TOWARD A TRANSDISCIPLINARY FRAMEWORK OF THE FIELD OF STUDY OF COMMUNICATION BASED ON THE CYBERSYSTEMIC APPROACH

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At the beginning of the twenty-first century, the academic field of study of communication has been related with "the expansion of understanding and observation of the processes of communication, cognition and information, not only with the synthesis or integration. The focus is to observe the differences and similarities between information, cognition, meaning, intelligence, mind and communication and proposing an integral synthesis for the communication phenomenon.

The aim of this paper was to build a unified framework for understanding the concept of communication in the physical, biological and human domains, through their systemic interrelations.

The Cybersystemic approach helps to elucidate differences and similarities in the systems of knowledge that involve the communication phenomena. Systemic design research integrates and organizes existing knowledge through Systems Sciences principles.
From an exploration review, this paper presents a systemic framework for the study of the communication phenomena under the outline of its holodynamic evolutionary process toward a higher level of complexity of an integrated communication phenomenon.

Research provides a starting point toward a unified understanding of the communication phenomena, under a conceptual approach that describes and explains a broader definition.
As a result, the cybersystemic framework allows an open dialogue through a multidisciplinary language of Systems Science and toward a better understanding the concept of communication[1].

Keywords: Cybersystemic, Communication Theory, Systems Science

[1] Some of these ideas are presented in the ISSS, 2016 Meeting as a research paper titled: *A Communication System for Socio-Ecological Processes*.

1. INTRODUCTION

The focus of the research is to re-examine the field of study of communication, under a broader multy and transdisciplinary systemic vision. One of the objectives of the Cybersystemic approach is to explain the phenomena of communication in the interrelated physical, biological and human domains. Furthermore, we aim to represent the phenomena with a reconstruction of the communication concept, based on isomorphic similarities, which characterize the concepts of 1)information, 2)meaning, 3)understanding, 4)knowledge, and 5)consciousness. The purpose is a meta-explanation or transdisciplinary point of view of the communication phenomena under the *Cybersystemic approach to the Communication System*. The Cybersystemic approach includes a framework of the organization of living and social systems (Greg Miller's *hierarchy of systems*); a holodynamic systems point of view toward a theoretical synthesis named *groundwork for integral thinking* developed by authors such as Teilhard de Chardin, Erwin Laszlo, and Ken Wilber. It is developed under the framework of First (Wiener, Ashby) and second-order cybernetics.

The Cybersystemic approach explains communication as a process of interrelated systems (environment, observed and observing) based on the evolutionary or holodynamic approach. The communication system is an essential component of the emergent-evolutionary process. The principles and levels of complexity are related to the domain of knowledge. Each domain of knowledge establishes that communication is an exchange process (matter-energy, information) that generates complex results such as intelligence, knowledge (in physical and biological entities) or meaning/understanding and consciousness (in human entities).

A transdisciplinary approach can provide aid with a meta-explanation linking different types of relations between complex systems processes oriented toward the emergence of intelligence, knowledge, communication, and consciousness.

In this paper, the design of the evolutionary process for the evolution of the communication system was influenced by the unified systemic approaches of Popper, Brier, Bawden and Nicolescu.

1. Popper's Tetradic Evolutionary Epistemological Model on Knowledge
2. Bowden's evolutionary approach to information (2007)
3. The Cybersemiotics approach of Søren Brier (2015, 2013[a], 2013[b], 2001, 2003, 1999)
4. Transdisciplinary Cybersystemics Nicolescu (2010)

2. EPISTEMOLOGICAL MODEL OF POPPER: BRIEF DESCRIPTION

Based on this holodynamic model and understanding of complex systems, when we apply the transdisciplinary form of knowledge, we attempt to define ideas about the subjective and objective approaches to knowledge under a pluralistic vision. Popper's vision presents a basic question about the problem of knowing, namely: How does our knowledge increase? According to Popper's trial-error method, the first stage is the identification of problematic situations; in a second stage, there is an attempt to build a theory to solve this problem. After those initial stages, a permanent process of elimination of errors begins, together with a critical discussion toward a satisfactory result[2]:

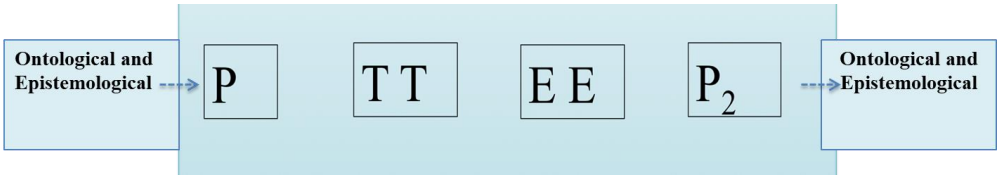

Figure 1. Popper's Tetradic Evolutionary Model on Knowledge[3]

Popper's process of knowledge (Figure 1), w also can explain some of the principles of knowledge in Systems Science. A system can be understood as any portion of the known universe, under objective and subjective approaches. The system has been intellectually selected from the rest of the universe for the purpose of considering the different changes that may occur within that portion of the universe, subject to conditions, organizations, cultures, structures, processes and environments (Warfield, 2003).

A basic systems review based on Popper's vision of the three world's model shows a structure of phenomena under ontological and epistemological points of view.

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[2], For example, a communication problem like the one presented in our study is an epistemological problem (conceptual problem), but when we localized examples in the nature of the phenomena of communication we look for an ontological problem (Where is the communication? What is communication? Where do we find communication?).

[3] P: Problem; TT: Tentative theories; EE: error elimination; P2: Problem result or problem two.

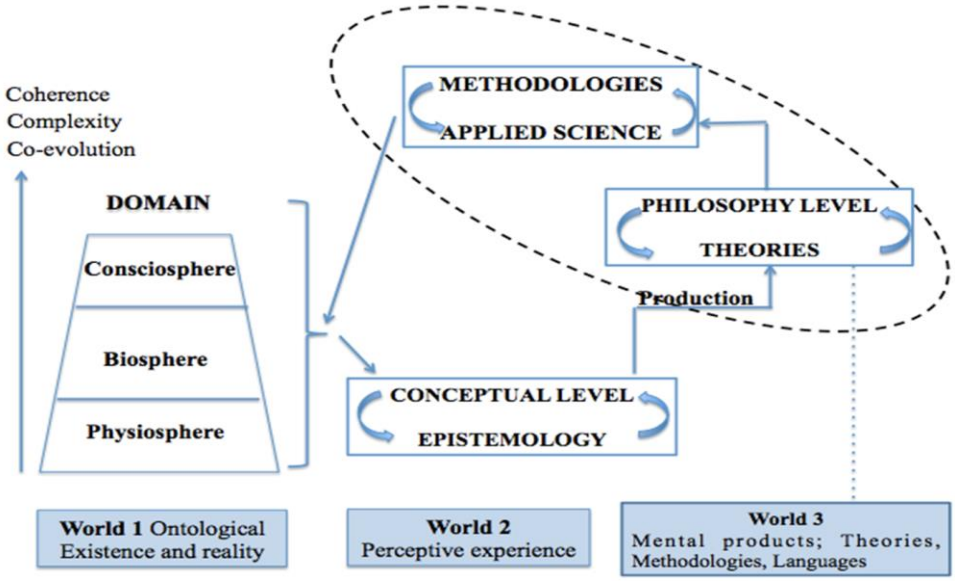

Figure 2. Epistemological model of Popper Expressed in a simplified Systems Science structure

Figure 2 represents the simplified epistemological and ontological model of the structure of Systems Science; it includes World 1 of ontological existence, World 2 of perceptive experience, and World 3 Mental products.

That structure of System Science considers that systems include components or subsystems and their dynamic relations; this can be called a simplified structure that characterizes complex phenomena under objective and subjective approaches.

A transdisciplinary approach is recommended for a big diversity of theories and methodologies with a logical order in all of their components and interrelations, which help us to build different forms of knowledge:

3. TWO SYSTEMIC APPROACHES TOWARD AN EVOLUTIONARY AND INTERDISCIPLINARY INTEGRATION OF A COMMUNICATION SYSTEM.

These two advances in communication theory could be understood as systemic approaches. The first one belongs to Bawden (2007) with an evolutionary framework of information theory. On the other hand, Brier (2015) not only explains information, but also communication, cybernetics, semiotics and knowledge. The two approaches are a synthesis of cybernetics and semiotics as a framework for the study of communication and are the foundations for the proposal to be put forward.

