

Dynamic Flow and Attributes of Knowledge

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Abstract: This paper presents a generic concept that human beings are driven by their deficit need(s) and interact with other objects in unique and distinctive styles to maximize the utility of their effort. Being limited by resources and time available, humans evolve specialized skills, intelligent systems are programmed to be efficient, optimal, and highly productive. The goals are thus achieved quickly and most economically. Humans become socially interactive, and machines become adaptive. In the later sections of this paper, we present a generalized theory that ties human needs with their distinctive styles to deal with other human beings (or other intelligent objects) and their goals are partially or completely achieved. This approach enables humans and machines to achieve gigantic and monumental goals. In the same vein, the approach facilitates programmers to integrate programming modules to be executed by intelligent machines to offer unique and distinctive solutions to gigantic and monumental problems. Human skill and machine intelligence achieve transparent bondage to make machines more humanistic and for humans to achieve the gratification of higher levels of more complex needs. The paper spans numerous disciplines and the conclusions are generic influencing almost all aspects of life and society as it is evident in Section 3.3 and Conclusions.

Keywords: Knowledge, Flow and Communication, Knowledge Machines, Structure of Knowledge

Date of Submission: 18-06-2023

Date of acceptance: 02-07-2023

I. INTRODUCTION

With the availability of knowledge dispensed over high-speed networks and by inexpensive devices, groups of elite users raise their ambitions to reach the highest goals, whatever they may be. In the same vein, the methodology and its systems approach intelligent machines to adaptively develop solutions to most complex problems or human needs [1], whatever they may be. The limit to this methodology is reached when human beings exhaust every nano-organism in biology to organize themselves (systematically) to solve microscopic mental and biological problems. In the same vein, the limit to this methodology is reached when the intelligence in microscopic VLSI circuits to solve the nano-circuits to organize itself (computationally and scientifically) to solve the most minute engineering and electrical, communication, or optical problems!

The approach provides a means to import human intelligence into computer hardware, software, firmware, and knowledge-ware, and conversely, it also provides a means for transmuting the programmed intelligence in AI machines into human thought processes at a conscious level. However, there is good reason to believe that human heredity and the wonders of the human mind and body do these functions at a subconscious level! The associated topics dealing with knowledge flow, knowledge elements, kels, knowledge-centric objects (kco's), kuanta of knowledge, the utility of knowledge, and knowledge utility numbers are introduced in this paper.

II. FUNDAMENTAL ATTRIBUTES OF KNOWLEDGE

Knowledge is vast and comprehensive, and yet being uniform in time and space has three distinctive features from a human perspective: a) knowledge that is beyond complete human understanding even though perceivable, and b) knowledge that approaches and intersects human comprehension to deal with it and make it useful) knowledge that is well understood and falls in the realm of sciences and to deploy it for general use and solve routine problems. Accordingly, they classify it. The following sections expound on some of its unique features of knowledge, such as its continuity, its dynamic nature, environment. Setting and culture.

2.1 Unique Characteristics of Knowledge

Knowledge crisscrosses numerous domains of time and space. Tracking it forward and backward is sometimes feasible. The domains that are traversed typically follow human thought that perceives

objects that have a concept or notion of what the object was, what it is, and what it is likely to be. A sense of the continuity of the thought and knowledge that accompanies it, in the time domain is thus bonded in the mind. Thoughts, time, and knowledge are thus bonded, at least for a little while the individual can think and rethink and validate and revalidate. Such bondage sometimes gets envisioned as dreams or as daydreams, and sometimes as inspiration.

