On the Ontology of Emergent Design and General Schemas Theory

Research into The Deep Structure of Design

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Introduction to the Ontology of Design

Design is an Ontological activity. Design brings new things into existence with emergent properties that do not exist in nature. Design is a singular human activity which alters and mediates our environment to us. Design is the means by which we create an artificial technological culture which allows us to produce our own infrastructure of our lifeworld. As such design is a very special activity that deserves some thought beyond what thought and mental effort we expend in the activity itself. In our case we will explore the deep structure of design itself. Because it is an ontological activity it has the structure that mimics the structure of Being. Therefore, in this essay we will consider the structure of Being and the structure of Design as a starting point in our excursion into the deeper structures that support design and that attach it to the structure of the worldview itself.

It is starting to dawn on us that Being has multiple fragments and is not itself unified, but instead has structure. Dasein[1] reacts to what has Being and produces something new which extends and expands of what Being covers. In other words what Being covers is changed by the activity of Design. So where most human activities merely deal with the furniture of the world as given, Design produces new furniture of the world. That is what makes Design unique as a human activity. And of course we are speaking of all Design whether in Science, Technology, Art or Engineering or any other discipline. All Design work transforms our world as we are living within it. What we are concerned with here is not the means of production, but the means of production of new things with new emergent properties hither to unknown or if foreseen, say in Science Fiction, then unrealized. So the first step in our argument is to consider the fragments of Being and then consider how Design is dialectically related to those fragments of being in its own fragmentary structure that parallels that of Being.

Being has five fragments, or kinds. In the last century Continental Philosophy spent much effort attempting to discover them. And in the tradition they are called by many names and understood differently by many different philosophers. For simplicities sake I will identify them here using the following names that I have used previously.

beings[0]
Pure Being[1] – Static
Process Being[2] – Dynamic
Hyper Being[3] – Undecidable
Wild Being[4] – Uncontrollable
Ultra Being[5] – Singular

To each of these kinds of Being corresponds a kind of Design with the same prefix:

designed things[0]

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[1] Cf. Heidegger "*there being*" = *being-in-the-world*

Pure Design[1]   – Representative
Process Design[2] – Designing Design
Hyper Design[3]   – Design of Designing Design
Wild Design[4]   – Design of Design[3]
Ultra Design[5]   – Design of Design[4]

One simple way to think of the kinds of Design is in terms of meta-levels, i.e. in terms of Russell's Higher Logical Type Theory[2]. But a way to understand that is to consider the meaning of multiple repetitions of the word Design. For instance in our language the second order of Being is Becoming. So we can expect that the second order of Design is Designing. But in order for it to be a meta-level we must be designing design itself. So let us consider a design of an art work or a product or a process, of anything which is designed. The designed thing exists at meta-level zero. The design itself embedded in that thing by its production is a static characteristic of the designed thing. This static characteristics we call meta-level one. But that design itself was designed in a process of design and thus it partakes in Process Being by which the design with the emergent properties that it confers on that object is instituted and established. So we institute a design intentionally by a design process that we go through in order to set up the production of the thing to achieve its desired emergent properties. The word design is a synonym for intentionality. We do not consider accidental designs to actually be the result of designing. Designing is a synonym for purposefulness in our normal vocabulary. There might be aberrant cases where some unconscious activity that had a result was later viewed as being designed, but at least for now we will consider that an exception and ignore it. We view design as a purposeful attempt to bring about emergent properties in some artifact which is the result of human activity on natural matter, even humans themselves. We will call an ontological monolith Being Becoming, or Designing of a Design. Notice that the two expressions are reversed in word order. This is significant and is an expression of the fact that

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[2] See Copi

Designing is a transformation of Being in some sense and is not merely the same as the becoming of Being, but it is instead a transformation of Being's becoming, thus setting the stage for a new round of transformational designing the next time around. There is natural change in the world but Design speeds up and transforms the change already present in preparation of a new phase of Design which will have new materials on which to work. Ultimately Being is extended though design as Design is extended through producing a more and more artificially mediated environment for humans to live within. Process Design governs the production of designs of things. The designs of things themselves as a characteristic of those things that bring with it emergent properties are the Pure Design, i.e. the goals of the design process.