3.1. Evolutionary approach to information theory by Bawden

Bawden (2007) explores a unified view of the information phenomena. His unified framework suggests an evolutionary model of organized complexity in physical domains, the notion of meaning in the biological domain and the meaning or understanding associated with the domains of human knowledge.

Bawden's 2007 proposal is an effort to outline a unified framework for understanding the concept of information in 3 different domains: the physical, the biological and the human. The author seeks the possibility of linking the different approaches of the information theories of knowledge to re-examine the information science discipline. The objective is to study the information theories under a broader context. According to Bawden, it is possible to identify what links the three domains of knowledge in regard to information, observing it as *a law of emergent self-organized complexity, applicable in all domains* (Bawden 2007: 307).

Bawden review of knowledge built under the *science disciplines approach,* as a form of knowledge that is dependent on the fundamental nature of concepts with which they deal: (i) mathematics; (ii) physical sciences; (iii) human sciences; (iv) literature and the fine arts; (v) morality; (vi) religion; and (vii) philosophy[4], -*in this sense, it seems clear that the information disciplines are best regarded as a field of study, the focus of which is recorded information*- (Bawden 2007: 309).

Once you point the way to how information phenomena is conceptualized, it is possible to distinguish the divergence between different points of view in a multi and interdisciplinary field of study. This problem can be observed in many areas of science such as Mechatronics, Engineering, Administration, Computing and Information, or Medicine (for example modern medicine requires biology, chemistry, anatomy, osteology, among other disciplines). The disciplinary fragmentation and specialization in science have left open several fields where it is not clear which are the threads that allow integrating the knowledge of such fields. According to Bawden, the concept of information appears linked to diverse domains of knowledge (physical, biological and human), specifically, the author wonders if the use of different concepts is a word problem, or whether, a closer link exists between the different meanings of the diverse scientific domains. This opens up an opportunity to think about a general information theory as a link between all the scientific disciplines, based on the fundamental capacity of the world at various information levels. This approach leads to summarize the concept of information in 3 different domains: the physical, biological, and human.

[4] "Hirst also recognizes *practical disciplines*, based on one of the sciences, but oriented toward solving practical problems. Engineering, for example, would be a practical discipline based on the form of the physical sciences" (Bawden, 207: 309).

Table 1. A framework of Informational Science based on Bawden, 2007.

Physical Domain	"Information exists. It does not need to be perceived to exist. It does not need to be understood to exist. It requires no intelligence to interpret it. It does not have to have to mean to exist. It exists" (Stonier in Bawden, 2007). Information is a fundamental feature of the universe as a matter-energy or the entropy and some aspects of quantum mechanics or the study of self-organised systems (p. 310-312).
Biological Domain	The central understanding of information en biological sciences is the origin of life "is the initiation of information storage and communication between generations". The difference is the emergence of an organized living cell and all the process associated with that: Nutrition-Metabolism, self-organization, and reproduction. All of this in a context of evolution in terms of biological information "by which biological information is coded, stored and transmitted within the living system" (p. 316). This allows a transition to information in human domains as a meaning in a context which gives rise to consciousness.
Human Domain	Explain how organized complexity and the meaning in context (Phi-bio domains) make its emerge understanding, "In addition "we have conscious participants with an internal mental comprehension of knowledge and an ability to make it explicit." (p. 316). Two models allow understand this organized complexity of human mind: (i) "a model of knowledge and related concepts as closely related entities which can be transformed into one another, outside the human mind; (ii) knowledge as something intrinsic to, and only existing within, the human mind and cognition (…) Information is then regarded as the objective – and therefore communicable and recordable – form of knowledge." (p. 317).

Bawden understands information as a principle of organization, not only in non-living matter (including energy), but also in a living being (or its constituent parts); and understanding-knowledge of living things. This will link information-organization-knowledge-meaning-understanding as an emergent process of self-organized complexity. Evolution will explain 3 different origins: the universe, life, and consciousness.

3.2. Cybersemiotics approach on information, communication, meaning and knowledge by Soren Brier.

We will take up some perspectives as Cybersemiotics work on the relation between information, at the level of matter and energy; and meaning and cognition in all living systems.

