LIVING SYSTEMS SCIENCE? THE SECOND FOUNDATIONAL ELEMENT pdf

1: Living systems - Wikipedia

Linking brain science and educational research, generative leadership is an innovative approach that taps into an organization's collective intelligence to spur purposeful action and produce effective solutions.

The Foundations suite of courses forms the broad base of technical, scientific, and social scientific knowledge that is a hallmark of ISAT students and graduates. Issues in Science and Technology: This sequence of five courses ISAT , , , , and engages students in the practice of science, both to motivate and to provide an understanding of science and technology in the context of important current social issues. Current areas from which issues are selected are living systems, the environment, modern production, internet networking and security and energy. This sequence of five courses ISAT , , , and provides students with basic methods and tools for understanding and analyzing problems in science and technology. Subjects are taught in an integrated manner with applications as the unifying factor. Topics include calculus, elements of the physical sciences, statistics, project management, the computer, knowledge-based systems, and instrumentation and measurement. Social Context of Technology and Science: This two-course sequence ISAT and introduces the student to the broader issues encountered in science and technology problem-solving, particularly social, ethical, economic and legal issues. Together, this series of courses provides a broad and robust foundation for more topic-specific content in upper-division courses. Taking the Foundations sequence also gives ISAT graduates the flexibility to change careers and gain expertise in new areas more easily than their peers. In the first two courses and , students learn and apply systems thinking methodology to investigate, define, and describe complex problems. The five Issues courses follow the ISAT philosophy by teaching important scientific concepts and content in the context of the real-world issues our society faces. Environmental Issues in Science and Technology ISAT teaches chemistry, biology, and statistics through an exploration of problems like climate change and acid rain. Biotechnology Issues in Science and Technology ISAT is a life sciences course that gives students the opportunity to do hands-on laboratory work and learn about challenges like genetic engineering and infectious diseases. The two sophomore-level Issues courses focus more on the physical sciences. Energy Issues in Science and Technology ISAT teaches core scientific concepts in physics as they relate to energy production and use, including an exploration of renewable energy and energy efficiency. Students study the design and implementation of wireless, and wireline networks and services. Knowledge of the social context is an essential tool for practicing technologists and managers because purely technical solutions almost never wholly solve the problems that they face in their daily work. Thus, social context courses provide very practical information that enables ISAT graduates to excel after graduation. Studying social context also raises broader questions about the appropriate role of science and technology in our society. It challenges students to think critically about the decisions we make about science and technology policy, appropriate use of technology, ethics, the nature of scientific and technological knowledge, and the challenges posed by the rapid evolution of science and technology in the context of a shrinking globe. Each of the courses has a laboratory component where students investigate real-world applications of concepts learned in the classroom.

LIVING SYSTEMS SCIENCE? THE SECOND FOUNDATIONAL ELEMENT pdf

2: The Periodic Table of Elements | Chemistry | Resources | Visionlearning

ater is the foundational element The second key element of this living systems. Knowledge of the dielectric.

