally cooperative (i.e., open for all to access given what is socially known and based on a societal-level state/condition of optimum fulfillment).*

4.2 Open society

> *A.k.a., Open societal engineering.*

An open society requires thinking in networks. By being willing to be transparent others can discover what "you" are doing, and through that discovery, they can connect their own work to activities that "you" are involved in, thus evolving the whole optimally. In community, participation is global, and hence, open source is the ideal approach, for it allows for efficient global cooperation.

Fundamentally, any societal system based upon a stored program (e.g., a software system that coordinates supply and demand, instead of the price mechanism) must be able to have that program changed when bugs and vulnerabilities are found. Therefore, humanity requires that program to be fixable and updatable. But, that same need for the "ware" to be soft (changeable) inherently opens the "ware" to abuse. Hence, the system must be open so that everyone can see what is occurring. And above the "ware" itself, there is the necessity for a social structure that satisfactorily guides changes to the program, ensuring the social population navigates similarly and anyone is unlikely to abuse the program.

4.2.1 The public [market-State domain]

A community-type socio-economic system necessitates globally cooperative standards for production and access. Conversely, authoritarian-based socio-economic systems specifically restrict access to information about the system in order to advantage some, while disadvantaging others. It is fundamentally dangerous to human fulfillment to actualize a non-public domain socio-economic system into the lives of a population. A socio-economic system that is not in the public domain is not particularly useful to the public (Read: those with unequal access); though it is useful to those with privileged private access. How could a system designed for organizing and coordinating the "public" population not be released into the "public domain"? Or, why (as in, for whose benefit) would the socio-economic information system not be released into the public domain? Who would its concealment/privatization benefit, and who would it harm? Why would a system designed (claimed to be designed) for the public, not be released into the public [domain]? Authoritarian-based socio-economic systems limit and distort corrective feedback from the inherent nature of their structure.

If humanity is constantly sharing what is designed and built, and publishing/realizing examples, while remembering what it is like to learn, then humanity will be able to constantly have an influx of useful solutions to the global fulfillment of all. Open processes, sharing, and a focus on learning, makes community accessible to everyone, which results in so much interesting and useful work. Herein, is strength in sharing, and together humanity can build something useful and fulfilling for everyone.

> **INSIGHT:** *An open society is a society wherein the information system for its conception and production is public.*

4.2.2 Open licenses in the market

Open source is a way of interacting with the market. Openly licensing allows others to replicate, reuse, adapt, improve, adopt, bring to scale, write about, talk about, remix, translate, upstream, fork, digitize, redistribute and build upon what we have done.

If an open license is implement in a commercialized product, it doesn't mean that the product has to be given away for free (the product with the open standard can still be commercialized), unless that is one of the conditional restrictions of the license.

> **IMPORTANT:** *In community, everything added is added community information system and habitat service system [platform] without patents or copyrights.*

4.2.3 Open source engineering

In general, open source engineering means that the engineering file contains the source content that was used in the creation. The content includes:

1. For software, the source code.
2. For all other content, the original design files.
3. Which, may be used by anyone to understand, to study, to apply, and to adapt the design, using:
4. The original source code.
5. The original design files.

4.2.4 Social cooperation

> **NOTE:** *The concept of 'contribution', as an approach is described in its decision context in the Decision System Specification under the sub-title, 'Participation'. Also, the concept of 'open source', as a value objective, is described in its social context in the Social System Specification.*

A social system is a grouping of units of individuation (units of consciousness with "free will") forming a cooperative network. In this sense, individuals are units of awareness that communicate and interact with each other. A social system is an interactive system. There are two fundamental ways in which an individual can interact with another: cooperatively (i.e., togetherness) or fearfully (i.e., competitiveness). Here, cooperation reflects/is caring, because the other is important and significant to "me", because "we" are all in this [environment] together, "we" are all interacting, its all a big interaction, and the cooperative way is more efficient and effective for all individuals. The opposite way is fear.

If "me" has fear -- if each one is fearful, then each individuation thinks only about themselves and acts only in consideration of themselves. Fear is all about "me"; it is not about "we", or "we" and "me".

