



# laetus in praesens

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## Harmony-Comprehension and Wholeness-Engendering eliciting psychosocial transformational principles from design

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## Introduction

Christopher Alexander has produced a remarkable 4-volume synthesis (*The Nature of Order: an essay on the art of building and the nature of the universe*, 2003-4). In its focus on material design, 'human nature' is subtly and curiously excluded -- as with the current challenges of designing psychosocial systems and the strategies of global governance. The work is the culmination of decades of reflection on design, and the appreciation of the subtle quality which makes a good place to be -- notably giving rise to *A Pattern Language* (1977). The new synthesis explicitly offers a powerful methodology for eliciting beauty as a driver of the emergence of increasing wholeness. This has been carefully integrated with the science of complexity theory.

Alexander's work has long been appreciated in the world of programming and systems design where he is best known to computer scientists and software engineers, inspiring a classic by Eric Gamma, et al. (*Design Patterns: Elements of Reusable Object-Oriented Software*, 1994). His new methodology has recently been taken up by the military with respect to command and control systems (David P. Harvie, *Knowledge Sharing Mechanism: enabling C2 to adapt to changing environments*, 2007).

The following exploration arises from a degree of frustration at the apparent lack of appreciation of the relevance of his methodology to psychosocial system challenges and to 'social architecture' -- beyond sensitive development of community neighbourhoods and 'social housing'. This frustration first took the form of an experimental adaptation of the many patterns in Alexander's 1977 study to the psychosocial realm (*5-fold Pattern Language*, 1984), subsequently published in the various editions of the *Encyclopedia of World Problems and Human Potential*.

Given the insights he has derived from carpet design, his new methodology, and the military uptake thereof, were a focus of an earlier commentary (*Magic Carpets as Psychoactive System Diagrams*, 2010). This articulated the concern regarding the subtle exclusion of 'human nature', concluding that: Alexander might be said to be interested in the 'packaging' of humans rather than the content so beautifully 'packaged'. This might be caricatured as a design focus on 'clothing' in the sense of the adage dating back to classical Greece: *clothes maketh the man*. However true this may be, it remains a fact that civilization has proven itself unable to deliver adequate 'clothing' (notably in the form of shelter) to an exploding population with many other needs. Despite a degree of explicit concern with 'subjectivity', notably a concern with addressing the question of human feeling in design, it remains a fact that his approach has proven of greatest relevance to 'object-oriented' programming (Doug Lea, *Christopher Alexander: an introduction for object-oriented designers* 1994).

The following effort to elicit insights, of wider relevance than Alexander's understanding of 'the universe', arises from a concern at the inadequacy of the design insights applied to 'human nature' and global governance -- as is only too evident from the emerging 'crisis of crises'. Arguably there is an urgency to develop appropriate 'new thinking' to enable civilization to navigate and embody the adaptive cycle as highlighted by Thomas Homer-Dixon (*The Upside of Down: catastrophe, creativity, and the renewal of civilization*, 2006).

However there is also a concern at the propensity to formulaic thinking in the quest for singular metrics (*Uncritical Strategic Dependence on Little-known Metrics: the Gaussian Copula, the Kaya Identity, and what else?* 2009). Unfortunately, seemingly implied in Alexander's current quest for a computational approach to 'wholeness-extending' design is just such a singular metric (*Harmony-Seeking Computations: a science of non-classical dynamics based on the progressive evolution of the larger whole, International Journal for Unconventional Computing (IJUC)*, 2009). Significantly he concludes that paper with the statement:

I hope the idea of harmony-seeking computation may then sit alongside other methods as a new tool in an armory of well-founded computational techniques to be used when appropriate. It is likely to be appropriate whenever a computational task is defined more by issues of adaptation, health, wholeness, and wellness, with reference to the position some system in some still larger whole, or perhaps even by a desire for beauty, or life, or elegance. All these might one day play a key role in very general kinds of computation. Science, architecture, biology, ecology, physics, cosmology - and computation - may all be the better for it.

The approach taken here does not presume to be definitive in any way nor to anticipate the results of Alexander's own current development of his methodology. It is explicitly designed to 'jump start' reflection on the psychosocial implications of Alexander's remarkable synthesis by highlighting pointers to further possibilities -- which are unlikely to be included in the development by his team (as indicated by the sciences identified in the above conclusion). The focus here is on Alexander's papers commenting subsequently on the methodological issues of his synthesis and not on his articulation of that synthesis in *The Nature of Order*. The particular interest here is the psychosocial relevance of the 15 transformations he has distilled from his work and the possibility of polyhedral configuration of them, consistent with his emphasis on geometric adaptation, in order to enable comprehension of a higher order.