Thank you very much for this fantastic, thought-provoking comment. I enjoyed reading your blog post. First, I agree that there is value in providing the means to improve our ways of communicating and collaborating. And sometimes that means assessing the quality of commitments and conversations. However, you may have seen in the Humanity 4. All of these are present in organizations, too. The first three are the basic fertile conditions necessary to engage the fourth, to bring a system to full, vibrant life. But when you started to talk about the smallest component of action in organizations, I thought you were going to say the self-integrative life within the system. That, to me, is more analogous to the germ theory of microbiologists. Think about conversation-based OD methodologies like Appreciative Inquiry, that helps groups explore what is "life-giving," or the World Cafe and Open Space Technology, that invite the collective wisdom of the group to emerge and be articulated. These are powerful processes, and not because every word is tracked and assessed. They are powerful because they invite people to be fully alive in the process. When you unleash will, passion and purpose, you get amazing results, generally without any monitoring or measuring needed though, of course, supporting infrastructure is helpful. This is not a prescription for optimal health for our bodies. On the contrary, it would quickly sap the life out of a person. By its nature, life is self-managing. Sometimes this will be the case, but more often especially in situations of complexity and creativity , conversations are emergent, living processes, where ideas are generated by the group and commitments are offered in service to a convergent purpose rather than at the specific request of a supervisor. I would be nervous about a software program that locked a group into only "requester-performer conversations. And I can imagine the value of feedback about how well information and commitments are flowing through the system. The machine has to serve the people. It has to serve life. In fact I believe it is impossible. This is because the CEO is weak or does not understand the problem. Are other housing associations clamouring to find out the approach used? Do firms that are struggling in this "recession" see that they must become more effective? It, and the comments, provide a large number of topics and it is hard to know where to start. For many years I have believed that organisations are alive and that living systems provide excellent reference points for how to manage them. I think your matrix topics would fit into these areas. If I can support this initiative in any way please let me know. Would you like to share a bit here about your approach or about an example from your work? Once we have established the discussion in terms of health, there are many metaphors that can then be used that people seem to understand. Is the team conscious and coherent able to keep its integrity and purpose? How mature is it can it self organise and manage key relationships? Is it flexible and resiliant respond appropriately to key feedback and adjust? Is it able to sustain itself are the right resources available and are they being utilised effectively? I just need to figure out how to stop! In my opinion, the only way to improve "management" as a whole is to drastically improve individual companies or organisations, and publicise this, to in effect force the rest to change their ways. Of course, the root cause is the CEO, that person is in effect tolerating or even advocating bad behaviours. This strikes me as one of the root causes behind the need for a new narrative about business: Somehow the living systems narrative needs to include this group, give them a valid role in the healthy functioning of the whole. There needs to be some sort of role transition for the apparatchiks to this new mode. I suggest several possible partial solutions: Any of these would be meaningless without comprehensive process reform also, of course: Sounds like something that might be tractable by experiments led by the human capital executive within a large company that has recognized the limits of hierarchy. Michelle - is there a living systems simile for this conversion of a growth-arresting component to something more productive? This is a key component of living systems thinking the dynamic relationship part of the pattern. This is the way many managers operate -- like the ones Bob described. If my goal is most of all to achieve an end result without sufficient regard for how I got to that result - without valuing process and

relationships, without valuing and attending to the health of the system and all the people within it -- I may win the battle but lose the war. Paradoxically, I know that this is ultimately how they will grow to be able to accomplish more than if I hammered them on every homework assignment for its own sake. The pattern is the same with organizations - in your story, you attended to process and relationships more than you forced or controlled the outcome, and you achieved a better result. And along the way, the people involved were enriched and will be better contributors in the future. I think this understanding - this wisdom - is still often lacking in management. Might the living systems term be evolution? Or might it be emergence -- creating the fertile conditions for emergence to happen? There are so many juicy words and concepts related to living systems. To me, we have to offer an expanded story in which it makes sense to treat people well. Gore is that companies that operate from this expanded story do perform better and that is forcing the rest to change their ways. But in general, "the rest" are simply adopting surface-level best practices without really understanding the underlying shift in philosophy. This is a really broad and ambitious program. I wonder how this idea is received by your clients, and how it shapes their management principles and actions when they begin to look at the organization this way. And the research gives us every reason to believe that organizations truly are an emergent level of life, just as our bodies are an emergent result of the activity of our cells, or just as a rain forest is an emergent result of the activity of the species within it. Not all of my clients get to that recognition of the organization as a living system. But for those who do embrace the full philosophy, it has been a powerful formula. Leaders take on the role of host or steward. They begin to value process and relationship at least as much as accomplishment. As you suggested, they treat individuals better. You noted that some of the goals are beyond the scope of the MIX -- would you recommend that I eliminate those sections here and present just those that fit with what the MIX is about?

LIVING SYSTEMS SCIENCE? THE SECOND FOUNDATIONAL ELEMENT pdf

3: Biological and Biochemical Foundations of Living Systems: Foundational Concept 2

Water is the foundational element of life. Its high melting and boiling temperatures relative to analogs such as hydrogen sulfide are a precondition to life. The density maximum at 4Â°C makes ice float, ensuring that lakes and oceans do not freeze on the bottom.