> **APHORISM:** *In a world where there is only "me", then there is likely to be fear of "we", and in a world where there is only "we", then there is likely to be fear of "me". When "me" and "we" integrate, fear is likely to disintegrate.*

As stated in the project's purpose, a primary goal of a social system is stability, which occurs through the facilitation of cooperation by means of intelligently shared organization and the sufficient completion of human need fulfillment.

> **APHORISM:** *If you love something, set it free.*

4.3 Open standards

The term "open" is usually means royalty-free (RF) technologies, "free" means no trade (no money), while the term "standard" usually means a technology or socio-technical system formalized by information integration. The definitions of the term "open standard" used by academics, the European Union and some of its member governments or parliaments preclude open standards requiring fees for use. In the market-State, obviously, many definitions of the term "standard" and open standards may permit patent holders to impose "reasonable and non-discriminatory" royalty fees and other licensing terms on implementers and/or users of the standard. In concern to openness and standards, standards are considered to be open when they are developed and made available through a community contribution service structure.

> **IMPORTANT:** *Open standards are the foundation for cooperation in socio-technical society. Open standards are a necessary pre-requisite to ensure individual freedom.*

Open standards are publicly available and developed via processes that are transparent and open to broad participation. In concern to participation, an activity is open when it is open to all persons [who are affected by the activity]. There shall be no artificial limitations (e.g., money, birth place) as a barrier to participation. In contrast, proprietary standards are privately owned by one or more entities that control their distribution and access. Open standards let people and organizations set up new services and make them available across the rest of the Internet without permission by a private owner.

INSIGHT: *Open Standards are the foundation of cooperation in modern society.*

Open standards are a socio-technical foundation of community, allowing anyone to learn and contribute to a services design and operation without requiring permission from anyone else. Open standards enable community existence, facilitate its adaptation, and provide a platform that supports social and economic opportunity for billions of users.

Calling a standard “open” makes a clear distinction against so-called “closed”, “de facto” or “proprietary” standards. Open standards must be subject to full public assessment and use without constraints in a manner equally available to all parties.

Open standards are important for allowing software made by different people to work together (Read: interoperable). An open standard for interoperability will be either free of patents or they will have been irrevocably declared free of royalty. Patents and copyright pose a privatization threat to open standards (and their implementation). Any person who owns a patent containing claims that are essential to the implementation of a standard can prevent anyone from making, using, or selling products that implement that patent in the market-State jurisdiction(s) in which the patent is acknowledge by the State. It is commonly understood that patents and copyrights prevent sale of another’s work in given jurisdictions. A patent does not protect privatized technology from being infringed upon by a competitor. It merely affords the property owner with legal recourse in the event that someone does. A patent gives the patent rights property owner a seat at the [enforcement] table, both offensively and defensively.

APHORISM: *In competition, if “you” have an idea that may help a lot of people, but it gives “you” an advantage in the market on “your” competition, then “you” keep it to “yourself” - intellectual property and concealment are advantageous in an environment of competition, over open source and sharing.*

Consider the implications for the owner of intellectual property (e.g., the owner of a patent or copyright) who wants to have that property integrated into an industry standard. Or, consider the interests of a developer of an industry standard service who learns that another person’s intellectual property blocks the implementation of the standard. Is private intellectual property compatible with planetary standards, with global cooperation an open source world? “Industry standards” are not always what they seem to be; some companies or standardizing organizations attempt to control standards through copyrights on specifications and patents in specifications.

Open standards should/ought to be available to everyone on royalty-free terms, or the standards should not be called open. That is one way a clear definition can help distinguish among standards. The term “open standard” is sometimes coupled with “open source” with the idea that a standard is not truly open if it does not have a complete free/open source reference implementation available. Open standards which specify formats are sometimes referred to as open formats. Many specifications that are sometimes referred to as standards are proprietary and only available under restrictive contract terms (if they can be obtained at all) from the organization that owns the copyright on the specification. As such these specifications are not fully Open. Where truly open standards do not have fees associated with their implementation, certification of compliance by the standards organization (generally an organization in the market, may involve a fee). The purpose of an open standard in the market-State is not the same as the purpose of an open standard in community. In the market, the open standard increases the market for a technology by enabling potential consumers or suppliers of that technology to invest in it without having to pay monopoly rent or fear litigation on trade secret, copyright, patent, or trademark causes of action. In the market, no standard can be described as “open” expect to the extent that it achieves these goals. In the market-State, an open standard has certain market-State “rights” associated with it. In the market-State, the definition of an open standards have many different levels of openness.

