INFORMATION ABILITY PROCESS AND INFORMATION SYSTEM AS REALITY MODELING TOOLS

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ABSTRACT

We all agree on wanting a better world, the issue is working out the details.

This essay explores reality. It looks at reality as an impredicative (self-contained) model, where there is an observer-actor with informational ability (infoability) that creates models. Those models are information (attribution of meaning) and serve this observer-actor-with-infoability (living being) as a guide to transform reality.

As the title indicates, two basic models are used to explore reality: the system and the process. These two models seem to create circularity, but there is no circularity in reality; in reality there is simultaneity. Reality exists only at present, and the living being uses memory to save the observed events creating systems. The chain of those memorized systems, which are one process, create the past for the living being's reality. In turn, that living being is using its infoability, pondering those events, creating probable scenarios and choosing the most meaningful outcome the living being makes a decision and creates the future.

Keywords: reality; meaning; informational ability; information; life; decision; communication; living being; model; system; process; event; scenarios

INTRODUCTION

"In summary: Inclusion of the biological, behavioral and social sciences and modern technology necessitates generalization of basic concepts in science; this implies new categories of scientific thinking compared to those in traditional physics; and models introduced for such purpose are of an interdisciplinary nature." (Bertalanfy, 2009).

Here we will contrast reality between one extended concept of reality –universal reality– and one narrow concept of reality – living being reality. The universal reality bears everything that exists, while the living being reality (virtual reality or sub-reality) is a sub-set of that universal reality. While universal reality does not require any living being, the living being reality requires infoability (Arango, Information and living things, 2010) in order to exist.

We are going forward in this essay using basic concepts in science like elemental particles, system model, present time, memory, emergent properties, process direction, and limits, among others. Using the system concept we can say that all particles at present state create one system; let us call it: The System. Using The System and change concepts, we can say that when some particles move in any pattern they create one process; let us call it: The Process. Then, we explore two types of processes: one internally conducted and another externally conducted. The internally conducted process refers to a living being's capacity to

direct and transform matter based on infoability, use communication to agree on one objective and cooperate, collectively creating one new particular reality. In turn, the externally conducted process follows physical laws with no common purpose and creates one universal reality.

From another point of view, let us say that an observer having infoability is a living being; then let us call you or me observers (Arango, Information and living things, 2010). One observer creates boundaries on two fronts: graphical and historical. On the graphical front you create systems when you draw limits. On the historical front you create processes when you define events' sequences. Let us say that when you create either boundary you create mental objects. Having those objects in mind, you combine them to make your decisions. Once you make decisions you can act on them or wait to act later. In any case, there are countless elemental particles that have changed position (moved) and that makes you a matter director in a hierarchy of living beings. Then, as observer, you have directed the observation process. Many events have taken place within the boundaries that make you the observer; what we want to notice here is that you have created one particular reality after observing your environment. You, I and all other humans create a common human reality we call humanity; where we all cooperate and/or take advantage of our environment. Creating new limits creates other realities, but let us say that all living realities create nature, and nature and non-living beings' realities create the universe.

Among the main issues associated with introducing new ideas, paradigms, or models, one important issue is the observer's present information—particular reality. New ideas need to scratch, suspend or recombine our existing information to create a new particular reality. The center in this process is the infoability that is conducted at least by two sub-processes: analysis and synthesis. Those sub-processes are conducted or portrayed by the brain lobes: analysis for left lobe and synthesis for right lobe[1].

Another important issue is communication—how to tune the idea between the actor (leader, manager, or idea creator) and the observer (spectator, worker, or idea recipient) when there are many types of infoabilities, for actors and observers. Also, the alternation between being an actor and an observer; your turn to speak gives you the actor function and your turn to listen gives you the observer function, turning communication into a new process of creating meaning. Then, let us work on this.

THE SYSTEM AND THE PROCESS AS MODELS

Every problem is a matter of information.

Let us start with the definition of principle: n. basic assumption required in a system of thought (Encarta Dictionary). Now let's have two principles—elemental particles and elemental units (objects)—that collectively create matter and information. Matter is a principle for universal reality. Information is a principle for living-being reality. Beings are material densities defined by infoability as structures, which we call objects. Beings exist due to matter; no information and no infoability required. Objects need living beings in order to exist; objects are attribution of meaning; collectively all objects constitute the information of a living-being.