What he found, however, was that the chemical and physical properties of the elements increased gradually and then suddenly changed at distinct steps, or periods. To account for these repeating trends, Mendeleev grouped the elements in a table that had both rows and columns. As one moves from left to right in a row of the periodic table, the properties of the elements gradually change. At the end of each row, a drastic shift occurs in chemical properties. The next element in order of atomic number is more similar chemically speaking to the first element in the row above it; thus a new row begins on the table. Thus sodium begins a new row in the periodic table and is placed directly beneath lithium, highlighting their chemical similarities. Rows in the periodic table are called periods. As one moves from left to right in a given period, the chemical properties of the elements slowly change. Columns in the periodic table are called groups. Elements in a given group in the periodic table share many similar chemical and physical properties. Comprehension Checkpoint Why does sodium appear directly below lithium in the periodic table? Sodium comes after lithium alphabetically. Sodium is similar to lithium in terms of chemical properties. Electron configuration and the table The "periodic" nature of chemical properties that Mendeleev had discovered is related to the electron configuration of the atoms of the elements. Each shell has a limited capacity for electrons. As lower shells are filled, additional electrons reside in more-distant shells. The capacity of the first electron shell is two electrons and for the second shell the capacity is eight. Thus, in our example discussed above, oxygen, with eight protons and eight electrons, carries two electrons in its first shell and six in its second shell. Fluorine, with nine electrons, carries two in its first shell and seven in the second. Neon, with ten electrons, carries two in the first and eight in the second. Because the number of electrons in the second shell increases, we can begin to imagine why the chemical properties gradually change as we move from oxygen to fluorine to neon. Sodium has eleven electrons. Two fit in its first shell, but remember that the second shell can only carry eight electrons. This electron takes up residence in yet another orbit, a third electron shell in sodium. The reason that there is a dramatic shift in chemical properties when moving from neon to sodium is because there is a dramatic shift in electron configuration between the two elements. But why is sodium similar to lithium? Electron Configurations for Selected Elements As you can see in the illustration, while sodium has three electron shells and lithium two, the characteristic they share in common is that they both have only one electron in their outermost electron shell. These outer-shell electrons called valence electrons are important in determining the chemical properties of the elements. If we picture the outer valence electron shell of an atom as a sphere encompassing everything inside, then it is only the valence shell that can interact with other atoms â€” much the same way as it is only the paint on the exterior of your house that "interacts" with, and gets wet by, rain water. Since both sodium and lithium have one valence electron , they share similar chemical properties. Comprehension Checkpoint The chemical properties of an element are determined by the number of electrons in a. Thus Li, Na, and other elements in group IA have one valence electron. Be, Mg, and other group-IIA elements have two valence electrons. The row, or period , number that an element resides in on the table is equal to the number of total shells that contain electrons in the atom. H and He in the first period normally have electrons in only the first shell; Li, Be, B, and other period-two elements have two shells occupied, and so on. A few examples are shown below.

LIVING SYSTEMS SCIENCE? THE SECOND FOUNDATIONAL ELEMENT pdf

4: Biological and Biochemical Foundations of Living Systems: Overview

Systems science is an interdisciplinary field that studies the nature of systemsâ€”from simple to complexâ€”in nature, society, cognition, engineering, technology and science itself.