NOTE: *Many specifications that are sometimes referred to as standards are proprietary and only available under restrictive contract terms (if they can be obtained at all) from the organization that owns the copyright on the specification. As such these specifications are not considered to be fully open. Sometimes the term “Freeware” or “Open” is applied to software which is available free of cost or even as source code but all the same with proprietary distribution terms. This is not Open Source and not Free Software. No matter what, the system must be shipped with an Open Source or Free license to qualify as such (in the market).*

The freedom to use, explore, modify and give away information freely leads to a completely different motivation for creating the software in the first place. The motivation shifts away from primarily making money to solving a problem. The resulting software is typically more focused to solve a single problem at it’s best and more open to integrate with other solutions. For users the investment into Free and Open Source design is more lasting because there is no single entity that can take away the right to continue to use the software which is what proprietary vendors can do.

Due to the naturally distributed nature of open source, the flaws of systems are more rapidly and effectively spotted and worked out then with closed source standards.

An open source system (hardware and software) is made publicly available so that anyone can study, modify, distribute, make, and sell the design or hardware based on that design. Ideally, open source hardware uses readily-available components and materials, standard processes, open infrastructure, unrestricted content, and open-source design tools to maximize the ability of individuals to make and use hardware. Open source systems is a term for tangible artifacts — machines, devices, or other physical things — whose design has been released to the public in such a way that anyone can make, modify, distribute, and use those things. Hardware is different from software in that physical resources must always be committed for the creation of physical goods.

Table 30. Contribution Approach > Open Standards:
Conditional categorises of open access with their descriptions.

Condition	Description
Availability	Open standards are available for all to read and implement.
Maximize end-user choice	Open standards create a fair, competitive market for implementations of the standard. They do not lock the customer into a particular vendor or group. No vendor lock-in.
No royalty	Open standards are free for all to implement, with no royalty or fee. Certification of compliance by the standards organization may involve a fee.
No discrimination	Open standards and the organizations that administer them do not favor one implementer over another for any reason other than the technical standards compliance of a vendor's implementation. Certification organizations must provide a path for low or zero cost implementations to be validated, but may also provide enhanced certification services.
Extension or subset	Implementations of open standards may be extended, or offered in subset form. However, certification organizations may decline to certify subset implementations, and may place requirements upon extensions.
Predatory practices	Open standards may employ license terms that protect against subversion of the standard by embrace and extend tactics. The licenses attached to the standard may require the publication of reference information for extensions, and a license for all others to create, distribute and sell software that is compatible with the extensions. An open standard may not otherwise prohibit extensions.

4.1 *Standards openness index*

In order to more greatly discern the openness nature of a standard, the following questions may be proposed:

1. How is the standard created?
2. How is the standard maintained after Version 1.0?
3. What is the cost of getting a copy of the standard?
4. Are there restrictions or permissions on how the standard can be implemented?
5. What is required to demonstrate compliance (i.e., the actual application) of the standard.

In concern to the openness of a standard:

1. The more transparent the standards process is, the more open the standard is.
2. The more the community can be involved and then actually is involved, the more open the standard is.
3. The more democratic the standards process is, where the community can make significant changes even before Version 1.0, the more open the standard is.
4. The lower the standards-related cost to software developers who want to use the standard, the more open it is.
5. The lower the standards-related cost to the eventual consumer of software that happen to use the standard, the more open it is.
6. When the licensing of the standard is more generous in the freedoms and permissions it provides, the more open the standard is.
7. When the licensing of the standard is more onerous in the restrictions it imposes, the less open the standard is.