Now begins the hard part. What is it to Design[3] the design of design. Here the process of Design itself is designed. That means there must be different kinds of Design processes and that we can alter and change that process intrinsically to produce other ways of designing things. One way we do that is to introduce Methods of Design. But our actual design practice is always slipping and sliding between methods and cannot actually be captured by any method, because a method means meta-hodos, the way after. The method is how we get other people to understand where we got to in our own design process. But we actually usually get there to whereever we have gotten by a circumlocutious route. This circumlocutious route is drenched in Hyper Being, i.e. in undecidability. How we produce emergent effects in the things we design and build is unknown even to us who are the agents producing these effects. All these problems with knowing what design really is shows up only at the third meta-level of Design where we realize that our ability to rationally design the design process breaks down. Of course, we produce methods continually, and attempt to use them, but ultimately no method is the answer and we have to resort to other means that are irrational

to actually complete our designs so that emergent properties actually appear. There is a whole industry of methodology design, where designers who have been successful design the design process for other designers. Methods are a whole universe of discourse within all design communities as some designers attempt to follow the lead in how do carry out the design process cleared by other expert designers. Of course, some methodologists are not successful designers themselves, but this is a degenerate case. But once all the myriad design methods have arisen and the market for methods has become bloated we ultimately realize that no method actually fulfills all our needs and every designer must design his own design process as he goes along in order to be successful. Following rote methods of others does not lead to success. This is a fundamental fact of our methodological exploits that must ultimately be faced. Creative Designers create the design process themselves. The meld and reshape methods to their own purposes and create new methods specific to the job at hand more or less successfully depending on how much they believe in the ideology of methods. The best methodologies are tool boxes of various partial methods that can be reworked into a method for the particular case at hand and tinkered with along the way so as to make it a better fit for the design work to be done. In this we enter into the realm of Hyper Being though Hyper Design, and vice versa. Derrida describes this as Differ**a**nce, i.e. differing and deferring. Plato in the Timaeus at the beginning of the Western tradition called it the third kind of Being.

Once we have entered into the higher meta-levels of Being and Design then things just get stranger and stranger. We have to go on to ask what is the Design of Design[3]. Design[3] is the production of methodologies that design the design process. Designing the production of methodologies calls for meta-methodologies. These are methods for producing methods. But not just that also methods for the application of methods. But these also break down, and thus we enter into a situation where there is a complete loss of control over the design process itself which we call Wild Design which is an articulation of Wild Being. As we try to impose rationality, representation, computability at deeper and deeper levels of design we begin to see a total breakdown of our capacity of self-control. This hits a fundamental wall at the level of Ultra Design which is an articulation of Ultra Being. Ultra Being is a singularity, and Ultra Design is the advent of the emergent itself. In Wild Design we lose control and the design takes on its own life, but in Ultra Design local losses of control become ultimate and the Emergent event takes over all control over the situation we find ourselves in as we design. It is we who are designed in Ultra Design. Emergent events body forth unbeckoned within our design work.

All this is, of course, known by the Artist who knows that the art work takes on a life of its own and designs itself ultimately. But Engineers and Scientists have a more difficult time recognizing the irrational side of their design work, whether it be the design of machines or the design of conceptual systems such as theories. However, even Engineers and Scientists know in their heart of hearts that their work has an important irrational component which is unexplained and possibility unexplainable. Facing this inner reality of design by recognizing that Design is fragmented into the same kinds as Being is the call that we issue to understand the Deep Structure of Design. This recognition produced the Romantic Movement as a reaction against the Enlightenment. And from that movement we have moved on to speak of unconscious forces such as Shopenhauer's Wille, and the personal unconscious of Freud or the collective unconscious of Jung. As we delve into the meta-levels of Design we are encountering this engagement in the meta-levels of Being with something beyond our kenning which ultimately we do not understand, and this lack of understanding is ultimately an inability to understand something about ourselves. We may have designs, but something within design has designs on us, and this becomes apparent at the level of Ultra Being where our designs

turn against us as an Other.