The concept of information is a central point for a diverse field of studies in science. Information can be used to explain physical and biological natural phenomena. Although misunderstood within the social sciences, after moving from the field of machines to the field of human systems, information has been treated as a universal concept that could encompass *subjective experiential and meaningful cognition -as well as intersubjective meaningful communication in nature, technology, society and lifeworlds* (Brier 2015).

According to Brier, the main problem is to decide which epistemological, ontological and philosophical framework of the concept of information is adequate for the integration of the different scientific domains. Søren Brier made an effort to explain the role of information in nature, mind, culture and life. It can be problematic to use an epistemological principle that comes from mathematics to explain another type of processes like the meaning or the knowledge related to the operation of the human mind. Hence, his orientation toward the use of a semiotics and biosemiotics framework, help to explain aspects related to living systems. Søren Brier (1999b) proposes a synthesis with which to observe the differences and similarities between information, cognition, meaning, intelligence, mind and communication and proposing an integral science of information. Each of these concepts is firmly explained in modern science, but it is not common to build a synthesis for the communication phenomenon. Søren Brier (1999a) outlines that his proposal is based on the Biosemiotics, that links first order Peircean semiotics with second order Cybernetics (SOC), and Information Sciences:

Table 2. Cybersemiotics levels of Søren Brier, 2013

Five-leveled Metaphysics	Peirce´s Semiotic
1. - Primary chaotic level (quality, potential).	Firstness (From Peirce Semiotics)
2. - Level of matter-energy and causality by natural forces.	Secondness (From Peirce Semiotics)
3. - An informational cybernetic system level of quasi-semiotic.	Informational cybernetics
4. - The semiotic level belonging to all living systems.	Biosemiotics
5. - The level of conscious language using systems.	Humans

The five metaphysical Cybersemiotics levels include (Brier 2015: 7):

1. "The Physiochemical part of the natural world that also constitutes the pure material-energetic aspect of or body primary chaotic level;
2. Our embodiment as the source of life of natural systems, which we share with other living species. It is a product of ecology and evolution, but also formed by cultural practices.
3. Our world of feeling, will, drives, affects, and thoughts, manifested as mind, consciousness, and self-consciousness. We think it is partly produced by our embodied nervous system and formed by culture, most strongly throughout our childhood. So far, we have not managed to reduce this experiential world to brain physiology. The felt self is not the same as the physiological model we call *our brain* (Mcginn, 2000; Brier, 2013b), an information cybernetic system.
4. The semiotic level belonging to all living systems, or biosemiotics.
5. The cultural world of conscious language, meaning, power, and technology, such as the informational machines we call computers. Language, pragmatically viewed, connects our perception with our thinking, communication, and acting in a social world."

According to Søren (2015), each of these worlds corresponds to a type of reductionist narrative. This way of organizing and defining interdependent fields like the material-energy, information, life, consciousness, and meaning generates a dissociation with the immediate reality. In spite of this, the experience is not interdependent, on the contrary, the

knowledge of reality depends on the interrelation of all those levels; four main areas of knowledge integrate the Cybersysemiotic model: 1)Living systems; 2)Experiential Consciousness; 3)Matter/Energy; 4)Social Meaning (Brier, 2015: 8).

> "The Cybersemiotic view thus organizes the sciences and humanities differently from anything that has been done before through Peirce's semiotic philosophy in a combination with Luhmann's system theory (Brier, 2013a, b, c, d).In Briers' words, *My suggestion for finding a transdisciplinary commensurable framework for all Wissenschaft is to start in the middle, with our daily lived semiotic, social, and linguistic practice* (Brier 2015: 7).

This work establishes that all the sign processes exist in different types of knowledge, which transcend the division between nature and culture; natural science and sciences of life, social science, and humanities. Related to the two previous proposals, the one following is a framework of the transdisciplinary study of the communication system.