From these and perhaps other criteria, the development of a standards openness index is possible.

There are varying degrees of possible openness in concern to data:

1. **License-free** (*trade free*):Data are not subject to any form of ownership, copyright, patent, intellectual property or industrial secret. Reasonable restrictions of privacy, safety and access may be allowed.
2. **Non-proprietary**: Data are available in a format on which no entity has exclusive control.
3. **Non-discriminatory**: Data are available for all, without the need of registration to access them.
4. **Machine readable**: Data are reasonably structured to enable automated processing.
5. **Accessible**: Data are available to the largest possible scope of users and for the largest possible scope of purposes.
6. **Up-to-date**: Data are made available as fast as possible preserving accuracy and value.
7. **Primary:** Data are collected in its source, with the highest possible level of granularity, not in

aggregate or modified forms.
8. **Complete**: All data are made available. All data are data that are not submitted to valid privacy, safety, or engineering limitations.

4.1.1 Basic requirements of an open standard

The societal system design specifications are standards, which contain technical and organizational information in documents about the society, as past, present (current InterSystem Team Operations, and future (iteration).

An open standard must be:

1. **Enabling** of future access (i.e., access to habitat services by future humans; procreation).
2. **Contributable** to, by any interested and informed individual (discovery and design openness).
3. **Available** to the planetary population ("public") and developed (or approved) and maintained via a cooperative and contributive process.
4. **Free of trade,** royalty, or fee (i.e., free for all to access, copy, redistribute, modify, use, re-use implement, and accountably comply with).
5. **Free of [State] agreements**, including any requirement for a license, legal agreement, non-disclosure agreement (NDA), grant agreement, click-through, or any other form of exchange, trade, or paperwork (i.e., free for all to access, copy, redistribute, modify, use, re-use, implement, and accountably comply with).
6. **Updatable/adaptable** as required to provide additional clarifications or to include additional information in those areas in which specifications are still evolving.

An open [source] specification (or, standard) has four categories:

1. **Availability**
   A. The specification must be redistributable free of charge.
   B. The specification must be redistributable free of agreements, money, and trade.
2. **Usage rights** (a "license" in the market-State)
   A. Essential patents must be made irrevocably available royalty free.
   B. Essential patents must be licensable free of agreements, money, and trade.
3. **Process**
   A. Further development must be open for anyone to participate in.
   B. Further development must be open for anyone to view.

4.1.2 Basic criteria of an open standard

To comply with the Open Standards Requirement, an "open standard" must satisfy the following criteria. If an "open standard" does not meet these criteria, it will be discriminating against open source developers.

A simplified set of open source criteria are:

1. No intentional secrets: The standard MUST NOT withhold any detail necessary for interoperable implementation. As flaws are inevitable, the standard MUST define a process for fixing flaws identified during implementation and interoperability testing and to incorporate said changes into a revised version or superseding version of the standard to be released under terms that do not violate the OSR.
2. Availability: The standard MUST be freely and publicly available (e.g., from a stable web site) under royalty-free terms at reasonable and non-discriminatory cost.
3. Patents (*a market-State based concept*): All patents essential to implementation of the standard MUST:
   A. Be licensed under royalty-free terms for unrestricted use.
   B. Be covered by a promise of non-assertion when practiced by open source software.
4. No agreements (*i.e., no market-State based agreements*): There MUST NOT be any requirement for execution of a license agreement, NDA, grant, click-through, or any other form of paperwork to deploy conforming implementations of the standard.
5. No Open Standards Requirement (OSR) -incompatible dependencies: Implementation of the standard MUST NOT require any other technology that fails to meet the criteria of this requirement.

High-level organizing components of an open standard include, but are not limited to:

1. Open Source (and free) – providing source code, with permission to use, modify and redistribute it.
2. Reciprocal (or copyleft) – distributed derivatives must remain shared under the EUPL, CC-BY-SA, etc.;
3. Compatible – when merged with another work covered by GPL-3.0, LGPL, etc., and the combined work can be distributed under these licences;
4. Interoperable – interfaces, APIs, libraries, and data structures may be freely copied in order to link with other components.
5. Multilingual – can be translated freely.
6. Complete – covers the use of patents, various

'works' and distribution methods including 'services'.
7. Compliant – with State laws.