To present this unordered science (if it is possible), The passage of time that governs the flow of thoughts is influenced by the velocity of knowledge through the mind. Such a velocity is highly variable from one mind and another mind is dictated by the makeup of the neural nets in the body and brain thus the structure of the body and brain are two different mediums for the knowledge to flow through. Though logic and interpretation are used in characterizing knowledge, they become available and leave uncertainty behind which is indeed the inherent characteristic of knowledge itself. The line of logic can be broken, disrupted, or intersected at any point, place, or instant thus adding to the inherent and unique characteristics of knowledge that knowledge in human minds can follow as life itself that is dynamic. It has a finite period during which it can be enhanced, modified, and stored in the nerve centers of the body and mind. Abstract as these notions are in this section, so is the knowledge that is stored in these nerve centers. The sciences and brain scanners are not advanced enough to perform a logical and associative content search, classify and document the search, or process the creative functions in this domain of knowledge. Even though these functions and processes are not orderly in the conscious frame of mind, the subconscious attempts to be orderly in time. Its passage in time and society greatly influences the content of knowledge-centric nodes (*KCN*) in the mind. The velocity of knowledge flow between various *KCNs* is conditioned by the state of media (e.g., the noise and neural state that invades the mind. In perspective, the human mind is affected by the distribution of *KCNs* overlaps the conscious and subconscious: thus, enabling the species to perform (some of them) scientific functionalities by training the mind to perform the Verb functions (*V*, *VF*, *v*, *vfs*, etc.) in the uncharted domain of knowledge presented in this section. The *KCNs* are interconnected by neural links that have individual media characteristics. Only perseverant pursuit of knowledge can train the intellect to shape the structure of knowledge that enhances the knowledge to train the intellect. These endless cycles bring about the evolution of the intellect in the species.

2.2 The Human Side of Knowledge

Knowledge and intellect are inherently and genetically intertwined like the chromosomes in the double helix of Watson that makes us the humans that we are in the wombs.

Knowledge grows in genetically coupled chromosomes to the intellect (and vice versa) by appropriately matching the impedance characteristics of the neural transmission links in the brain and organs thus enabling an internal medical operating system to govern the mind and body of the hosting organism (however small or large) it may be. structure

When the genetic system undergoes division and disorder, especially in the presence of dominant and unstable noun objects (*N*, *NO's*; like Putin, Trump, etc.). These *NO's* that have the undercover traits of deceit and aggression without morality and ethics can and do destabilize society. The convolutions (**s*) between such large *NOs* are uncongenial for the massive numbers of many elementary noun objects (*n*, *nos*; like saints, philosophers, workers, and populous).

2.3 ATTRIBUTES OF KNOWLEDGE AND DYNAMIC FLOW

Knowledge can be reduced to tiny elemental cells constituted by quantized noun objects, quantized verb functions, and their quantized convolutions. Most species deal with modules or quanta of rudimentary knowledge to gratify their routine needs and acquire them to make life easier. Most of the elite learn to deal with and manipulate more advanced quanta of sophisticated knowledge to gratify their special needs and learn them to satisfy their needs, environment, and their circumstances. *Kels* do indeed have a hierarchical structure. Like nature itself, knowledge exists in all textures, sizes, and forms. Human senses that operate in real and physical space offer a very tiny glance of a much more intricate and sophisticated universe of knowledge that can be sensed by perception and resolved by programming/mathematical tools. To deal with reality and use in the knowledge era, the structure of knowledge needs careful adjustment, alignment, and association, especially if it is to be deployed in a computational environment.

The origin of *kel* (to represent knowledge cell) is derived from the word pixel to stand for picture element (i.e., picture-cell, written as a pixel). In addition, there is a resounding similarity between *kel* and the natural elements in chemistry at the atomic, molecular, and reactionary levels. For instance, the chemical elements also consist of neutrons, positrons, and electrons that play an adaptive role as the elements form molecules, and complex chains of organic, inorganic compounds, and acids. Nature has

provided an innate intelligence for the world of materials to exist.