Please bear in mind that models are information while they are in living beings' minds. Once a model is materialized i.e. taken to one paper as map or blueprint, taken to one three dimensional construction,

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[1] This is a concept accepted by many psychologists. But those sub-process, analysis and synthesis, do not need to be exclusively there, the fact is: analysis and synthesis represent two complementary ways of thinking.

taken to one mathematical function in a paper, etc. the model it is no longer a model –it is reality. It is one set of elemental particles with material properties representing one model;[2] i.e. now the model is one piece of universal-reality and other living beings can start exploring that piece of universal-reality and create their own models, information, and finally their particular-reality.

As principle for The System and The Process models in this section, let us use Jennifer Wilby's definition of system:

> *"A system consists of a number of parts and the relationships between the parts and is set within a boundary that is drawn by the observer of that system. The system identified by a boundary will have inputs and outputs, which may be physical or abstract and those processes form the work of the system as transforming those inputs into outputs."* (Wilby, 2011)

This definition has two parts based on the static notion of the system concept; the first part describes the system statically: parts, relationships, and boundary. The second part describes the system dynamically: inputs-outputs, work, and transforming.

Then a system definition is: *"A system consists of a number of parts and the relationships between [among] the parts and is set within a boundary that is drawn by the observer of that system.* In order to have a system you need parts interacting at one boundary.

And a process[3] definition is: "*The system identified by a boundary will have inputs and outputs, which may be physical or abstract and those processes form the work of the system as transforming those inputs into outputs."* In order to have a process you need inputs and outputs that transform the system and its environment. Now, those inputs-outputs are events; i.e. something passing the boundaries from outside to inside creates an input event; and something passing the boundary from inside to outside creates an output event.

The System and The Process are particular cases for these definitions since all particles are included in the largest boundary any observer will draw, the universal limits.

SYSTEM-PROCESS SYMBIOSIS OR ONE BASIC MODEL: MSS-MPS

"There can be no disagreements only misunderstandings. We are all looking at the same universe, in the end we must agree." Korzybski's General Semantics.

Using one Cartesian plane as reference, we will create one model for the physical universe and drawing boundaries we can build one hierarchical model: MSS-MPS. But before going there let me judge the notion of a unit as a more abstract concept than the notion of a wheel, i.e. both are abstractions or objects, but you can find "wheels" by direct observation of your environment, while you need to abstract almost all material characteristics in order to have the notion of a unit.

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[2] This distinction could be taken to philosophical terms. Please bear in mind that once you materialize something is no longer a model but matter with full material relationships like: mass, charge, inertia, action-at-distance, etc.
[3] This definition could be rework but the dynamical notion is reflected by notions like inputs-outputs, processes (sub-process), work (process)

Let us enrich the unit's notion by going over the set theory. In set theory, the unit model will be turned into one whole, one group of elements[4]. Having the set of all elemental particles like in Figure 1 is one system: "A". Having the set of all elemental particles like in Figure 2 is another system: "B". Both systems differ in the position of the elemental particles, sets "A" and "B". In order to have a direct comparison between the universal systems -"A" and "B"- let us now combine system "A" and system "B" into one new system "C" like in Figure 3. Now we will have the universe in two sets of particles, each formed by all elemental particles, see Figure 3. The system "C" have the same interactions among elemental particles, but have two sets that we can compare by direct observation[5]. Ofcourse, this is not a practical way to model the universe but has gotten great attention as the basis for the Big Bang model.
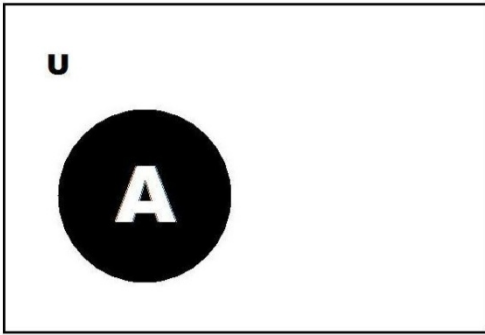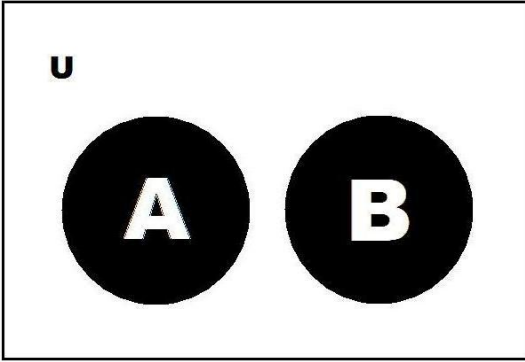