4.2 Open access

In general, open access (OA) refers to releasing content freely to the public at no cost and with limited restrictions with regards re-use, modification, and re-distribution. The general meaning of open access (OA) is to share research and standards publications freely (without trade or restriction) so anyone can benefit from reading, research, and use toward societal development. For there to be open access, a societal organization must allow others to re-use that research and to apply that research toward societal development. In concern to online content, open access (OA) makes content permanently available online to view without restriction. When research and application is held behind restrictive walls of access, then mutual societal development is likely to be significantly impaired. Making real-world information sets (e.g., research, standards, and protocols) open access (a.k.a., open source, free, etc.), is a requirement for the operation of a community. The best form of open access for facilitating the creation and operation of community is to license content via a creative commons copyleft persistent license:

- **CC-BY-SA (Creative Commons Attribution Share-alike License)**

The benefits of open access to researchers and societal organization includes:

1. Improved reach of research; improved application of research.
2. Improved data collection, facilitating data collection on evidence for impact.
3. Improved reputation for researchers through increased citations.
4. Improved quality of research through open, transparent and reproducible research practices.
5. Improved production, distribution, and material cycling of access to highest quality services.

5 Organizational definitions of open source and open standards

There are many organizations with slightly different definitions for open source, including but not limited to:

1. Open-source hardware:
   A. Open Source Hardware Association.
2. Open-source software:
   A. Open Source Initiative Definition)annotated version 1.9).
   B. Free Software Foundation.
3. Open-source standards:
   A. Open Standards. Open Source (OASIS).
   B. ITU-T.
   C. Governmental definitions.
   D. Open Geospatial Consortium.
4. Open-source (commons) documentation:
   A. Creative Commons.

5.1 Open-source qualifying organizations and qualifications

NOTE: *For the vast majority of open source projects, an open source license implicitly serves as both the inbound (from contributors) and outbound (to other contributors and users) license; "inbound=outbound".*

The following organizations qualify open-source:

5.1.1 OpenChain Open Source Specification Standard (The Linux Foundation)

OpenChain ISO/IEC 5230:2020 is the International Standard for open source license compliance. OpenChain exists tos build trust between organizations in the supply chain.

The four principles the standard is built on are (*OpenChain Project*, 2020):

1. Build trust around the open source supply chain.
2. Remember that less is more:
   A. Define the key requirements of a quality compliance program
   B. Do this by solving real pain points in the supply chain
3. Keep our specifications limited to what and why (avoid the how and when)
   A. Embrace different implementations to solve challenges
   B. Avoid mandating specific process content
4. Be open to all to participate and contribute

5.1.2 Open Source Hardware Association

The distribution terms of Open Source Hardware must comply with the following criteria:

1. **Documentation** - The hardware must be released with documentation including design files, and must allow modification and distribution of the design files. Where documentation is not furnished with the physical product, there must be a well-publicized means of obtaining this documentation for no more than a reasonable reproduction cost, preferably downloading via the Internet without charge. The documentation must include design files in the preferred format for making changes, for example the native file format of a CAD program. Deliberately obfuscated design files are not allowed. Intermediate forms analogous to compiled computer code — such as printer-ready copper artwork from a CAD program — are not allowed as substitutes. The license may require that the design files are provided in fully-documented, open format(s).
2. **Scope** - The documentation for the hardware must clearly specify what portion of the design, if not all, is being released under the license.
3. **Necessary software** - If the licensed design requires software, embedded or otherwise, to operate properly and fulfill its essential functions, then the license may require that one of the following conditions are met:
   A. The interfaces are sufficiently documented such that it could reasonably be considered straightforward to write open source software that allows the device to operate properly and fulfill its essential functions. For example, this may include the use of detailed signal timing diagrams or pseudocode to clearly illustrate the interface in operation.
   B. The necessary software is released under an OSI-approved open source license.
4. **Derived works** - The license shall allow modifications and derived works, and shall allow them to be distributed under the same terms as the license of the original work. The license shall allow for the manufacture, sale, distribution, and use of products created from the design files, the design files themselves, and derivatives thereof.
5. **Free redistribution** - The license shall not restrict any party from selling or giving away the project documentation. The license shall not require a royalty or other fee for such sale. The license shall not require any royalty or fee related to the sale of derived works.
6. **Attribution** - The license may require derived documents, and copyright notices associated with devices, to provide attribution to the licensors when distributing design files, manufactured products, and/or derivatives thereof. The license may require that this information be accessible to the end-user using the device normally, but shall not specify a specific format of display. The license may require derived works to carry a different name or version number from the original design.
7. **No discrimination against persons or groups** - The license must not discriminate against any person or group of persons.
8. **No discrimination against fields of endeavour** - The license must not restrict anyone from making use of the work (including manufactured hardware) in a specific field of endeavour. For example, it must not restrict the hardware from being used in a business, or from being used in nuclear research.
9. **Distribution of license** - The rights granted by the license must apply to all to whom the work is redistributed without the need for execution of an additional license by those parties.
10. **License must not be specific to a product** - The rights granted by the license must not depend on the licensed work being part of a particular product. If a portion is extracted from a work and used or distributed within the terms of the license, all parties to whom that work is redistributed should have the same rights as those that are granted for the original work.
11. **License must not restrict other hardware or software** - The license must not place restrictions on other items that are aggregated with the licensed work but not derivative of it. For example, the license must not insist that all other hardware sold with the licensed item be open source, nor that only open source software be used external to the device.
12. **License must be technology-neutral** - No provision of the license may be predicated on any individual technology, specific part or component, material, or style of interface or use thereof.

Unlike software, which is generally protected by copyright, hardware may have market-State protection by a number of different rights - or no rights at all. That makes licensing hardware a bit more complicated than licensing software.

5.1.3 Open Source Initiative Definition (annotated version 1.9)

According to the Open Source Initiative's definition, open-source does not only imply access to source code, but also compliance with the following criteria for the terms of distribution. (*Open Source Initiative*, 2007)

The open source initiative definition of open source annotated version 1.9 from the Open Source Initiative [opensource.org] defines open source as (*Open Source Initiative*, 2007):

1. **Free redistribution** – license must not require royalty or any fee.
   A. Rationale: By constraining the license to require free redistribution, we eliminate the temptation for licensors to throw away many long-term gains to make short-term gains. If we didn't do this, there would be lots of pressure for cooperators to defect.
2. **Full access to source code** - program must allow free distribution of the source code.
   A. Rationale: We require access to un-obfuscated source code because you can't evolve programs without modifying them. Since our purpose is to make evolution easy, we require that modification be made easy.
3. **Full access to derived works** - license must allow modification and distribution.
   A. Rationale: The mere ability to read source isn't enough to support independent peer review and rapid evolutionary selection. For rapid evolution to happen, people need to be able to experiment with and redistribute modifications.
4. **Integrity of the author's source code** - license must explicitly permit distribution of software built from modified source code.
   A. Rationale: Encouraging lots of improvement is a good thing, but users have a right to know who is responsible for the software they are using. Authors and maintainers have reciprocal right to know what they're being asked to support and protect their reputations.
5. **No discrimination against persons or groups** - license must not discriminate against any person or group of persons.
   A. Rationale: In order to get the maximum benefit from the process, the maximum diversity of persons and groups should be equally eligible to contribute to open sources. Therefore we forbid any open-source license from locking anybody out of the process.
6. **No discrimination against fields of endeavour** - license must not restrict anyone from making use of the program in a specific field of endeavor.
   A. Rationale: The major intention of this clause is to prohibit license traps that prevent open source from being used commercially. We want commercial users to join our community, not feel excluded from it.
7. **Distribution of license** - rights attached to the program must allow distribution.
   A. Rationale: This clause is intended to forbid closing up software by indirect means such as requiring a non-disclosure agreement.
8. **License must not be specific to a product** - rights attached to the program must not depend on the program being part of a software distribution.
   A. Rationale: This clause forecloses yet another class of license traps.
9. **License must not restrict other software** - license must not place restrictions on other software that is distributed along with the licensed software.
   A. Rationale: Distributors of open-source software have the right to make their own choices about their own software.
10. **License must be technology-neutral** - no provision of the license may be predicated on any individual technology or style of interface.
    A. Rationale: This provision is aimed specifically at licenses which require an explicit gesture of assent in order to establish a contract between licensor and licensee.