In a closely correlated methodology, *kels* also play such a complex role. *Kels* can share noun objects and convolutions as much as atoms can share nuclear elements, electrons, and valency bonds. The particularly adaptive role of atoms to form varieties of compounds is evident when *kels* can arrange and rearrange their structures of *no*'s, *'s, and *vf*'s, to form different configurations of knowledge of the chain of *kels* to form minor *kcos* and major *KCOs*. The analogy is evident to treat the chemical world as a type of knowledge society or culture where the *no*'s, *'s, and *vf*'s are the basic building blocks and these *kels* are formed and unformed depending on the dynamic social setting and the setting. At a very microscopic level, change in the chemistry of every atom is as real as the change of every *kel*!

To be practical, we explore the quantum theory of knowledge whereby the knowledge paths between small knowledge-centric objects (*kcos*) and large knowledge-centric objects (*KCOs*) can be investigated. A continuum of noun objects (*no*'s), verb functions (*vf*'s), and the associated convolutions (*'s) is thus retained between *KCOs*. This continuum is searched out by segmented knowledge machines that operate between the smaller *kcos* and the larger *KCOs* in any given domain or direction of knowledge. Dewey Decimal System (DDS) or the Library of Congress (LoC) classification offer two methodologies to classify the domain of knowledge pursued. One or more pathways exist in the chain of evolution of the subject matter and related inventions that have occurred around practical and real modules of knowledge in the range of any smaller *kco* to the large¹ *KCO*. All modalities of knowledge representation (images, documents, graphs, presentations, etc.) need investigation to complete the pathway(s) between *kcos* and *KCOs*.

Minute constituents of *kels* (i.e., *no*'s, *'s, and *vf*'s) can and do interact with the social and cultural character of the medium that carries them. In a sense, the statistical properties of the medium alter the genesis, the transmission, and the retention of these *kels* thus offering the vast varieties of lives, decay, and death of knowledge in different societies and cultures. The principles for the transmission of data and information become applicable in this paper. Even though human beings may be daunted by such intricacy, knowledge machines can routinely handle the tracking, transmission, attenuation, and dispersion of knowledge in most societies.

The role of a *kel* is as fundamental as the role of the seminal biological cell in all species. The two chromosome pairs formed as xx (female) and/or an xx or XY (male) chromosomes to constitute the female and male genetic cell evolve after the genetic code in the male (*no1*) - *kel1* penetrates and ruptures (*vf* (s) in a distinctly unique fashion (*)) the female (*no2*)- *kel2*. A new *kel3* and a new *no3* (the fetus) are thus formed, and it carries the genetic code of both *no1* and *no2* as the *no3- kel3*. One, twins and multiple babies are all formed from process (*no1 * vf1*, also see Figure 1).

In a very oblique sense, the inception of knowledge and the origin of life are intertwined. The genetic code should be considered as the knowledge that carries the imprint of the species of the two codes (male and female) that get interlocked should be considered and the generation of new *no3- kel3* noun object.

2.3.1 Generality in Nature and Other Disciplines

The formation of complex *KELs* from their microscopic structure or *kels* occurs in human minds. Major knowledge-centric objects (*KCOs*) are also constituted by their fragmented elements. Software development is based on machine instructions, macros, subroutines, and utility programs. The growth of life forms such as bacteria, and even species in biological sciences is a process of systematic composition of more minute cells. Such an integration methodology is applicable in the evolution of larger structures of knowledge and is depicted as follows:

δ kels \rightarrow μ kels \rightarrow Δ kels \rightarrow Σ kels \rightarrow $\Sigma\Sigma$ kels,

stated alternatively; minute *kels* \rightarrow becoming \rightarrow large *kels* (*KELs*) and, then from larger *kels* to macroscopic *KELs*

δ *KELs* \rightarrow μ *KELs* \rightarrow Δ *KELs* \rightarrow Σ *KELs* \rightarrow $\Sigma\Sigma$ *KELs* \rightarrow *KCOs*

written alternatively; minute *KELs* \rightarrow becoming \rightarrow large *KELs* (*KCOs*)