Figure 1 Universal System A
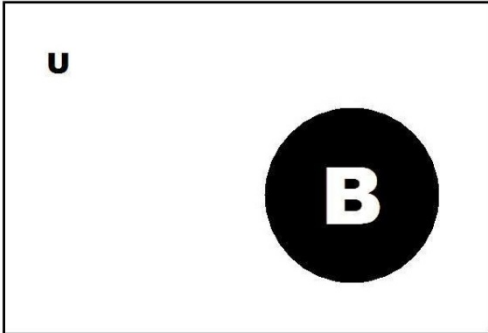
Figure 2 Universal System B

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[4] In this case, the idea is to have a principle or the basis for the set, which is a whole, made of principle-units or say the basic-parts. Here we start some redundancy: The unit is used for <u>one</u> whole and <u>one</u> part.

[5] This note is for those readers that do not have noticed that system figure 3 having two sets of all elemental particles is not possible in universal reality. You cannot have two universes since universe includes all that exist. Now, this concept is possible in particular realities, each observer has its own model containing the elemental particles he wants.

Figure 3 Universal Process from A to B

Now, let us use the Cartesian plane to chart The System in the vertical axis and The Process in the horizontal axis. See Figure 4. Let us start taken one universal picture, i.e. projecting all elemental particles into one plane; in this case we will get one picture like the famous Hubble Ultra Deep Field picture (Nasa, 2004). If we had photographed both sides -left and right- perfectly, rotating one hundred eighty degrees[6], we would have all elemental particles that exist. Now let us rotate the picture ninety degrees in order to see the picture's edge (one line); we obtain our vertical axis in the Cartesian plane. Assume we wait a year and take the "same" picture again[7]. Repeating the process we will have another vertical axis, projected into the vertical plane. These repetitions will create the universe Cartesian plane model. Having the universe as reference, Figure 5 represents The Process of the universe, showing the changes every year from now on, and we will have in this way one view of The System and The Process.
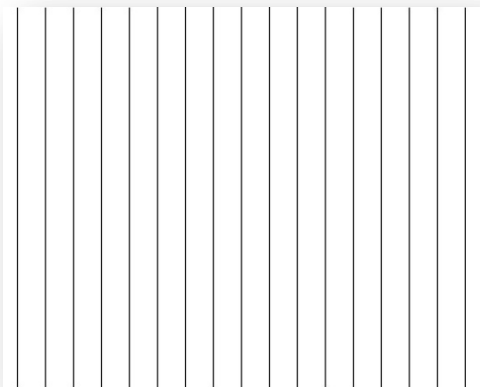

Figure 4 The system A, The System B, The Process C

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[6] Please accept any possible difference between the Hubble picture and one ideal picture capturing the entire universe.

[7] There is no way to take the same picture, one year has passed, but that is the usual via –imprecise way- we communicate.

Figure 5 -n- systems and -m- processes

To construct our MSS-MPS (Meta-system, System, Sub-system and Meta-process, Process, Sub-process), let us draw one boundary for our system-process, the Earth. In this case, we have one sphere having a radius one mile above than the Everest's height. The Earth's gravitational center point is going to draw the "X" axis in our Cartesian plane. With this we have built the MSS-MPS structure. The outside of the sphere—its environment—is the meta-system "M", the sphere defines the system "S", and any elemental particle inside the sphere as one sub-system "S". Doing the same for The Process, after projecting our system into one universal plane and turning it 90 degrees, it can go through various events; we are having the meta-process "M" outside the sphere, the process "P" within sphere limits tracking all particles at once; and the sub-processes "S" tracking each particle at a time. Using the Cartesian plane, we can track our MSS-MPS structure. The main difference versus The System and The Process is the observed arbitrary boundary and work produced. We have created one holistic and hierarchical model MSS-MPS that tracks particles inside, outside and those entering or exiting the boundaries.[8] One representation for this model can be the figure 6. The system interactions take place inside horizontal-parallel boundaries; the boundary creates the component. The process transportations take place through the vertical-parallel boundaries; and there are transformations within both horizontal-vertical boundaries; the component.