5.1.3.1 Open Source Initiative (OSI) criteria for open source licenses

The Open Source Initiative (OSI), the organization responsible for reviewing and approving open-source licenses provides a list of five criteria an open standard must satisfy. "If an 'open standard' does not meet these criteria, it will be discriminating against open source developers," the site says:

1. **No intentional Secrets:** The standard must not withhold any detail necessary for interoperable implementation. As flaws are inevitable, the standard must define a process for fixing flaws identified during implementation and interoperability testing and to incorporate said changes into a revised version or superseding version of the standard to be released under terms that do not violate the OSR.
2. **Availability:** The standard must be freely and publicly available (e.g., from a stable web site) under royalty-free terms at reasonable and non-discriminatory cost.
3. **Patents:** All patents essential to implementation of the standard must:
   A. Be licensed under royalty-free terms for unrestricted use, or
   B. Be covered by a promise of non-assertion when practiced by open source software.
4. **No agreements:** There must not be any requirement for execution of a license agreement, NDA, grant, click-through, or any other form of paperwork to deploy conforming implementations of the standard.

5. **No OSR-Incompatible Dependencies:** Implementation of the standard must not require any other technology that fails to meet the criteria of this Requirement.

5.1.3.2 *Open Source Definition principles*

The principles that apply to the Open Source Definition of an open standard are:

1. Licensees are free to use open source software for any purpose whatsoever.
2. Licensees are free to make copies of open source software and to distribute them without payment of royalties to a licensor.
3. Licensees are free to create derivative works of open source software and to distribute them without payment of royalties to a licensor.
4. Licensees are free to access and use the source code of open source software.
5. Licensees are free to combine open source and other software.
6. Anything else should not be called an open standard.

5.1.3.3 *The Open Source Definition criteria*

Bruce Perens, creator of The Open Source Definition, outlined six criteria an open standard must satisfy:

1. **Availability:** Open standards are available for all to read and implement.
2. **Maximize End-User Choice:** Open Standards create a fair, competitive market for implementations of the standard. They do not lock the customer into a particular vendor or group.
3. **No Royalty:** Open standards are free for all to implement, with no royalty or fee. Certification of compliance by the standards organization may involve a fee.
4. **No Discrimination:** Open standards and the organizations that administer them do not favor one implementer over another for any reason other than the technical standards compliance of a vendor's implementation. Certification organizations must provide a path for low and zero-cost implementations to be validated, but may also provide enhanced certification services.
5. **Extension or Subset:** Implementations of open standards may be extended, or offered in subset form. However, certification organizations may decline to certify subset implementations, and may place requirements upon extensions (see Predatory Practices).
6. **Predatory Practices:** Open standards may employ license terms that protect against subversion of the standard by embrace-and-extend tactics. The licenses attached to the standard may require the publication of reference information for extensions, and a license for all others to create, distribute, and sell software that is compatible with the extensions. An Open standard may not otherwise prohibit extensions.

5.1.4 Free Software Foundation (FSF)

It is sometimes helpful to understand that Open Source is a matter of liberty (as freedom), and not necessarily price (as freedom). To this end the Free Software Foundation says that one should think of "free" as in "free speech", not necessarily as in "free-market service" (i.e., not in the sense of having another person give something away at their own expense). In concern to software, free software means that the users of a program have the four essential freedoms (as conditions present in the environment):

1. **The freedom to run** the program, for any purpose.
2. **The freedom to study** how the program works, and change it to make it do what you wish. Access to the source code (Open Source) is a precondition for this.
3. **The freedom to redistribute** original copies so you can help your neighbour.
4. **The freedom to distribute modified copies** of the original version.