## Insights of Christopher Alexander

In his remarkable early study, Alexander focuses on that subtle quality which makes a place 'good to be' (*The Timeless Way of Building*, 1979). Unfortunately, although this may be associated with the configuration of the built or natural environments, an increasing proportion of the population unable to change those environments. The challenge is then how to engender a 'place' that is 'good to be' in the psychosocial environment -- **irrespective of material circumstances** on which he is focused. It is on this quest that the following arguments are of interest.

To give a sense of a complex and subtle argument, **the following paragraphs are extracted (unchanged, except for indicated omissions), but re-ordered and clustered** by (and within) sub-headings, from Alexander's relatively lengthy explanation replete with examples and illustrations (*Harmony-Seeking Computations: a science of non-classical dynamics based on the progressive evolution of the larger whole, International Journal for Unconventional Computing (IJUC)*, 2009).

**Wholeness:** There is a structure, visible in any given part of the world, which we may call the *wholeness*. The wholeness is an abstract mathematical structure, existing in space. It captures what we may loosely consider as the global structural character of a given configuration, in itself and in relation to the world around it. The wholeness is a structure that exists at many levels of scale, and covers the interrelationships of the configurations at different scales.

**Centres:** The primary entities of which the wholeness structure is built are centers, centers that become activated in the space as a result of the configuration as a whole. Centers typically have different levels of strength or coherence. The coherence of a configuration is caused by relationships among centers.

**Properties-Relationships-Transformations:** In particular, there are 15 kinds of relationships among centers that increase or intensify the strength of any given center. These 15 properties are listed [below](#), and define the way that configurations within a configuration help each other.

One first practical item on the agenda is to provide well-defined and precise versions of the 15 transformations in *The Nature Of Order*. Though easy to state, this is a remarkably difficult task, for three reasons. Firstly, the 15 properties, though defined with some level of precision, remain somewhat elusive. Defining computational operations that can induce these properties in arbitrary configurations is a challenging task. Secondly, it is difficult to define them as transformations, since this presupposes a language of configurations that is amenable to the transformations. Thirdly, some of the transformations are easier than others to define operationally in sufficiently concrete terms.

**Unfolding:** Within this scheme, unfolding of new configurations is a natural process, and can be understood and followed. We thus have a basis for making computations about unfolding. These are somewhat similar to the bifurcations that have been observed and analyzed in complex non-linear systems, but they are much richer and more complex than the theory of bifurcations can at present contemplate. Unfolding occurs as a result of wholeness-extending (W-E) transformations. These W-E-transformations are combinations and sequences of 15 possible spatial transformations based on the 15 properties that determine how coherent centers may be built from one another.

**Geometric adaptation:** The central issue of this paper is geometric adaptation. In many real world systems, both in nature, and in those places where human beings form communities with animals, plants, and other human beings, the central observable is a close-knit adaptation of the system elements, usually arising over time, and most often expressed in the intricate geometry of the system.

**'Computation':** This close-knit geometric adaptation has not yet been a major focus of scientific study, because it eludes simple algorithmic formulations. That is not because it is more complex, or too complex to be modeled. It happens, rather, because the elements of such adaptation are so extremely simple, and so rooted in common sense, that they nearly elude the algorithmic and algebraic

formulations that we view, wrongly, as more sophisticated.

The planners, building officials, construction companies, engineers, who have redefined everyday processes during the last 100 years, have been working in a broad context of algorithmic thinking and yes-no thinking. And they have, without explicitly intending to, destroyed a far more subtle process. Until that subtle process is acknowledged, and redefined in modern terms, it will not have the status it requires to play an effective role in modern society.

What I am referring to is a structure-confirming, structure-enhancing, structure-extending, structure-strengthening, structure-sensitive process... 'wholeness-extending'... It is a kind of computation, entirely unfamiliar to conventional mathematics, but a computation nonetheless, and one that reaches profound results....