These chemical building blocks are also the basis for all living organisms on Earth. While living organisms contain a number of different elements, some elements are found in greater abundance in living organisms. These elements are oxygen, carbon, hydrogen, nitrogen, calcium and phosphorus. Carbon Carbon forms the basis for all life on Earth; indeed, life forms on Earth are referred to as carbon-based life forms, emphasizing the importance of this element for life. Carbon atoms readily bond to other atomic elements, such as oxygen and nitrogen. Since carbon can so readily bond to other elements, long chains of bonds can form and provide the physical and chemical structure needed for the complex processes and structures that occur within living organisms, such as structural proteins and genetic information in the form of nucleic acids. Sciencing Video Vault Hydrogen Hydrogen is the simplest element, as its atom contains only a single proton and a single neutron. As a result of this simplicity, hydrogen readily bonds with other elements, making it an important component for the formation of living organisms. Hydrogen is the other element along with oxygen which forms water, a crucial component for most life forms on Earth. Hydrogen is also a byproduct in many biological reactions, including photosynthesis and metabolism. Nitrogen is an important element in the development of plant life, as compounds containing these elements are readily absorbed and used by plants. Nitrogen is also an important component of many proteins and deoxyribonucleic acids DNA , which is crucial for genetic material to be passed on to subsequent generations of life. Sulfur Sulfur is a major component of two essential amino acids used by living organisms: These amino acids, like all amino acids, are crucial for the construction of proteins that are used for structural stability and repair of living organisms. For example, the structural integrity of hair and feathers can be attributed to these amino acids. Sulfur is also used as a source of energy and is metabolized by some species of bacteria and other lower life forms. Phosphorus Phosphorus is used in the formation of phospholipids, a type of molecule that is a major component of the cell membrane of all living cells. Without this cell membrane, cells would not be able to develop and would not have the structural stability to form in the first place. This protective layer of phospholipids holds all the internal components of cells in place, allowing for the processes that maintain the life of the cell to take place. The phospholipid layer also protects the cell by keeping any unwanted or potentially destructive materials outside of the cell.

LIVING SYSTEMS SCIENCE? THE SECOND FOUNDATIONAL ELEMENT pdf

5: Systems science - Wikipedia

5th Grade Life Science - Living Systems This Unit focuses on transport systems in animals (respiratory, circulatory, digestive and excretory) and plants (roots, stems-xylem and phloem, leaves) and addresses the California Science Standards for 5th grade Life Science.

Not coincidentally, these elements exist in great abundance in the Milky Way galaxy and beyond. Human beings are, as a popular saying suggests, stardust. They are not distributed uniformly throughout the body, but some of them concentrate preferentially in some tissues. With this property, carbon can join with a wide range of other elements. Carbon is a major component of amino acids, the building blocks of proteins. Proteins, in turn, make up the structural components of most organs and tissues, including muscle, enzymes and neurons. Sciencing Video Vault Hydrogen Hydrogen, the lightest and simplest chemical element, can form only one type of bond â€" a single bond. Nevertheless, hydrogen can form a greater variety of compounds than any other element, even carbon. It is, as the name implies, found in carbohydrates but also in proteins in fats, which are structural in animals. In addition, the starchy components of plants that give them their shape are made up of carbohydrates. Water, which makes up more than two-thirds of the human body, contains hydrogen. Nitrogen Although nitrogen may get comparatively little attention, it is abundant in nature. Nitrogen is found in all amino acids and thus in all proteins. In chemical terms, an amino group consists of one nitrogen atom and two hydrogen atoms. While protein is often thought of mainly as a dietary component, proteins are the drivers of everyday life, catalyzing essential biochemical reactions that build the organs and tissues that keep living things growing, adapting and reproducing. Oxygen Oxygen is vital for respiration on a moment-to-moment basis. At the same time, it is found in water, all proteins and all foods. Fats, which even the leanest animals possess in significant quantities, include oxygen, which â€" like carbon â€" is a wondrously versatile molecule from a chemical standpoint. As the Earth has aged over the course of its four-billion-plus-year lifetime, the concentration of oxygen in the atmosphere has steadily climbed from trace amounts to about 20 percent, underscoring its crucial nature in the scheme of life. Phosphorus Phosphorus is something of a background player in the life-maintenance drama. It is a critical part of every plant and animal cell, as it forms the bulk of the phospholipid bilayer that gives cell membranes their integrity while allowing them to be selectively permeable to other substances. Phosphorus is also found in bone, and chemical energy derived from metabolic processes is stored for immediate use in phosphorus-based compounds such as ADP adenosine diphosphate and ATP adenosine diphosphate. Sulfur Sulfur is found in all proteins, most notably in cysteine and methionine. While its role in humans is perhaps not frequently celebrated, it is especially critical in cyclic processes in bacteria, which have been around for billions of years longer than people and will almost certainly be around after human beings are long gone. Sulfur is also essential for many bacteria to properly carry out their version of photosynthesis, a set of reactions most commonly associated with plants.