These freedoms are the prerequisites to open source software development, and they are studied and promoted by the Free Software Foundation.

5.1.4.1 *Free Software Foundation Europe (FSFE)*

The Free Software Foundation Europe (FSFE) collaborated with other individuals and organizations in the tech industry, politics, and community to outline a different five-point definition. According to the FSFE, an open standard refers to a format or protocol that is:

1. Subject to full public assessment and use without constraints in a manner equally available to all parties;
2. Without any components or extensions that have dependencies on formats or protocols that do not meet the definition of an Open Standard themselves;
3. Free from legal or technical clauses that limit its utilisation by any party or in any business model;
4. Managed and further developed independently of any single vendor in a process open to the equal participation of competitors and third parties;
5. Available in multiple complete implementations by competing vendors, or as a complete implementation equally available to all parties.

5.2 Open standards qualifying organizations and qualifications

The following organizations qualify open standards.

5.2.1 ITU-T open standard definition

The ITU-T has a long history of open standards development. However, recently some different external sources have attempted to define the term "Open Standard" in a variety of different ways. In order to avoid confusion, the ITU-T uses for its purpose the term "Open Standards" per the following definition:

1. "Open Standards" are standards made available to the general public and are developed (or approved) and maintained via a collaborative and consensus driven process. "Open Standards" facilitate interoperability and data exchange among different products or services and are intended for widespread adoption.
2. Other elements of "Open Standards" include, but are not limited to:
   A. **Collaborative process** – voluntary and market driven development (or approval) following a transparent consensus driven process that is reasonably open to all interested parties.
   B. **Reasonably balanced** – ensures that the process is not dominated by any one interest group.
   C. **Due process** - includes consideration of and response to comments by interested parties.
   D. **Intellectual property rights (IPRs)** – IPRs essential to implement the standard to be licensed to all applicants on a worldwide, non-discriminatory basis, either (1) for free and under other reasonable terms and conditions or (2) on reasonable terms and conditions (which may include monetary compensation). Negotiations are left to the parties concerned and are performed outside the SDO.
   E. **Quality and level of detail** – sufficient to permit the development of a variety of competing implementations of interoperable products or services. Standardized interfaces are not hidden, or controlled other than by the SDO promulgating the standard.
   F. **Publicly available** – easily available for implementation and use, at a reasonable price. Publication of the text of a standard by others is permitted only with the prior approval of the SDO.
   G. **On-going support** – maintained and supported over a long period of time.

5.2.2 Governmental definitions of an open standard

Different organizations define the concept of an "open standard" differently. The following are different organizations' definitions of "open standard".

5.2.2.1 Pan-European eGovernment Programme for Interoperability (EIF 1.0)

The Pan-European eGovernment Programme (IDABC) in DG DIGIT issued their European Interoperability Framework (EIF 1.0) with a strict minimum definition of open standards and mandated their use in pan-European eGovernment services. There, the open standards should be:

1. Adopted and maintained via an open process in which all interested parties can participate;
2. Published and available freely or at a nominal charge;
3. Made irrevocably available on a royalty free basis, even if intellectual property issues apply to patents covering all or parts of the standard;
4. Free of constraints on the re-use of the standard.

5.2.2.2 Danish

1. An open standard is accessible to everyone free of charge (i.e. there is no discrimination between users, and no payment or other considerations are required as a condition of use of the standard).
2. An open standard of necessity remains accessible and free of charge (i.e. owners renounce their options, if indeed such exist, to limit access to the standard at a later date, for example, by committing themselves to openness during the remainder of a possible patent's life).
3. An open standard is accessible free of charge and documented in all its details (i.e. all aspects of the standard are transparent and documented, and both access to and use of the documentation is free).

5.2.2.3 French

By open standard is understood any communication, interconnection or interchange protocol, and any interoperable data format whose specifications are public and without any restriction in their access or implementation.

5.2.2.4 Indian

- 4.1 Mandatory Characteristics An Identified Standard will qualify as an "Open Standard", if it meets the following criteria:
  - 4.1.1 Specification document of the Identified Standard shall be available with or without a