I have used the word computation with a variety of different, though related meanings:

- *Intuitive computations*, made intuitively, by human craftsmen...
- *Conscious computations*, made consciously by a designer, according to a consciously used scheme that calls for certain actions to be performed in sequence...
- *Natural computations*, possessing explanatory power for straightforward scientific problems that have not yet been solved...
- *As yet half-formulated harmony-seeking computations*, which may be implicit in the behavior of different complex systems, and which, if so, would shed important light on the nature of the phenomena...

In a generic sense they are all computations. But in nearly all these cases they are not recognizable as computations in quite the way we presently understand calculations or algorithms.

**Harmony:** When health, or wholeness, or harmony, exists in a part of the world, what is under discussion is always the relationship of a given system to the larger world beyond that system. So the issue is not merely whether a group of elements act together. What is important is that when the elements are grouped together to form a system, the resulting system either does or does not act in such a way as to heal, or sustain, or improve, the coherence and health of the yet larger system around it, some part of the world outside and beyond the group, some system of which this group of elements is a part.

The *emergence* phenomenon is a two-fold relationship, between a set of elements and a group they form. The *harmony* phenomenon is a three-fold relationship, between a set of elements, the group they form, and the helpfulness of the ensuing group to the world beyond the group.

**Wholeness-extending transformation:** A W-E-transformation is a transformation that moves a complex configuration forward, retaining as much of its wholeness structure as possible, and drawing new structure from the latencies within the wholeness itself. In so doing the configuration usually becomes richer and more complex in unforeseeable ways that benefit the larger whole although this can happen without intervention by a decision-maker.

...this whole-seeking or harmony-seeking process is not teleological, not goal-seeking. Instead, it comes about because of a new type of operation performed on the structure that exists, that brings to fruition a larger, unexpected, and unanticipated new structure of wholeness, in each individual case. The existence of such a computation, and its operation in virtually every creative process in nature and in art, perhaps embodies the real creativity of the universe at work.

**Human involvement:** By observing this kind of computation going on, and then, hopefully understanding it well enough to simulate it, we may lead to a new era of our ability to think.... because harmony-seeking computations occur in nature, and can also occur in human creative processes. The constant awareness of these two very different spheres, and the process of comparing them, is what, above all, makes this kind of computation interesting....

But if we accept that the harmony-seeking computation is based on transformations that are (for whatever reason) largely congruent with human cognition and mentality, then we may not be silly to consider such a process as an explanatory process even in the most outlandish structures.... If we can examine these computations, and begin to understand or extract the underlying way they work - all of them together - and if we succeed in getting the gist of this type of computation, we may find a way towards a powerful new way of computing that is guided by emerging harmony, and by a motion towards harmony.

Operationally, and emotionally, such a procedure is creating structure in a new way. It may be done by an artist, with an intuitive grasp of the underlying latent structure, at each step in the unfolding of the whole. Or it may be done by an engineer. Socially speaking, this is a new kind of process, a new function for an artist, and a new challenge to engineers, architects and planners of all kinds. This new kind of work demands enormous concentration and attention.

The intuitive act is nevertheless a computation, and we may be able to pin down what kind of computation it is. Then, if we can succeed in making a harmony-seeking computation, even perhaps one day helped by a computer working in a new way to achieve similar holistic results, that will be because the thing we recognize intuitively as coherent or whole, is, mathematically, a particular recursively generated structure of symmetries and centers which have the 15 properties in them. It is this underlying structure that allows the human mind, and natural processes, both, to follow this path and to seek wholeness in the way they do.

## Controversy regarding 'subjectivity' vs. 'objectivity' regarding 'beauty' and 'life'

The question of the nature and appropriateness of the subjectivity of Alexander's approach is evoked in a published dialogue about his approach (*A Conversation with Three Scientists: Physicist Philip Ball, Biologist Brian Goodwin and Mathematician Ian Stewart, Katarxis*, 10, September 2004). It contains the following comments on psychology:

- Whether a form is a product of a certain process has nothing to do with psychology. That it leads to our connecting better in a

psychological sense says something deep about how our cognitive system is tuned (evolved) to recognize and interpret such structures.