So our fundamental premise is somewhat contrarian in the sense that the trend is to produce methods for design and try to get the designers to sign on to the use of our methods as the solution to all his problems. And of course we would like some method for producing methodologies, i.e. we would like to ground our methods in some sort of rational meta-design approach. But in the end we are continually recognizing that methods in themselves are empty and ultimately do not solve our problems and they form an endless nihilistic series of designs of the design process which function more as ideologies then practical panaceas for all our problems. Methodologies in fact are a problem because they take responsibility for the outcome of design away from the designer. The designer says I followed the method faithfully and now there is a mess, it is not my fault but the fault of the methodologist. And so there is an endless line of methodologists who like sophists and sycophants attempt to sell their wares to designers and thus take responsibility and knowledge away from those designers for the production of the methods which attempt to control the design process which itself inherently impossible to control, because to control it we have to control ourselves, collectively. Methodologies in this context become little more that political ideologies within design teams, where it is politics and not the efficacy of the methods that decides what method will be used to channel the work of design. In this work we will face the inevitable barrier to the effective use of design methods, which is the inner structure of design itself and the fact that it is patterned on the structure of Being due to its ontological nature. If we come to recognize the meta-levels of Design then although we will ultimately not understand it, we can at least understand the limits of our own understanding. This is a route to Self-Knowledge which was suggested by Apollo. He said Know Thyself and Nothing to Excess. What we seldom recognize is that these two wisdom phrases resonate with each other. We cannot take self-knowledge to

excess either. There are limits to self-knowledge or to say it another way there is a fundamental ignorance about ourselves that is a hard barrier. But self-knowledge also helps us steer ourselves away from Excesses. In the way of excess or lack, i.e. falling into the nihilistic opposites, we lose a grip on knowledge of ourselves, in the form of knowledge of our limits as finite beings who project Being and engage in Design which in turn both fragment in the same way to impose inner limits at the ontological level. Our recognition of these inner limits imposed on us as designers by Design in all its kindness is a means of self-knowledge and avoidance of excess.

We need to be able to recognize the various kinds of Design as meta-levels of Being in our own design processes. We need to institute a sort of phenomenology of design within ourselves so we recognize when we are approaching the Sirens on the rocks whose song would draw us on to our own destruction. Adorno and Horkheimer in the Dialectic of Enlightenment[3] give the image of Odysseus in the ship as the middle class in relation to the working class. But we could give that image a twist if we see the Methodologist and his fellow sailors as the Designers that follow a particular method ideology, or instead it could be the team lead who knows best which method to follow and his design team who follow his choices blindly. When both the Methodologist and the Designers believe that all processes can be reduced to purely rational practices which can be followed by rote then we get the effect of putting up our own barriers to the arising of the Emergent effect we are trying to instigate. Just as in Art where it has long been recognized that there is an unconscious component to Design, we need to recognize that in Engineering and Science and find ways to come to terms with it without falling into nihilistic responses that just exacerbate the problems that are already very difficult. If instead we institute in ourselves a phenomenology of design then we will look

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[3] Continuum International Publishing Group (1976)

for those practices that work, and we will draw from methods what order to our processes that we can, and we will be open to innovation when we hit those higher meta-levels of design that call for our utmost creativity in dealing with them. It is easy to have flamboyant goals in design which we imagine we can fulfill. But in the process of design itself many of the most flamboyant goals are abandoned for expediencies. Ultimately we may just be wanting something that will work with the emergent properties we imagined, and then we will refine that prototype into something workable within the situation that we envisage for the design artifact. Design is hard work, because with modern systems everything must work perfectly for the system as a whole to work at all. So we have to take an initial conceptual design and then flesh it out considering and elaborating every detail. Design is, of course, the phase of elaboration between the gathering of requirements and the implementation. Normally there is a conceptual design that is then elaborated in detail down to a level where the design can be implemented. But this process of elaboration in design is fairly straight forward. The creative part is the production of the conceptual design that is thought will call into Being the emergent properties that we hope will accrue if the design is correct. Most methods deal with the process of elaboration, and completely ignore the part of the design process where the conceptual design is created. That conceptual design is created in relation to a design landscape that is multi-dimensional and consists of all possible designs for a given thing within its envelopes of imposed constraints. Hyper Being is the undecidability of hovering before that design landscape and trying to pick out the optima in that multi-dimensional landscape. Hyper Design is the exploration of that landscape, the hunting party that goes into the wild of that multidimensional landscape and brings back possible solutions that may be tried out and traded off in relation to each other. Wild Being is the recognition that the designs have their own propensities within the landscape and Wild Design flows out those propensities which sometimes take