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[8] Please remember that particles have mass and charge and have the potential to alter other particles position by impact or action at distance.
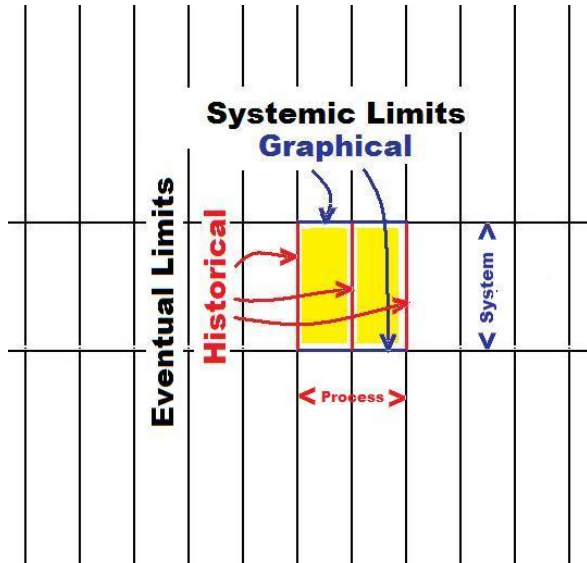
Figure 6 System-Process limits. One model MSS-MPS

With the "correct" assumptions the holistic-hierarchical model, MSS-MPS, can be applied to many particular situations; as an example let us see how it applies to the Theoretical History presented in GST terms: "Sociology is essentially concerned with a temporal cross-section as human societies *are*; history with the 'longitudinal' study how societies *become* and develop." (Bertalanfy, 2009, pp. 109-110). In this case, civilization will have sociology seen as one system and history without any emotional-rational attachment i.e. without the meaning attach to it, we will see the history of one human-society as one mere animal herd. Being free to draw boundaries, Humans are sub-systems and humankind the macro-system; humans have two main events, birth and death, and so have societies. Hopefully we will survive humanity's "meaningless" behavior.

Using this MSS-MPS model, you—as one whole—are one system-process. The meta-system—meta-process is given by your environment and within your limits there are plenty of sub-systems—sub-processes. One of these sub-systems is information (mindset) and one of these sub-processes constitutes your infoability.

INFORMATION AS SYSTEM AND INFOABILITY AS PROCESS

"Consciousness turns out to consist of a maelstrom of events distributed across the brain. These events compete for attention, and as one process outshouts the others, the brain rationalizes the outcome after the fact and concocts the impression that a single self was in charge all along. ... Consciousness does not reside in an ethereal soul that uses the brain like a PDA; consciousness is the activity of the brain."
Steven Pinker

Here we will turn from observing matter to "observing" information. We can compare the material system and the informational system; system kinds are material and informational; elements are particles and objects; forces are inertia and action-at-distance, for matter; and meaning and communication, for information. Based in our system-process model, we can compare matter and information. Matter: the matter-system principle is structure, and the matter-change-process principle is disequilibrium.

Disequilibrium changes the structure but does not change matter itself. Information: the information-system principle is meaning, and the infoability-process principle is learning. Learning changes our mind-set but does not change the concept of meaning itself.

Before discussing the information system, let us discuss the infoability process. Infoability is the result of five sub-processes: perception, discrimination, accrual, comparison, and judgment. (Arango, Matter, Information and Life, 2011). Perception is the process of receiving an action or one physical perturbation that reaches the observer. Discrimination is the process of giving limits to what is perceived, is the first step in creating objects from the perception. Accrual is saving what was discriminated, is to create memory. Comparison is the process of reviewing discriminated object(s) against accrued object(s). Judgment is the process of making a decision from the comparison(s).

In biological terms, infoability emerges from basic organisms –the smallest living beings– creating more complex organisms one "level" at a time. Let us assume RNA is the smallest living being, followed by the prokaryotic cell, the eukaryotic cell, animals-plants and combinations. Those living beings create information systems at each level. Here, higher level does not mean superior but richer more complex systems, where there are more meanings; and more objects than the previous level and ofcourse more infoability.

Food and danger are basic survival attribution of meaning[9]. At our level we can see that children have different meaning for them than adults have; also there are different meanings for them within different cultural backgrounds; the common element for this difference is basically the different informational system-process between the living beings involved, children and adults. The comparison here is over the meaning attributed to the same food or the same danger, which constitute systemic notions because they have components and links. Having additional assumptions in place and abstracting according to our informational boundaries, we can similarly compare the meaning attributed to food and danger by the eukaryotic cell and by the human being; food and danger are seen differently by the cell and the human; but food attracts both living beings and danger repels both, telling us that beside the material size or infoability size, both living beings have the same food and danger meaning-notions or objects.