- Well... mathematical theories and human psychology are two different things. But it's a pretty good test of a theory, to see whether it can help us understand how our preferences form.
- I think we all probably know what he means when he says he experiences more 'life' in certain structures, but to then attribute this as a property of the space or structure, rather than as a psychological construct, seems wholly unjustified.
- Much of this 'theory of life' is really about cognitive psychology, projected onto the outside world. It seems to me that it might be more productive to explore why the brain perceives, orders and responds to things this way, not why the world is constructed this way.
- My suspicion is that the more complex and 'intelligent' one makes the 'agents' in a model, the further one gets from reality - because once we are in a situation where we have a great deal of choice, simple 'physical' models become too psychologically naïve.
- So at present, trying to model situations where too much psychology is involved does, in my opinion, result in a weaker (less realistic, less reliable) model.

Alexander responds to these specific critics and their points in an (earlier) paper (*New Concepts in Complexity Theory: an overview of the four books of the Nature of Order with emphasis on the scientific problems which are raised*. 2003). He distinguishes between:

- a judgement described as subjective because it is idiosyncratic, namely the product of one person's mind or ideas, namely not part of a shared canon or capable of being part of one
- a statement called subjective because it engages, or includes, the personal subjectivity of the observer, the I-ness or consciousness or feeling of an observer

He considers the first a valid criticism from a scientific perspective and the latter situation to be fairly common in science itself. He accepts that his *The Nature of Order* is filled with examples of the second kind:

... since union of system behavior with the subjective experience of the observer is fundamental to what I have to say, fundamental to the idea of wholeness as something not merely present in an objective material system, but also present in the judgment, feeling, and experience of the observer. In short, cognitive/subjective experience is affirmed by objective reality.... Indeed, the neutral observations we need, in order to reach adequate discussion and comprehension of wholeness, are observations of a type which *can only be obtained when we agree to use the observer's feeling of his or her own wholeness as a measuring instrument*.

Regarding the capacity of 'objectivity' to handle 'subjectivity', it is appropriate to ask how:

- historically unprecedented resources can be devoted to 'hearts-and-minds' in Afghanistan and neighbouring arenas with little success -- but supposedly as the prime strategic focus for an endangered world -- heavily aided and abetted by the **natural sciences** and the **formal sciences** (especially mathematics), and with little reservation
- key human values, essentially 'subjective', can be framed more generally as the principles according to which the world is governed and public resources are 'objectively' allocated
- scientists can reconcile the 'subjectivity' with which they 'fall in love' with the 'objectivity' which might be assumed to inform such decisions -- beyond hard evidence regarding pheromones and other triggers of 'attraction'
- scientists, most recently climate scientists, can ignore the factor of overpopulation (and resource overshoot) in studies which purport to be objective, but which are so heavily influenced by subjective considerations

It is curious that in the 21st century intellectual capacity is unable to handle the objectivity/subjectivity debate with greater elegance. It is much to be regretted the extent to which the debate degrades into objectivity=appropriate and subjectivity=inappropriate, or vice versa. Such debate is a complete waste of time in the most fundamental sense. It can be reframed by several means:

- transcending binary logic by acknowledging the value of a quadrilemma: objectivity, subjectivity, objectivity-and-subjectivity, neither-objectivity-nor-subjectivity
- recognizing that the debate is a reflection of the first of the **three laws** of **Arthur C. Clarke**: *When a distinguished but elderly scientist states that something is possible, he is almost certainly right. When he states that something is impossible, he is very probably wrong.*
- acknowledging the classical Taoist wisdom, expressed in *The Pivotal*, to the effect that:  
*Tao is obscured when men understand only one of a pair of opposites, or concentrate only on a partial aspect of being. Then clear expression also becomes muddled by mere wordplay, affirming this one aspect and denying the rest. Hence the wrangling of Confucians and Mohists; each denies what the other affirms, and affirms what the other denies. What use is this struggle to set up "No" against "Yes," and "Yes" against "No"? Better to abandon this hopeless effort and seek true light!*

## Comprehending Alexander's transformation principles within the psychosocial realm

**Transformation properties:** As noted above, central to Alexander's current synthesis, on the basis of past decades of research on patterns, is the recognition of 15 transformations or properties:

Levels of Scale	Good Shape	Roughness
Strong Centers	Local Symmetries	Echoes
Thick Boundaries	Deep Interlock	The Void
Alternating Repetition	Contrast	Simplicity
Positive Space	Gradient	Not-Separateness

Given the potential implications of his work, the key question is how to interpret these for the psychosocial realm. Clearly the language developed by him, especially for the built and 'natural' environments, is challenging in relation to its psychosocial significance.