over the designs as if they had a mind of their own. This is the Frankenstein myth where the creators creature begins to walk around on its own doing unsavory things that are unexpected. Ultra Being is the recognition that the design does have a life of its own, not just propensities to move in certain ways. All the really good designs will in some way design themselves and thus turn out in ways totally unexpected by the designer, who is used by the design which designs itself. The problem is always to allow the design some latitude for self transformation without allowing it to completely break away from the reigns and self-destruct. The wise designer will know when to go with the design flow and when to rein it in and set limits taking control of the design again. In a phenomenology of design we would attempt to learn to recognize these discontinuous transitions between the meta-levels of design. We would learn our own limits and would learn humility in dealing with ourselves as designers and with other designers.

Design after all in many of the systems we build today is an intersubjective activity. No one person can design it all himself. While having strong team leads and opinionated designers has some short term advantages for the most part a large design when produced by a tyranny of design tends to not be as good as one produced by a real team. This is because a real team has different viewpoints that are interacting rather than a single viewpoint mimicked and repeated in all the members of the team. Looking at designs from multiple viewpoints simultaneously tends to make them more robust and more adaptable than is possible in a rigid power centric team structure. Sartre in The Critique of Dialectical Reason[4] described the fluid group as the origin of all reified institutions. Elias Cannetti calls that the pack, which he relates to the hunting group in Neolithic times in Crowds and Power[5]. These teams that actually work as teams and do not have lopsided dominance structures are much more effective in design

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[4] Verso; Revised edition (2004), Two volumes.

[5] Farrar, Straus and Giroux (1984)

work that is too big for the individual to accomplish alone, as with other activities.

So in these larger teams our phenomenology of design must be intersubjective so that we all recognize the nihilistic pitfalls of excess and lack and where to draw the non-nihilistic distinction not just for ourselves but for the group as well. And part of these distinctions we need to draw are between aspects of the inner articulation of design itself as they manifest in our design work. Knowing when we are talking about Design as a static ideal and when we are discussing the aspects of the process of design instead, or knowing when we are dealing with Hyper Design, Wild Design or Ultra Design are very important things for us to realize and are fundamental insights into our design work that have nothing to do with methodologies, but rather with our realizations about what we are doing and how what we are doing is unfolding within us and influencing us which in turn is influencing our design work. Hyper Design appears in the process of design as discontinuities: decision points, choke points, critical events, etc. On the other hand Wild Design manifests in the material of design having its own druthers and propensities that are counter to our will. Murphy's Law is an expression of this. Ultra Being is the design process seen from the outside as a projection process which is out of our control either as an individual or as a team.

Underlying Fragmented Ontology of Being

Our initial approach to the Ontology of Design is via the concept of the Fragmentation of Being into Meta-levels. This approach is based on fundamental ontology which recognizes what Heidegger calls Ontological Difference[6]. Ontological difference is the difference between 'beings' and 'Being.' Analytic Philosophy in general does not accept this difference but it is fundamental to the development of Continental Philosophy. Once we have accepted the difference between Being and beings, or Design and designed

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[6] Vail, L. M.; Heidegger and Ontological Difference (Pennsylvania State Univ Pr 1972)

entities in our case, then the question is whether Being is a Monism. Much of the history of Philosophy has treated Being as a Monism and the question has been whether that Monism was Parmenidean or Heraclitian, i.e. Static or Dynamic. Heidegger considered these two modalities of Being as equiprimordial. Thus instead of a Monism of Being as either static or dynamic, he constructs a Monolith of Being containing two modalities which I call Pure Being and Process Being. These modalities of Being Heidegger talks about in Being and Time[7] as *present-at-hand* and *ready-to-hand* modalities of dasein, i.e. *being-in-the-world*. In other words Being is only known through dasein's modalities of *being-in-the-world* and as such is a Monolith containing these modalities of projection by Dasein of the Being of beings in the world. These are the first two types of Being in the first beginning of the tale of the Demiurge in Plato's Timaeus. Merleau-Ponty claims in The Phenomenology of Perception that these two modalities of Dasein have a psychological emanation as *pointing* and *grasping* respectively. I claim that they are related to Calculus and Probability in mathematics. With respect to Pure Being the subject/object dichotomy is established but it breaks down with respect to Process Being and becomes Dasein which is prior to that split. Dasein ecstatically projects the world as its realm of existence.