4. TRANSDISCIPLINARY AND EVOLUTIONARY CYBER-SYSTEMIC APPROACH ON COMMUNICATION SYSTEMS.

Communication as a scientific discipline has been observed under different perspectives, according to Vidales (2012). Two of the most important perspectives in the twentieth century are: the systemic one, with mathematics, information theory, first and second order cybernetics, and the interpretative traditions (semiotics, hermeneutics, and phenomenology). From first and second order cybernetics and evolutionary systems and transitions it is possible to establish four general domains in which is possible to understand the relation between systems in the Physiosphere (non-living matter), the Biosphere (living matter) and in Consciousness (mind) and its transcendent integration at a higher level. These are the unified views on *transdisciplinary approach on communication and evolutionary perspective on dynamics and complex systems.*

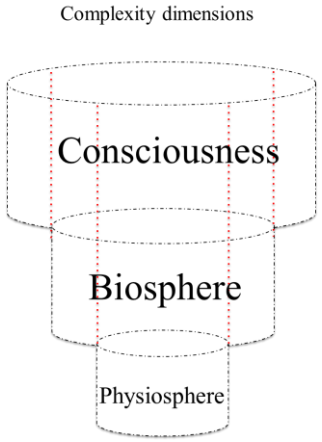

Figure 4. An illustrative diagram of transdisciplinary holodynamic model steps based on Wilber (2005, 2012).

From the broad holodynamic integrative proposal of Wilber (2005), a transdisciplinary review with four major areas of knowledge are identified:

1. The first one describes basic laws of non-living matter; the fundamental laws that govern the cosmos and the elementary particles from which all the matter-energy of the universe is composed, from quarks (Gell-Mann 1995) to galaxies.
2. The second one describes the origin, evolution, properties, and relationships of living things and their natural world. The study of biological systems, their classification, organization, chemical constitution, functioning, reproductive capacity and their interaction with the environment from cells to ecosystems.
3. The third one describes conscious human beings and their civilizations: its individual and collective behavior, its mind and consciousness and all of the social, historic and cultural forms of the organization[5].
4. The fourth one describes the deep transcendent approach of philosophies and religions.

In a general sense, the comprehension and interrelation of these four domains focus on the study of subatomic particles, atoms, molecules, subcellular structures, cells, tissues, organs, apparatus and systems, individuals, populations, communities, ecosystems, biosphere, planet earth, solar system, galaxy, universe, and transcendent approaches to knowledge.
In Figure 5 the model describes the new attributes at each new emergent level of complex systems as a result of a holodynamic evolutionary process, in which the constitutive properties of the subsystems remain, and new synergetic properties emerge in the open co-evolutionary transformation process. This emergence process also means, that communication as a whole, is not only an interactive process but also a complex organizational networking system of systems between physical, biological and conscious systems at and between different holodynamic levels.

The Cyber-systemic approach is the relation between the Science of systems and first and second order Cybernetics. In the science of systems, in order to understand reality, it is necessary to first understand three entities: Context, Systems (open and closed) and Models.

[5] The human domain can include the development of communication as the main originator and recipient of the communicative process for which will be described another future publication.

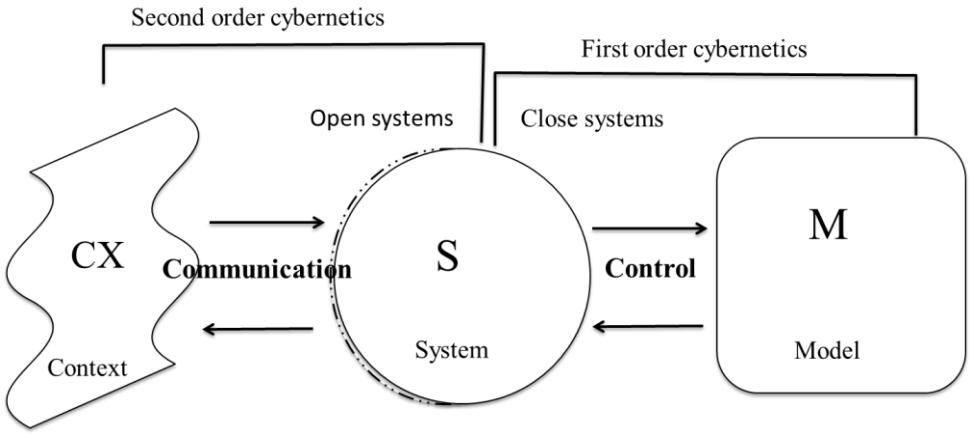

Figure 5. Cybersystemic organization on control and communication based on Beer (1985)

The science of systems has designed taxonomies of many types of systems, at different levels of complexity and consciousness (van Gigch 1990). Identifying the similarities between different levels of the reality in which the communication phenomena exist. The systemic taxonomies are a model of the different levels of the complexity of every type of system. The level of complexity is linked to the interactions of the components at each recursive level of the holodynamic taxonomy model, it can explain the dynamics, characteristics, functions, properties and internal and external relations that define the identity of the level of complexity of each system at different stages of its evolutionary process.