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6: What Are the Six Most Abundant Elements That Occur in Living Organisms? | Sciencing

Issues in Science and Technology: This sequence of five courses (ISAT , , , , and) engages students in the practice of science, both to motivate and to provide an understanding of science and technology in the context of important current social issues. Current areas from which issues are selected are living systems, the.

Evid Based Complement Alternat Med. Published online Feb 9. Published by Oxford University Press. The online version of this article has been published under an open access model. Users are entitled to use, reproduce, disseminate, or display the open access version of this article for non-commercial purposes provided that: For commercial re-use, please contact gro. The theory is axiomatic. It originates from the phenomenological idea that physiological health is based on three factors: From the theory is derived a treatment strategy called Systemic Medicine SM. Energy-stimulating phytomedicines increase available energy and decrease total entropy of an open biological system by providing negative entropy. The same occurs with phytomedicines that act as biological intelligence modulators. They should be used as the first line of treatment in all ailments, since all pathologies, by definition, imply a higher than normal organic entropy. Introduction Brief History of the Phenomenological Theory: At the end of the 18th century, Antoine-Laurent Lavoisier â€" unveiled the mystery of fire, discovering that its anatomy- and minimum common denominator-constituted a triangle whose sides corresponded to heat H , fuel F and oxygen O. Lavoisier also deducted the biconditional characteristic of fire, i. Since then the fire triangle has been the foundation of all firefighting techniques. The Systemic Theory was conceived by the author in , while pursuing a unified theory of living systems 1. As the result of an engineering background, an interest in philosophy, health, phytotherapy and knowledge of the General Adaptation Syndrome 2 , he recognized in energy E , intelligence I and organization O a minimum common denominator in living systems, of a triangular anatomy, analogous to the fire triangle; establishing that a biological system can only exist if, and only if, all three elements were present, and vice versa: The author proposed its application in the field of phytotherapy 3 and medicine 4 , in two local bestselling books, which created interest within the medical community and resulted in the creation of the first medical center. The application consisted in classifying and applying herbs according to whether they are: Energy, Intelligence and Organization structure a common denominator of life that answers an age-old question: A sick animal has diminished levels of these three elements, while a healthy one has all three in suitable amounts. Early History and Prior Developments of the Theory Aggressors or stressors were identified by Professor Hans Selye, and described and classified in over articles and 32 books. He formulated the General Adaptation Syndrome GAS 5 , which classified effects on animals and humans affected by threats exhaustion, disease, fear, extreme cold â€¦ as: The next step was taken by Soviet scientists led by Lazarev and Brekhman, who investigated properties of substances, with the ability to increase adaptability and resistance to stress. By more than studies had been published by Soviet scientists concerning the use of adaptogens. Since then many other plants and sources have been found to have the same properties 6 â€" 9. The new phytomedicines increased resistance to stressors as depicted by Selye 3 , enhancing energy, and regulating immune, neuroendocrine and cellular function. Some researchers question the validity of the adaptogen definition in science; however, most concur on their health enhancing properties The latter also paved the way to the E, I and O triangle, explained further on, and the Systemic Theory.

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7: Fundamental awareness: A framework for integrating science, philosophy and metaphysics

Living systems theory is an evolutionary scientific theory that justifies well- defined research across multiple disciplines. Its connection to the zeitgeist of a new.