The evolutionary step in each of the transitions (\rightarrow) is triggered or catalyzed by a verb function(s). Such verb functions can be inherent within the *kel* or induced externally. For example, lightning discharge can form molecules of ozone O₃ in the atmosphere where oxygen is abundant. The knowledge society is an ordered environment of *kels* represented and integrated as δk 's, μk 's, Δk 's, Σk 's, $\Sigma\Sigma k$'s, ..., and then of

¹ The more precise representation of the entire set of processes is represented as (*qno1 \rightarrow δq *1 \rightarrow δqvf \rightarrow δq *2 \rightarrow $\delta qno2$) where the prefix q denotes a quantum of the genetic code in each kel. Genetic science elaborates the processes that follow from the formation of the seminal cell of the fetus to the duplication of the cells but in the context of where and how the cells are deployed. The changes in the womb and the physiology of the parental object $\delta qno2$.*

δK 's, μK 's, ΔK 's, $\sum K$ s, $\sum\sum K$'s, or KCO 's, etc.². Chemistry also displays simple and complex to very, complex chains of distribution of atoms in the real-world.

2.3.2 Atoms and Knowledge Elements

The diagrammatic representations of a *kel* and of a Carbon² atom are shown in Figures 1 and 2. Atoms can and exist with many atomic weights as much as *kels* can exist in many – *kel* weights¹ (like atomic weights) depending on the utility of the knowledge embedded in the *kel*. For instance, the atomic weight of noble metals is much higher than that of ordinary elements. The energy contained in their atoms is greater than that in the hydrogen atom with an atomic weight.

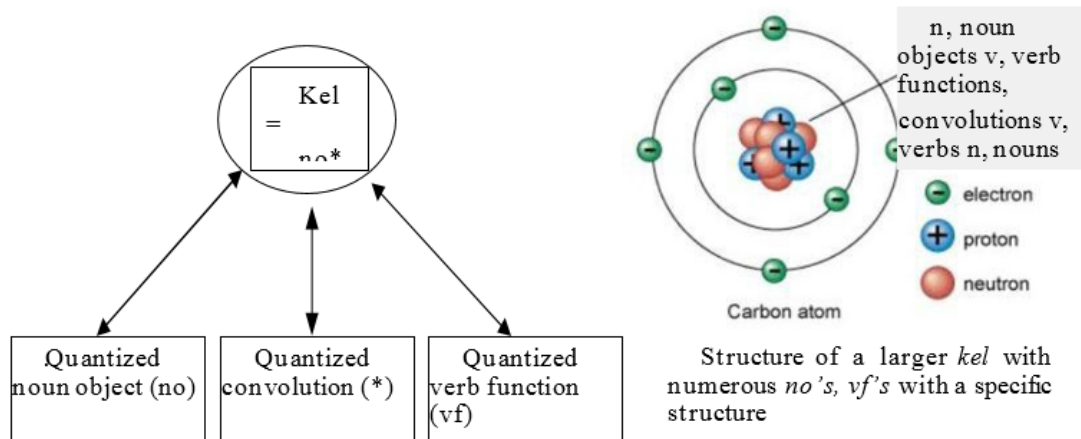


Figure 1 Configuration of an element of knowledge, *kel* formed from a set of the tinniest but flexible and dynamic entities (*no*, * and *vf*). These *kels* are comparable to atoms of neutrons, protons, and electrons. The basic building blocks can be shared and enhanced to form new *kels* during social interactions or knowledge processing.