Let us distinguish the notions of object and model; and also see the association between system and object and the association between process and model. Objects are basic discriminations from perceptions. At our human level, these objects came as direct results from our environment, and are physical inputs converted into information by a combined process between our senses[10] and the mind. These direct interpretations -objects- are accrued as memory; then they are compared in the mind and models are created judging over differences among these objects. Since models are based on the sequences of objects and the judgment of the observer, let us say models are informational processes.

In statistical terms, events create objects and judging over those events, probabilistic models are created. Good probabilistic models have good predictions of future events and the same happens for bad models; bad models give poor predictions of future events.

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[9] Some other richer concepts are justice, peace, love, rage, duty, etc.
[10] Any of the faculties by which stimuli from outside or inside the body are received and felt, as the faculties of hearing, sight, smell, touch, taste, and equilibrium. American Heritage Dictionary from TheFreeDictionary.

Communication is like action-at-distance and meaning is like inertia. Communication is still based on internal attribution of meaning or information creation. The observer turns from observing to acting and back to observing. Meaning is internal, only existing as an emergent property at some informational structures, i.e. like mass in the material system. Communication is the result of interpretation –meaning attribution- to physical system inputs and outputs, i.e. like charge in the material system. The material system has material inputs and outputs and the informational system has informational inputs and outputs. The first step in communication is to agree on the code-meaning, i.e. in the parts of the system. In this case there are concrete letters, words, sentences –visual or spoken- that have meaning for those that agreed on the code and are abstract and have no meaning for those that do not know the code-meaning. Once both ends agree on the code-meaning, which is the mass, the communication works like action-at-distance, creating cooperation toward achieving common or complementary goals, one direction; or maintaining individuality, coexisting but having two different directions. Then, let us say that we have been taught that information is external, but since we perceive material structures or their disequilibrium and we have infoability, we create information internally by attributing meaning from what happens.

There are many more points of view to the informational system-process. Let us emphasize that each point of view is an issue of meaning created by the material-informational system-process defined by physical laws in the universal reality, not by the observer. In other words, each living being has a hierarchical informational system-process following material system-process laws, which follow matter-information principles of meaning attribution. Here we have the observer "predicting" the feelings of their peers when they act, and actors learning about the feelings of their observed living peers. In any case, the actor acts and judges over the environmental behavior of its acts; this creates one actor particular reality.

UNIVERSAL-REALITY VERSUS PARTICULAR-REALITY

"*Perspectivism is the philosophical view developed by* Friedrich Nietzsche *that all ideations take place from particular perspectives. This means that there are many possible conceptual schemes, or perspectives in which judgment of truth or value can be made. This implies that no way of seeing the world can be taken as definitively "true", but does not necessarily entail that all perspectives are equally valid."* (The Free Dictionary).

We moved from the unit to a set as group of units; from the set to the system by the interaction of units (parts or components); we can move from system to individual through the notion of centralization: *"An 'individual' can be defined as centralized system"* (Bertalanfy, 2009). Now let us move from individual to community by including the teleological notion. This teleological notion implies the capacity to decide where to go and the capacity to direct matter in the decided direction. This implies two processes, the informational process that decides the direction, and the material process that executes the movement in that direction. These teleological and physical actions can be applied to protein communities as well as to human communities. From the biological point of view, it is one living being; one sub-system that teleologically observes and another sub-system that teleologically acts. In business terms, you make a decision and then invest work and money toward that decision.

"We come, then, to a conception which in contrast to reductionism, we may call perspectivism. We cannot reduce the biological, behavioral, and social levels to the lowest level, that of the constructs and laws of physics. We can, however, find constructs and laws within the individual levels." (Bertalanfy,

2009). Here we find constructs that direct matter, and have two notions at the individual level, observer and actor. One component of a system decides, and other component of the system acts; i.e., one sub-system plans and other sub-system executes. Those individual sub-systems form a community –system-process that has material and informational properties.

Then, matter directors –communities- require a holistic material-informational system-process. When observing, processing information; and when acting, transforming matter. The director (observer-actor) is using an informational system-process to direct matter in order to do what living beings do, transform matter. Let us now say that these observers-actors are matter and information integrated in one real holistic process that creates life, or mathematically: matter + information = life. That real-system-process produces one particular reality for each living being.