Theory[edit] Living systems theory is a general theory about the existence of all living systems, their structure , interaction , behavior and development. This work is created by James Grier Miller , which was intended to formalize the concept of life. In Living Systems Miller provides a detailed look at a number of systems in order of increasing size, and identifies his subsystems in each. Miller considers living systems as a subset of all systems. Below the level of living systems, he defines space and time , matter and energy , information and entropy , levels of organization , and physical and conceptual factors, and above living systems ecological, planetary and solar systems, galaxies, etc. This takes place by means of information and material-energy exchanges. Living systems can be as simple as a single cell or as complex as a supranational organization such as the European Union. Regardless of their complexity , they each depend upon the same essential twenty subsystems or processes in order to survive and to continue the propagation of their species or types beyond a single generation". At each level, a system invariably comprises twenty critical subsystems, which process matterâ€"energy or information except for the first two, which process both matterâ€"energy and information: The processors of matterâ€"energy are: He constructed a general theory of living systems by focusing on concrete systemsâ€"nonrandom accumulations of matterâ€"energy in physical spaceâ€"time organized into interacting, interrelated subsystems or components. Slightly revising the original model a dozen years later, he distinguished eight "nested" hierarchical levels in such complex structures. Each level is "nested" in the sense that each higher level contains the next lower level in a nested fashion. His central thesis is that the systems in existence at all eight levels are open systems composed of twenty critical subsystems that process inputs, throughputs, and outputs of various forms of matterâ€"energy and information. Two of these subsystemsâ€"reproducer and boundaryâ€"process both matterâ€"energy and information. Eight of them process only matterâ€"energy. The other ten process information only. All nature is a continuum. The endless complexity of life is organized into patterns which repeat themselvesâ€"theme and variationsâ€"at each level of system. These similarities and differences are proper concerns for science. From the ceaseless streaming of protoplasm to the many-vectored activities of supranational systems, there are continuous flows through living systems as they maintain their highly organized steady states. Cells and organs of a living system thrive on the food the organism obtains from its suprasystem; the member countries of a supranational system reap the benefits accrued from the communal activities to which each one contributes. Miller says that his eclectic theory "ties together past discoveries from many disciplines and provides an outline into which new findings can be fitted". Matter is anything that has mass and occupies physical space. Mass and energy are equivalent as one can be converted into the other. Information refers to the degrees of freedom that exist in a given situation to choose among signals, symbols, messages, or patterns to be transmitted. Other relevant concepts are system, structure, process, type, level, echelon, suprasystem, subsystem, transmissions, and steady state. A system can be conceptual, concrete or abstracted. The structure of a system is the arrangement of the subsystems and their components in three-dimensional space at any point of time. Process, which can be reversible or irreversible, refers to change over time of matterâ€"energy or information in a system. Type defines living systems with similar characteristics. Level is the position in a hierarchy of systems. Many complex living systems, at various levels, are organized into two or more echelons. The suprasystem of any living system is the next higher system in which it is a subsystem or component. The totality of all the structures in a system which carry out a particular process is a subsystem. Transmissions are inputs and outputs in concrete systems. Because living systems are open systems, with continually altering fluxes of matterâ€"energy and information, many of their equilibria are dynamicâ€"situations identified as steady states or flux equilibria. Miller identifies the comparable matterâ€"energy and information processing critical

subsystems. Elaborating on the eight hierarchical levels, he defines society, which constitutes the seventh hierarchy, as "a large, living, concrete system with [community] and lower am levels of living systems as subsystems and components". Miller provides general descriptions of each of the subsystems that fit all eight levels. The absence of a supranational decider precludes the existence of a concrete supranational system. Miller says that studying a supranational system is problematical because its subsystems These systems do little matter-energy processing. The power of component societies [nations] today is almost always greater than the power of supranational deciders. Traditionally, theory at this level has been based upon intuition and study of history rather than data collection. Some quantitative research is now being done, and construction of global-system models and simulations is currently burgeoning. Miller identifies the subsystems at this level to suit this emphasis. Thus, for example, the reproducer is "any multipurpose supranational system which creates a single purpose supranational organization" p. The specification of the twenty critical subsystems in any living system. The specification of the eight hierarchical levels of living systems. The emphasis on cross-level analysis and the production of numerous cross-level hypotheses. Bailey says that LST, perhaps the "most integrative" social systems theory, has made many more contributions that may be easily overlooked, such as: LST also analyzes the irregularities or "organizational pathologies" of systems functioning e. It explicates the role of entropy in social research while it equates negentropy with information and order. It emphasizes both structure and process, as well as their interrelations. By asserting that societies ranging from totipotential communities to nation-states and non-supranational systems have greater control over their subsystem components than supranational systems have, it dodges the issue of transnational power over the contemporary social systems.