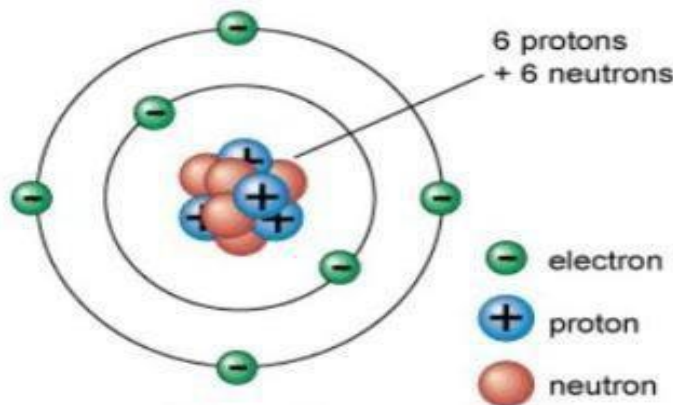


Figure 2 The *kels* in Figure 1 are comparable to atoms made up of the nucleus, electrons, protons, and neutrons. The basic building blocks or *kels* can be shared and enhanced to form other knowledge elements. As much as the structure of atoms is altered in chemical reactions, the structure of knowledge is altered, modified, truncated, or even eliminated by actions, words, or dealings in human environments.

III. MODULES OF KNOWLEDGE AND MOLECULES IN CHEMISTRY

In most stylized interactions, *kels* adopt a formal approach depending on the syntactic and semantic setting for the interaction. In a computation environment, the protocol is essential for any interaction between machines.

² Carbon atom is chosen as an example, but any element that forms molecules and compounds exhibits similar properties and traits.

In a human environment, etiquette and customs define the modality and success of the exchange of information and knowledge. The typical behavior of a *kel* is shown in Figure 3 but the formality of the process ($no * vf$) is retained in most settings.

When *kels* interact with each other, new knowledge is created by the syntactic and semantic rules that led to the interaction. The result also becomes a part of the incremental knowledge generated by humans and/or by knowledge-based *KEL* machines. This naturally or artificially generated new knowledge can be generated in simple or in complex chains of interactions. Figure 3 depicts various circumstances for the artificial generation of new knowledge as single and/or multiple noun objects interact.

For example, two hydrogen atoms can form a molecule in the simplest case. Hydrogen and oxygen can combine as H_2O , H_2O_2 , D_2O , D_2O_2 , etc. in various convolutions. Biological and genetic cells are formed when numerous elements interact. See the left column in Figure 3.

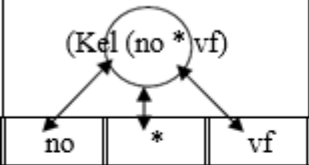
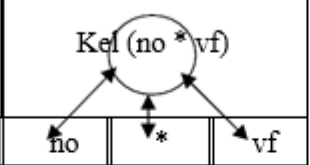
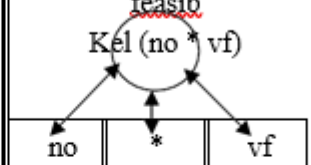
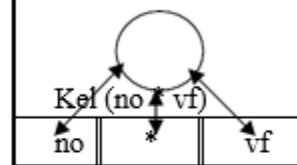
Simple kel like an atom	kel12 all kel_{ij} 's cases	kel ijk all kel_{ijk} 's are also	Complex kel_{xyz} etc. $kel_{xyz} = \sum kel_{ij}$
			
(i) Quantum kel = knowledge cell comprising of knowledge when noun object acts a verb function vf in a specific convolution *.	(ii) $kel_{12} \rightarrow kel_1 + kel_2$ $no_{12} \rightarrow no_1$ and no_2 $*_{12} \rightarrow *_1$ and $*_2$ $vf_{12} \rightarrow vf_1$ and vf_2	etc. ... etc. etc.	etc. etc. etc.

Figure 3 The chain of new knowledge structures is generated when a basic *kel* (such as the knowledge in an invention (e.g., 2-D computer memories)) starts to interact with other *kels* such as 2½-D memories leading to the Architecture of 3-D memories. Numerous other examples also exist such as the discovery of Penicillin by Fleming has led to the development of other specific chains of antibiotics, and such as the invention of the IC engine has led to the turbocharged automobile engines, etc.

Knowledge space encompasses physical space as much as memory time spans real-time and as much as perception spans cosmic time. The order of complexity of knowledge space is greatly enhanced because every noun-object, verb-function, and their combination are unique to the quantum of knowledge being pursued and the human being processing it. Moreover, the psychological and mental coordinates of space and time are socially and culturally variable.