The scope of such an approach is derived from the General Theory of Systems (GTS) (Von Neumann, 1948, Shannon, 1948, Wiener, 1948, Ashby, 1956, Boulding, 1956, and Wilber, 2005); a classification with 10 levels of complexity:

Table 3. Framework of hierarchies' levels in systems

First level. **Static structures.** **Second level.** **Simple dynamic system.** **Third level.** **Cybernetics systems or control systems.**	**Physical Domain**
Fourth level. **Simple open living systems.** **Fifth level.** **Plants.** **Six level.** **Animals.**	**Biological domain**

Seventh level. **Individual human systems.** **Eighth level.** **Social organizations.** **Ninth level.** **Transcendental systems (also included in Ken Wilber, 2005).** **Tenth level.** **Ecological systems (also include in the taxonomy of Ken Wilber, 2005).**	**Conscious human Domain**

To better understand a broad communication system for all complexity levels it is necessary to study the dynamic evolutionary process of all types of systems, and their gradual emergence in time, at growing levels of complexity and consciousness, or organization (Teilhard 1963; Wilber 2005). In summary, the evolutionary approach toward complexity, or complexification is a holodynamic description of the transformation process of all types of systems toward integrated ecosystems, the biosphere and Gaia (Peón, 2015).

RESULTS

The design of the evolutionary process for the transformation and understanding of the communication system was influenced by the unified systemic approaches, or worlds of Popper, Søren Brier, Bawden and transdisciplinary Cyber-systemic

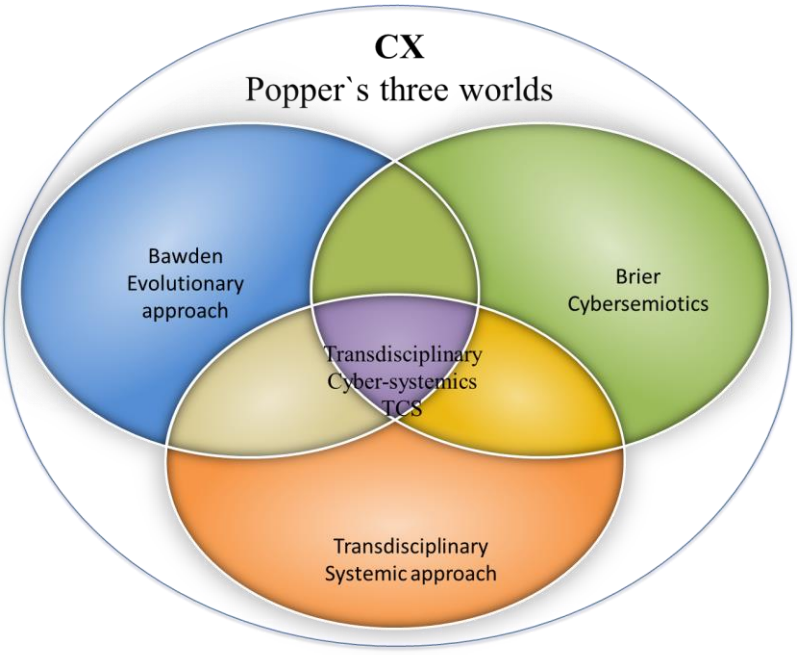

Figure 6. Transdisciplinary Cybersystemics (TCS)

Figure 6 is a representation of an integrated design of the evolutionary process for the transformation and understanding of the communication system, influenced by the unified systemic approaches, or worlds of Søren Brier, Bawden and Nicolescu. It is also a transdisciplinary approach to knowledge under Popper's three worlds context (CX). The synthesis of this will be explained in the figure 7.