However, once it was realized that there might be different modalities of Being then the search was on for other modalities of Being. Heidegger himself proposed another modality called ~~Being~~ (crossed out). This became known as Differance by J. Derrida which defined it as *differing* and *deferring* and related it to writing within our tradition which is logocentric. M. Merleau-Ponty comparing the work of Heidegger with that of J. P. Sartre on Being and Nothingness[8], called this third kind

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[7] Heidegger, M.; (HarperSanFrancisco,1962) Trans. J. Macquarrie & E. Robinson; Also see (State University of New York Press, 1996) Trans. J. Stambaugh

[8] (Washington Square Press 1993) Trans. Hazel E. Barnes

of Being the "Hyperdialectic between Being and Nothingness" in The Visible and Invisible[9]. This is the third type of Being after the second beginning of Timaeus in Plato's Dialogue concerning the Demiurge. I call this "third kind of being" Hyper Being after the usage of Merleau-Ponty and claim that it has a modality of the *in-hand*, and a psychological emanation as *bearing*. I claim that it is related to Fuzzy Sets and Logic in Mathematics. Dasein becomes a Query at this level of Being.

Wild Being was proposed by M. Merleau-Ponty in The Visible and the Invisible. Since then it has been explored by various philosophers such as John S. Hans in The Play of the World, Deleuze and Guattari in Anti-Oedipus and A Thousand Plateaus, and by Cornelius Castoriadis as *magma* in World in Fragments[10]. Plato does not claim that it is a different type of Being, but in the third beginning of the Timaeus he treats propensities which is a sign of this kind of Wild Being. I claim it is related to Chaos Theory in Mathematics and particularly the Mandelbrot Set. I claim also that it has the modality of *out-of-hand* with respect to Dasein and that its psychological emanation is *encompassing*. Dasein becomes an Enigma at this level of Being.

Finally, something very strange happens at the meta-level of Ultra Being which is the fifth meta-level. At this meta-level there is a phase transition from Being to Existence. Existence can either be interpreted as Void as in Taoism or Emptiness as in Buddhism. Both of these are nondual interpretations of existence. However, these nondual interpretations are themselves duals of each other and there must be something that distinguishes them. That something I hypothesize is the singularity of Ultra Being which is Being seen from the outside rather than from the inside. Thus below the fifth meta-level there are duals in Being

and nonduals in the shadows connecting those duals surreptitiously. But at the fifth meta-level where the phase transition to existence occurs, then the projection of Being is itself seen externally as an existent and as such it distinguishes between emptiness and void. Thus Ultra Being is a singularity out of which the other kinds of Being arise. But Ultra Being also represents the culmination of genuine emergence as opposed to artificial emergence which is what occurs below the fifth meta-level of Being.

The different kinds of Being are called Standings along with Existence, Manifestation and the A-manifest beyond the duality with the Non-manifest. There are seven standings which are in the first meta-dimension beyond dimensionality as such. Existence contains Emptiness, Ultra Being and Void as sub-standings or sub-stances. Ultra Being was called Prime Matter historically, i.e. the substance out of which everything was made. Prime matter seen from the point of view of the substance of consciousness is empty and seen from the point of view of nature is void. Ultra Being is the externality of Being seen as an existent. Its modality is beyond handedness[11] and its psychological emanation is constriction of the singularity. It is called Ultra Being because as far as we know this is the ultimate reaches of Being where it finds itself washed up on the shores of existence.

The key point that I discovered in my previous dissertation on The Structure of Theoretical Systems in relation to Emergence[12] was that for something utterly new to enter the world it had to pass though and embody all four kinds of Being within the world. Now we know further that what gives unity to the new thing is that it is a singularity of Ultra Being. Design is a process by which the appearance of human

[9] (Northwestern University Press, 1969) Trans. Alphonso Lingis

[10] World in Fragments: Writings on Politics, Society, Psychoanalysis, and the Imagination (Stanford University Press, 1997)

[11] If you look at the 'homunculus' of the brain mapping of the body you see that the hands are very large with respect to this mapping of the body to the brain. Thus handedness is a very significant means of relating to the world by the body.