Organization and context become the basis of all the elements and *kels*. Both display and contain the mechanisms of how and why elements and *kels* may be useful/useless and in turn contain a utilitarian/dysfunctional value of either element or *kels*. For example, the organization of the carbon atom makes it amenable to numerous useful chains of foods, and derived compounds; whereas Argon or Arsenic has a potential non- or dis-utilitarian value.

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Hence, it becomes necessary to limit the definition of kuantum to a –sensible size and to be practical locations in setting the object size of the kuantum, the size of the verb function to be discernible, and the type of convolution (*) to be in the realm of human comprehension. Only the unique combination of these three–kuants constitutes the *kels* in its particular setting at a given instant ‘t’.

Initially, the kuantum of knowledge can be limited to the most useful noun objects and verb functions. Two examples follow. In a down-to-earth format, a kuantum of knowledge can be stated as (food (n), eat (v), restaurant (x, y, z), date, and time (t)). At the other extreme, a cosmic kuantum can be stated as (spaceship A (n), explores (v) and coordinates- Planet B (x, y, z), cosmic calendar date and time (t)). The need to be practical and limit the programming complexity becomes a necessity to deal with kuantized knowledge within the realm of computation. Even so, the content of the knowledge so gathered (i.e., the food eaten in the restaurant, or the data collected by the spaceship) is not communicated in this representation. The flow of the entirety of knowledge needs more numerous smaller kuantum (*kco*’s) to be complete by the global kuantum of knowledge (or *KCO*).

3.1 Representation of the General Format of Interactions

The recent changes in the Internet age are catalyzed by gating functions in the silicon chips and wave mechanics of photons in the optical fibers. This unprecedented synergy in silicon - based computation with glass-based communication has elated human thought to new levels of intellectual activity and scientific exploration. The mental processes still hold an almost mystical execution of neural programs to mold concepts, knowledge, and wisdom with learning, behavior, and adaptation. Machines to implement such functions are just appearing in society.

Even though thought processes are associated with neural space, computational processes are associated with physical and Pentium space. These intermediate linkages bridge reality and physical spaces with the human psyche dealing with objects, their actions, interactions, and their effects. Human beings have learned to cross these spaces readily by mind and thought control, a wink, or even a gesture of the face. Such fine processes are hard, if not impossible to program in the software of social machines. Quantized knowledge between human minds and machines can be established by controlling the quantized noun objects, the convolutions, the verb function, and their timings. These four entities makeup up the computational space as the mind would alter them in the psychological space to accomplish most social functions or processes. The quantized social machine would alter the status of the elemental noun objects and their entropies accordingly. Thus, the machine could in a limited sense track, follow, and duplicate the minute mental and psychological processes of a human mind at a quantum level.

3.2 Three (Real, Mental, and Computational) Spaces of Knowledge

The impression of physical space is instilled in the human mind since its inception. Estimation of distances is an inborn skill and is evident as infants grab things. The dimensions in physical space are readily computable in machines. Mental space is acquired soon after infancy to deal with others, need-gratifying objects, environment, and self. The environment, others, and the self soon start to exert influence on the reactions and responses of children and adults, and a link between self and environment is by action (or verb function) such as an infant crying/or trying to communicate because of some outstanding need. The relation of objects in the environment, and others in the society concerning one’s self starts to play a part in dealing with the physical space, reality, and relationships.

Mental space is dominated by objects, convolutions, and verb functions. In the most rudimentary format, these three entities are constantly arranged, rearranged, formatted, and reformatted to meet and gratify the all-pervasive human needs. Needs that initiate motivation also supply the psychological and physical energy to find the means to gratify the most outstanding need at any instant time. However, objects, actions, and the convolutions that bind the two together all play a seminal role in how and how well the need is gratified.