The community material system-process directs execution. Using our holistic-hierarchical model, let us draw a new system-process boundary. The boundary is drawn by the capacity –emergent property– that a set of elemental particles either has, or does not have, to direct matter at "their will". Going by the book, our initial reference is the prokaryotic cell, which has the capacity to direct matter[11]. In this system, let us assume that proteins are sub-systems and they are linked by communication; remember that we infer that the prokaryotic cell has an information system because it directs matter at will.[12] In this process, we will have food-intake transformed in residual—expelled and transported through cell boundary and the cell movement. More conventionally: proteins transform amino-acids into other macromolecules and proteins also transport other molecules within the cell and across the cell boundaries. Here the prokaryotic cell level real-system-process creates its particular reality. We see one holistic-hierarchical model: MSS-MPS for one living being. The prokaryotic cell, having its own infoability, creates information or its own reality. The macro-system and macro-process are outside the cell boundary –universal reality-; the prokaryotic cell needs to discriminate (attribute meaning to) the environment for food or danger. Internally, proteins need to understand how to use the food or run away from danger.

The community Informational system-process decides direction. We are going to use the holistic-hierarchical model MSS-MPS to review the basic living beings characteristic of deciding how to direct matter at "their will", since, in order to direct matter or change matter's direction at will requires the living being choosing a direction. The direction notion requires creating boundaries for reference, meaning attribution, and making decisions about the direction; all these elements familiar to the information's concept. At our human level, deciding a direction is done in the mind which is the result of the neural communication processes. Let us simplify by having two parts intervening in the system-process, the brain lobes. The nervous system is the meta-system, the brain is the system and the lobes are the sub-systems. This is the deciding informational system –nervous system- and the rest of the body is the material system-process executing the decision.

Then, the basis for particular reality has material and informational systems-processes and both are limited. Your material perception is limited by the farthest distance at which you can see, hear, smell, taste, and feel; and your informational judgment, how wisely you can process this data to identify what

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[11] Here we talk about a practical matter direction, the actor's matter directed by the actor and perceived by the observer as "unpredictable", "unusual", "rare", etc. This is the classical concept of control, keep and maintain direction. You can go to the idealistic concept of directing all matter but that is not our discussion now.

[12] There is enough research to stay that proteins (macro molecules) have many functions within prokaryotic cells as well within eukaryotic cells' organelles that clearly show proteins direct matter.

you have within reach, gives you informational limits. One example is driving reactions; you need to see and then act as wise as possible in order to avoid accidents. Then in order to have one real information system, we require the real information process that attributes meaning to the universal reality. Let us notice that information and infoability seem to create circularity, but since reality is at present and simultaneous, this circularity is resolved by universal-reality-simultaneity that it also reflected within all infoability sub-processes, i.e. our neurons work at present within their specializations,[13] perceiving, discriminating, accruing, comparing, and judging at present time.

Humans have higher abstraction ability; in our informational system-process we have developed, numbers, math, writing, and many other models that help us support the way we transform reality or direct matter using other tools not available to other living beings that have different abstraction levels.

Universal reality involves all particles but does not involve information, while particular reality is limited to the current living being's material and informational limits. Since there are many living being structures, there are sub-particular-realities supporting each particular reality, which in turn support a bigger reality given by other living beings. Overall living and non-living beings are both created by elemental particles creating one universal reality.

Models are informational constructs based on two notions, systems and processes that are particular realities; in contrast to the universal-reality, models do not interact outside our minds, models are elaborated by eukaryotic cell actions in our body. Those eukaryotic actions emerge from the prokaryotic actions, and those prokaryotic actions emerge from proteins actions, and so on, until the basic living being. All these actions are run simultaneously, representing the particular reality that each of us live.

Then the basic concept in this essay is that models are mental representations of the universal reality – information- and any work we do to represent those models is based on material changes –infoability-; which create our particular reality. In turn, with our particular reality we approach the universal reality in order to change it, pursuing the desired results from the models, i.e., we want to change the world based on the models we create from the world itself -models. The closest we model reality the closest we will be able to transform it at our will.

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[13] This process is the same mathematical process created by delta limits taken to the differentiation process. It is also the process of half-life radioactivity decay, where at each period measure the radioactivity is half-life what was at the beginning of the period creating asymptotic functions that do not change reality.

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