**Assumptions:** The assumption made here is that there is a 'translation' possible between these realms based on understandings of isomorphism between systems. This was the assumption made with respect to the earlier exercise (*5-fold Pattern Language*, 1984). It is unclear whether there is a specific correspondence between Alexander's patterns of 1977 and the above 15 transformations.

The assumption made here is that the transformations are a distillation of the significance of those patterns and that it might indeed be possible to cluster the original patterns in terms of the 15 transformations, with the possibility that some patterns might relate to several clusters and some may have been dropped. It is also a fact that in his subsequent work he stressed the manner in which users could best be actively involved in selecting and designing patterns -- presumably patterns absent from his original set (*The Oregon Experiment*, 1975). A valuable commentary has been made on that process by Greg Bryant (*The Oregon Experiment After Twenty Years*, *Rain Magazine*, 14, 1, Spring 1991).

The concern here is with the use of Alexander's original pattern language for the built environment as a template from which to derive psychosocial patterns. Since first engaging in this exercise (*5-fold Pattern Language*, 1984), a range of authors has made the case for a degree of isomorphism between systems at different levels -- as original emphasized in general systems theory. Those authors include Henryk Skolimowski (*The Participatory Mind: a new theory of knowledge and of the universe*, 1995), Douglas Hofstadter (*I Am a Strange Loop*, 2007; *Gödel, Escher, Bach*, 1979) and Gregory Bateson (*Mind and Nature: a necessary unity*, 1979). In an earlier paper an argument was developed in support of 'cognitive entanglement' between cognitive systems and external, 'natural' systems (*Cognitive Implications of Lifestyle Diseases of Rich and Poor Transforming personal entanglement with the natural environment*, 2010).

Alexander himself makes the point that:

Newton, as a matter of record, considered the progress of the universe, in the large and in the small, to be entangled, inevitably, with a movement towards harmony, and with the greater harmony of the world as a necessary underpinning for the discoveries of science. Leibniz, Kepler, and others thought the same. (*Harmony-Seeking Computations*, 2009)

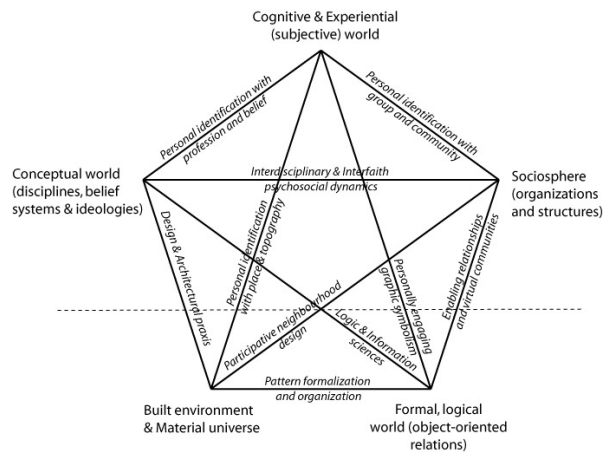
The question is how human nature is cognitively entangled with that movement towards harmony. This is a matter which Alexander explores in a particular way but, as noted above, it is questionable whether his effort to objectify this understanding effectively denatures individual engagement in the appreciation of that harmony, however it is engendered.

## Use of pattern language for the material world as a template

The approach of the 1984 experiment was to adapt Alexander's language, via a 'formal' systemic 'template', to give a 5-fold set of pattern languages -- each being a language in its own right:

- **Template:** This endeavours to describe the pattern in content-free, formal terms as pure relationship. As such it is a guideline for the elaboration of patterns for other arenas.
- **Physical environment:** This is an adaptation of Alexander's own 1977 pattern description for the built environment (*A Pattern Language*, 1977)
- **Socio-organizational environment:** This describes the pattern as it applies to the organization of social groups, organizations and networks.
- **Conceptual environment:** This describes the pattern as it applies to the organization of a conceptual framework or a body of knowledge.
- **Intra-personal environment:** This describes the pattern as it applies to the organization of modes of awareness adopted by a person.