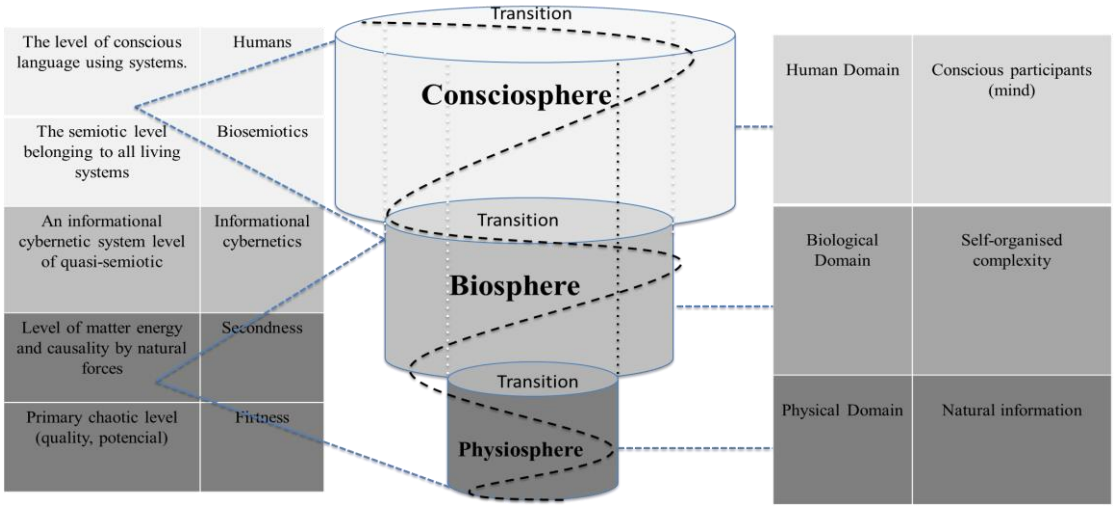

Figure 7. The groundwork for integral thinking four domains of knowledge based on Wilber, Brier, and Bawden.

Under the influence of those worlds, our research is oriented toward the holodynamic transformation of the communication at different organization levels of complexity. Under the Cybersystemic approach, the communication system encompasses non-living systems, living systems and conscious systems and their multiple and varied eco-systemic interrelations (Peón 2015). Its functions operate through the variety (Ashby 1951) of possible states, depending on the level of observation in its holodynamic levels of operation. In the higher or complex domains of human and organizational levels, the communication system has a great quantity and variety of entities and non-linear relationships, i.e. brain-mind. Communication as a phenomenon is present in all the domains of knowledge, it doesn't have *a priori* existence but is a phenomenon resulting from the natural or artificial interaction of various entities of material, energy and informational order.

Based on the broad scope of the transdisciplinary or universal form of epistemological knowledge, the study of the communication system includes different dimensions of knowledge such as energy fields (gravity force, electromagnetic force, weak and strong nuclear forces), biophysics, biochemical, conscious, non-conscious. It also includes the ontological domains of knowledge based on experiential and contextual knowledge of communication and cultural pluralistic approaches which also include the natural ecosystem, and human civilizations. Using a metaphorical description, the communication

system is a like a glue that connects different types of concrete and theoretical entities, a bridge that transcends the different domains of knowledge. In the holodynamic evolutionary process toward systems with a higher degree of organization or complexity, synergic links are established among different kinds of complementary systems, between the domain of a transdisciplinary form of knowledge as a bridge between different cultural perspectives, and beyond them in real-world systems.

If reality exists as an interconnected whole is possible to see the interaction between entities that allows the existence of communication. From this point of view, a holos is a nested system with the necessary fundamental principles that allows us to understand their laws, habits, patterns or trends. The dynamic evolutionary approach to the communication process links the physical, biological and cultural domains from simple to complex states of structural unity.

Figure 7 shows in the left column Soren Brier proposal on Cybersemiotics and its recursive levels; in the right column is Bawden evolutionary approach on information. In the middle column is the transdisciplinary evolutionary Cybersystemic or holodynamic approach on communication and his relations with Brier and Bawden.

Figure 7 also describes a holodynamic process where new systems with emergent identities and properties emerge with each new evolutionary jump toward a higher level of complexity and consciousness as a result of the communication dynamic. Each new stage of knowledge in the communication system describes the level of variety or complexity of each emerging system in the physical, biological, and human domains, in their ecosystemic relationships and beyond them, at transcendental levels.