Human perceptions can encompass objects large as cosmic objects and continents or as small as electrons and photons. The range of variations can become too immense for the mind or machines to comprehend or process all variations, all at once. To seek a solution within the rational mind or by a programmable machine, we suggest that the solution to any given problem specify that bounds for (*no*’s, ***’s, and *vf*’s) to a range that the mind may offer a satisfactory solution and the machines may offer an optimal (or at least a near -optimal) solution. Quantization of (*no*’s, ***’s, and *vf*’s) within the range thus becomes feasible.

The association between (noun) objects (who), verb functions (what), and their convolutions (of social relations how) gets associated with needs (why) in the mind of infants and adults alike. The association with time (when and how long) is generally associated with now and as long as it takes. These linkages are also formed in the minds of infants since time is now and how long depends on the

gratification of the need (why). The mental space forms the basis. Social objects traverse these mental spaces like clouds in the sky where some major need gratifying objects (such as parents, schools, universities, jobs, etc.) retain permanent coordinates with all six questions answered (at least partially) in the hyperdimensional spaces in the mind. Such mental associations can be reworked in computer systems like telephone numbers are worked into switching systems that provide channels of communication in networks. A scientific model becomes essential and mathematical relationships become necessary to optimize the chain of need(s), action(s), and response to gratify such needs. More than that, in a social setting, socially acceptable norms play a part and culturally variable factors make the programming of social machines more demanding than the programming of plain old scientific computers based on already optimized mathematical algorithms.

3.3 Statistical Properties of *kels* and *KCOs* and their Influence

Kels resident in human beings for long periods substantially shape the personality of the host. For example, a human being (*no*) with a subject matter-specialty in physics and teaches (* and *vf*) it for decades, becomes a physics teacher (a larger *KEL* or *KCO*). Other positive examples [3,4] are also evident. For this reason, the evolution of a *kel* to a *KCO* becomes evident in almost all circumstances and numerous situations. In the case of inanimate *kels*, petroleum in gasoline becomes petrol. The terminology becomes less important than the evolutionary chain of *kels* to *KELs*, and then on to *kcOs* and *KCOs*. The negative polarity of such large *KCO's* is also evident in history [5,6, and7] and leaves behind significant impact on society and culture. During the cultural evolution of any nation, the social influence of positive and negative leaders coexists, and it causes ripple and noise in the society that is reflected in the statistical image knowledge profile. The dynamic nature of knowledge in every nation, society and time is the result.

Complex *Kel's* in large associations with other *kels* have a high "utility (or dis-utility) functions". For example, a highly sociable person or a subject matter expert will have higher utilitarian value than an introvert or a high school student. Such human *kels* can be classified according to their expected contribution to the welfare of society. The highly valuable *kels* also at the top of a hierarchical structure gratify the most wanted human needs within the society. Such needs have been classified (as in Maslow's Need Pyramid [1] or by Ahamed [10]). The *kels* that gratify these human needs also can be rearranged accordingly. The *kels* that satisfy the realization of social, and ego needs humans and societies will have their highest *kel*- utilitarian value.

IV. CONCLUSION

In this paper, we have delineated the similarity between knowledge science and Chemistry, wherein the elements in nature provide a blueprint for the elements of knowledge and their behavior. Short and long, simple and complex strings of knowledge centric objects are generated by the type and quantity (or quanta) of knowledge (the noun objects, the verb functions, and their convolutions) in various subjects, disciplines, conversations, cultures, and societies. Such chains can be cascaded up or fragmented down to get to the very essence of knowledge. In either extreme case, the limit of human understanding is reached since knowledge is infinite and comprehension is limited. Knowledge is amenable to the science of morphology to fragment and modularize. Knowledge is also amenable to the science of integration, reconstruction, and reconstitution.

The fragmentation and segmentation on the one hand, and then integration and reconstitution have basis two social flavors. On the positive scale, the knowledge elements that form complex chains of larger socially beneficial knowledge-centric objects reward the environment that hosts them. On the other hand, such elements constituting the formation of larger socially destructive structures harm and hurt society. Innumerable examples exist in any society and culture.

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