LIVING SYSTEMS SCIENCE? THE SECOND FOUNDATIONAL ELEMENT pdf

8: James Madison University - B.S. in Integrated Science and Technology - Year 1 and 2

Biological and Biochemical Foundations of Living Systems: Foundational Concept 2 Highly-organized assemblies of molecules, cells, and organs interact to carry out the functions of living organisms. Cells are the basic unit of structure in all living things.

Kafatos Find articles by Menas C. The moral rights of the named author s have been asserted. ABSTRACT The ontologic framework of Fundamental Awareness proposed here assumes that non-dual Awareness is foundational to the universe, not arising from the interactions or structures of higher level phenomena. The framework allows comparison and integration of views from the three investigative domains concerned with understanding the nature of consciousness: In this framework, Awareness is the underlying reality, not reducible to anything else. Awareness and existence are the same. As such, the universe is non-material, self-organizing throughout, a holarchy of complementary, process driven, recursive interactions. The universe is both its own first observer and subject. These views fully reflect main stream Western philosophical traditions, insights from culturally diverse contemplative and mystical traditions, and are in keeping with current scientific thinking, expressible mathematically. How can we explain why there is something it is like to entertain a mental image, or to experience an emotion? It is widely agreed that experience arises from a physical basis, but we have no good explanation of why and how it so arises. Why should physical processing give rise to a rich inner life at all? It seems objectively unreasonable that it should, and yet it does. And how do we know that our experiences conform to others? As yet, none of these domains of human knowledge have resulted in a convincing, integrative solution to the hard problem of qualia, though extensive reporting of first person experiences points in a possible direction. We feel that a generalized framework for considering the nature of consciousness can solve the hard problem if it considers inputs from all three investigational domains: We will also argue that reductionist, materialist science has hit a dead end and a radical approach departing from the practices of the last century needs to be adopted. A systemic failure to prioritize this kind of truly broad spectrum, cross-cultural engagement is identifiable among many, if not most practitioners in all three domains. However, not only should every possible resource be taken advantage of, but a theory that incorporates all three may best serve to create a language with which all participants working in the field of consciousness studies can engage each other in meaningful dialog despite the significantly different backgrounds, world views, and training. In fact, we argue here that what is needed is an integrated approach, a transdisciplinary framework allowing different perspectives and integration across widely different disciplines. For such a synthesis we here specify a monistic form of idealism, that we call Fundamental Awareness. In this paper, we present a synthesizing philosophical and scientific e. We argue that even for the so-called physical world, any attempt of a Theory of Everything will fail outside the framework proposed here. We will first briefly describe concepts and practices from the scientific and metaphysical domains that we believe, at minimum, need to be incorporated into this philosophical tradition. Central themes of Fundamental Awareness The following bodies of knowledge and experience are the essential elements from which we build our framework. We believe that any framework to understand consciousness that does not incorporate these bodies of knowledge, at least, or attempts to link them in an integrated manner is, at best, incomplete and most likely circular and inconsistent with quantum mechanics and the nature of experience itself. Quantum mechanics Understandings of quantum mechanics QM from the Copenhagen Interpretation CI of Bohr and his early quantum physicist peers, through subsequent elaborations and extensions by Heisenberg, Born, Pauli and still later on von Neumann, Wigner, Stapp and Kafatos indicate the central and essential role of the conscious observer in the moment by moment evolution of the universe. If the experimenter makes an observation of the electrons passing through one of the slits, by knowing that indeed it passed through that slit using a probing interaction, then the observed pattern behaves like that produced by particles following a defined trajectory straight through the slit hitting the screen and assembling into two bands directly opposite the slits, as