In the Physical systems level different energies (strong, weak, electromagnetic, and gravity) link entities, from the smallest (quarks, leptons, bosons) to the broadest (galaxies), because these functional relations are understood as communicative processes. According to Martinez (2012), the particles (sub-atomics and atomics, and gravitational forces) are in constant movement (orbital, vibratory).

> *There is a certain type of message that is continually reaching each of the atoms, which assures them that they are not alone because they are chained together forming a spatial structure. Each of the atoms is in a very definite position as a result of the exchange of information that tells them where the other atoms are at any time and what attitude they should take in case they change position*.
> (Martínez 2012: 69).

In the biological or organic systems, the relations, processes, and entities are more complex for one reason: the biological systems are adaptive systems (complex adaptive systems)

with the unique ability of learning (Gell-Mann, 1999, 36). The evolution has allowed a high degree of integration, i.e. an organism has the capacity to solve problems through learning. According to Gell-Mann it is necessary to understand two things: (i) The complex adaptive system has biological evolution schemes resulting from real world systems experiences; (ii) Every type of organism embodies these evolutionary programs.

Finally, these points of view integrate cognitive, perceptual and emotional information in a complete set of interactions, analogous to a cell function. Apparently one of the principles that are observed in all the systems that allow the integration is its innate capacity to generate orderly energy or to possess a structure that allows to capture and use it in more complex forms (as described by Schrodinger, 2014, under the negentropy concept). Every time a series of entities becomes organized with a goal of interrelation or interaction, a new system with a different structural identity and a higher degree of complexity emerges through a synergistic process of integration, that is what we call communication and it is presented in all domains of knowledge and reality.

CONCLUSIONS

The understanding of the evolutionary interconnection process is essential for the comprehension of the communication systems at all levels of the holodynamic integration between all types of systems. The structural integration of the structural identity of systems or autopoiesis explains the phenomena of self-production and self-organization at recursive levels; in each level of higher complexity, there is an emergence of properties. Reproduction, purposiveness, adaptation, cognition, even survival are epiphenomena of the autopoietic organization of living and conscious systems. Allopoietic systems, by contrast, produce something other than what constitutes them. Designed for a purpose, artifacts like automobiles and factories produce something needed elsewhere" (Krippendorff 2009: 288).

A self-organizing system as a communication in all the domains of knowledge (Physical, Biological and Conscious) through the permanent evolutionary dynamic can develop structural autopoietic identities and sustain them under the changing conditions of their evolutionary environment or context.
Ashby's law of self-organization identifies three properties: (1) Circular networks of recurrent communication that stabilize such systems while (2) internal variation ensure their ability to move from one level of stability to another, in the course of which (3) *communication becomes increasingly orderly and resistant to outside intervention* (Krippendorff, 2009: 287).

As a synthesis of Wilber holodynamic model we present five principles for the understanding of the communication system:

1. The reality that exists is composed of holos as an evolutionary dynamic or nested holodynamic system.
2. The system has four basic capacities of its cycle of life: self-preservation, self-adaptation, self-transcendence and self, life cycle.
3. The system operates on a principle of a recursive function as a complementary synergistic interaction (Watzlawick 1971) where you can see the different levels of complexity or variety (Ashby 1958).
4. It has the capability of emergence (morphogenetic equilibrium capacity, or evolutionary mutation toward higher levels of complexity and consciousness in a dynamic environment.

The communication systems enable a holodynamic interaction and evolutionary process toward systems with a higher degree of organization or complexity; Human communication (consciousness) as varying degrees of complexity depending on how they interact in the real world. The unified Cybersystemic of communication is an approach to the theory (Figure 3), and application of the communication system.

According to the complexity level, unified interactive Cybersystemic communication can be applied in technological systems as control and automation processes. It is also present in the homeostatic and morphogenetic or mutation processes of open living systems and in conscious organizational systems, and in multidimensional processes of control, adaptation and innovation in complex organized systems.

The holodynamic communication framework describes the complex nature of reality, as a composed of holons, it means systems of elements, processes, totalities or parts, composed of wholes/parts. It explains totality at a particular recursive level or dimension of other totalities in each emergent holos dimension.

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