[12] (London School of Economics, University of London, 1982)

made artifacts become emergent events within the world. Thus Design itself must be ontological and embody the fragments of Being within its own being. This essay explores the implications of that deep ontological structure of design which mimics the fragmentation of Being which is necessary to bring about emergences within the worldview.

Searching for the Deep Structure of Design

In my research on Emergent Design and General Schemas Theory I explore the implication of the fragmentation of Design which follows from the fragmentation of Being. That leads us on a strange journey not unlike that of Odysseus who braved the strange and unknown seas in his attempt to return home to the familiar. Similarly, on our journey into the heart of design we encounter many strange features of the *general economy* (meta-system) of design which do not appear as long as we stay within the *restricted economy* (system) of methodologies or even meta-methodologies. The term "general economy" was coined by G. Bataille in his Accursed Share. In that book he notes that all normal economic relations are really restricted economies within a broader general economy which was intrinsically irrational and which deal with positive feedback in negative and positive directions such as excess and lack, rather than negative feedbacks which allow a systems to remain viable in the sea of harsh conditions that may sometimes obtain in the landscape of design. The recognition of the deep structure of design based on our understanding of fundamental ontology leads us directly into the general economy of the artificially produced global and local cultures which interacts with the general economy of nature on our planet and beyond. Our recognition of the impact of asteroids introduces us to the general economy of the solar system. Our recognition of gamma ray bursts and other dangerous phenomena beyond our solar system is an introduction to the general economy of the galaxy and beyond. Our recognition of mega-volcanos like the one under Yellowstone is an introduction of the general economy of the earth. We continually live and design for ourselves within our culture within a general economy (or meta-system) which we normally censor and refuse to recognize until it manifests itself in some undeniable way. Negotiating these rough seas of the general economy in our small bark of the restricted economy of ends and means that normally is assumed to surround design, gives us some insight into the deeper structures that lie below the surface of our design activities. Understanding the relation between the general economy within which emergent design occurs and the deep structure of emergent design is one aim of this research.

Emergent design is the heart of Emergent Engineering, which is design which seeks to produce emergent effects at various schematic levels, rather than just at the level of the system schema. Systems Engineering needs to become Emergent Engineering and recognize the efficacy of other schemas than just that of the system. And this is possible because each schema has a different set of meta-level articulations which interface with the meta-levels of design itself.

General Schemas Theory has a broader application than just understanding the nature of Design. But Design is an excellent starting point for understanding the import of General Schemas Theory as it relates to practice of Designers, such as Systems Engineers, who practice systems architectural design, as well as other types of designers. Systems Engineering Architectural Design is a prime example. We are attempting to find mathematical and philosophical foundations for this new discipline of Systems Engineering. But we believe that our discoveries with respect to Design and General Schemas Theory have much broader application than just to the field of Systems Engineering.

General Schemas Theory is an extension of General Systems Theory to all possible schemas besides the "system" for instance other schemas like "form," "pattern," etc. It is

believed that an acquaintance with Systems Theory should be the basis of Systems Engineering. However, the term system has lost its meaning because it has been applied to everything. So in order to give the term system back its meaning we need to explore all the other schemas that are possible and to situate the system schema with respect to all other schemas. This of course results in the transformation of *Systems Theory* into **Schemas Theory**, which results in the transformation of *Systems Engineering* into **Schemas Engineering** and then eventually into **Emergence Engineering** which tries to effect emergent design at various schematic levels. And that takes us into a realm beyond Systems Engineering proper to so that when we address a particularly important topic such as Design we are in fact speaking to the Design community as a whole rather than merely Design within Systems Engineering. We have picked Design because Requirements and Test have received more attention than Systems Design in the literature for Systems Engineering, and because Systems Architectural Design has become lately a hot topic especially in relation to the idea of Super-systems or so called "Systems of Systems." But what we find is that a system of systems is merely repeating the same system schema at another level of abstraction. So to understand Emergent Design it is necessary to understand Meta-systems which are a completely different schema, and contrast that new schema with the well known System schema. When we do that we discover the Special Systems that exist as thresholds of organization between these two schemas. It is the exploration of the Special Systems in relation to design that serves as a special key to unlock for us an understanding of the Deep Structure of Design.

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