expected for particle behavior. On the other hand, in the absence of direct observation, as they pass through one slit or the other, the screen shows an interference pattern indicating the wave-like nature of the electrons. In the orthodox CI and in subsequent enhancements by von Neumann, the wave function that describes possible outcomes of a quantum event is a complete description of all such possibilities and therefore, prior to observation, all these possibilities exist in superposition. In this sense, quantum phenomena are contextual. The implications of these views were hotly debated with, most notably, Einstein. As we know, the opposite has occurred, with entanglement repeatedly being demonstrated in many experiments spanning several decades in well controlled experiments, not only in the quantum realm, but now in the macroscopic realm with entanglement within diamond crystals. Specifically, in John Bell proposed a theorem and mathematical formalism to test for the existence of local realism that would require hidden variables implied by the EPR paradox. Based on this assumption, several well-known physicists have posited theories with large cosmological implications in an attempt to obviate or subvert wave-particle dualism and quantum indeterminacy. In doing so, we are obliged to recognize that any phenomena alleged to exist in the absence of observation or measurement in quantum physics cannot be viewed as real. Aspect and collaborators in Paris, 17 by N. Gisin and collaborators in Geneva 18 as well as several other laboratories in the US and elsewhere, vindicating quantum predictions to a surprising degree of accuracy. Thus, while there are some alternate interpretations of QM that differ significantly from the line of thought that descends through Bohr, Heisenberg, Pauli, Born and von Neumann in particular, many of these do so only out of an urge to preserve a classical world view see http: This, we believe, in part represents the imperative of the dominant philosophy of science of the 20th century, most robustly developed by the Vienna Circle: In this philosophical system, only statements verifiable either logically or empirically would be cognitively meaningful. Developed in the absence of a knowledge of or acceptance of the findings of QM already coming out of Copenhagen, these philosophers reified a materialist view of the world that closed the door on metaphysical speculations. It remains the dominant contemporary world view: Thus, we now find that, for the most part, there is a tacit belief in contemporary culture that only empirical science can explain consciousness itself. However, for the purposes of this Fundamental Awareness framework and remaining unhindered by the skeptical prejudices of this world view, we consider the Copenhagen Interpretation, particularly in the orthodox forms elaborated by von Neumann, to be the most relevant to understanding consciousness in the universe. As Henry Stapp has said personal communication: While there is as yet no confirmed and comprehensive view of the Planck scale of existence, we consider a generalized view that a quantum foam of entities arises within or from the vacuum. Self-organizing entities which comprise dark matter and dark energy are implicitly included in all these discussions, though the absence of details concerning their nature precludes further inclusion in our framework; to be continued! As such, time and space emerge with the quantum foam and the universe begins its rapid, exponentially expanding evolution. This self-organization is of course mediated by the known forces: Whether the self-organization arises from linear systems of interaction e. What these generalized forms of self -organizing complexity have in common are: All systems â€” at every level of scale, quantum and classical - are comprised of potentially interactive entities. The nature of self-organization is dependent on the numbers of interacting entities and the richness of the modes of possible interaction. Too much disorder and there can be no self-organization; too little and there is no ability for an adaptive change in the forms of self-organization in response to a changing environment. In all of these systems, the properties of the whole are not predicted by the characteristics of the lower scale parts that comprise them, as long as there are sufficient numbers of these parts and the conditions of interaction and environment are appropriate to allow for self-organization, relatively stable higher scale, emergent structures will arise. At higher scales, atomic and molecular self-organizations yield the emergent properties of the substances and materials of our own, usual level of scale: Such autopoietic systems then further self-organize into communities e. However, it is in total resonance with the view of a quantum universe which eventually appears to conscious observers as the classical world. The appearance of material stuff is scale dependent. Two examples of appearances that are

scale dependent and which may be reified by an observer as having inherent existence:

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Living systems theory is a general theory about the existence of all living systems, their structure, interaction, behavior and development. This work is created by James Grier Miller, which was intended to formalize the concept of life.

LIVING SYSTEMS SCIENCE? THE SECOND FOUNDATIONAL ELEMENT pdf

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