**Indicative configuration of a 5-fold pattern language**  
(with those of the psychosocial realm above the dotted line)



As presented in the diagram, the three upper vertices correspond to the psychosocial realm of primary interest here. The lower two vertices have been the primary focus of Alexander's work:

- **'Built environment'**, and its links to the psychosocial realm, corresponds to design praxis, sense of place (*The Timeless Way of Building*), and participative design (*The Oregon Experiment*)
- **'Formal, logical'**, and its links to the psychosocial realm, corresponds to pattern formalization (*A Pattern Language*, *The Nature of Order*), as a template enabling 'translation'. Recent concerns have been with engaging graphic forms (*Harmony-Seeking*) and information theory (*Complexity Theory*, *Computation*). Curiously it might also be understood as belonging to the world of logic as a human artefact -- and therefore part of the psychosocial realm. These correspond to Alexander's current effort towards a computational methodology and formalism to clarify the application of the 15 transformations (*Harmony-Seeking Computations*, *International Journal for Unconventional Computing (IJUC)*, 2009; *New Concepts in Complexity Theory*, 2003).

It is important to be clear that it is possible to 'read into' Alexander's explicit preoccupation with the quality of human experience, in the built and natural environments, a concern with the design of psychosocial environments independently of material environments. If such design is to be interpreted as 'social architecture' (rather than simply 'social housing'), the point is made by Christina Wodtke (*The Elements of Social Architecture*), especially the fact of its publication in *Information Architecture: Blueprints for the Web* (2009). It might be considered to be epitomized by the only reference to 'social' organization in *Harmony-Seeking Computations* (2009), namely to the flight of geese in formation, the organization of ant colonies, or the coherent movement of slime mold.

As noted by the *Wikipedia* entry on '[social design](#)', this has *many definitions and the term is put to very different uses across the globe. Some definitions exist within the design world and refers to design in its traditional sense, meaning the shaping of products and services. Other definitions refer to social design as the creation of social reality; design of the social world.* It is the latter sense which is intended in distinguishing the 'psychosocial realm' from the patterns elicited by Alexander.

An earlier experiment with the 'translation' described was carried out with the 30 Articles of the *Universal Declaration of Human Rights*, giving rise to a 4-fold *Universal Declaration of the Rights of Human Organization: an experimental extension of the Universal Declaration of Human Rights* (1971):

- **Individual:** This is the authorized text of the *Universal Declaration of Human Rights* as contained in the Official Records of the Third Session of the United Nations General Assembly, Doc. A/810. [*As a legal construct, this might be associated with an amalgam of the 'built environment' and a 'formal, logical' definition in the diagram above*]
- **Collective:** Organizational and collective rights and the rights of groups [*This is associated with the 'sociosphere' in the diagram above*];
- **Discipline:** Rights of disciplines and other modes of thought and activity [*This is associated with the 'conceptual world' in the diagram above*];
- **Role:** Personal rights, namely the rights a person should permit their own roles and all their own modes of thought and activity [*This may be associated with the 'cognitive and experiential world' in the diagram above*].

The specific challenge with respect to the current language of Alexander's 15 transformations is to detect wording of relevance to the psychosocial realm. A possible shortcut, given the existence of the 1984 'translation' -- and **assuming that the patterns of that time are indeed clustered to some degree in terms of the 15 transformations** -- is to use the psychosocial language highlighted through such clustering to guide the translation.

To this end, the index of the *5-fold Pattern Language* (1984) has been converted into a table with the patterns as rows and the columns indicative of the 15 transformations. Additional columns have been added from the 1984 exercise to indicate to how many 'broader' patterns a given pattern was linked, and how many 'narrower' patterns were linking to it. The first rows of that table are presented below. At this stage this is merely indicative of an exercise which could be pursued more assiduously.

#### Extract from table to associate patterns with transformations

[access [complete table](#) providing active links to individual pattern explication in psychosocial terms]

Framework for Association of Alexander's Patterns and Aesthetic Transformations Annex to <i>Harmony-Comprehension and Wholeness-Engendering: eliciting psychosocial transformational principles from design</i> (2010)																
Pattern Names re-formulated as templates in 5-fold Pattern Language (1964)	Properties / Transformations of Christopher Alexander from <i>The Nature of Order</i> (2004)												Links			
	Strong centres	Levels of scale	Thick boundaries	Alternating repetition	Positive space	Good shape	Local asymmetries	Deep interlock and ambiguity	Contrast	Gradients	Roughness	Ethos	The Void	Simple and linear calm	Non-separateness	B
1 Independent domains															0	2
2 Distribution of organization															1	4
3 Interpretation of complementary modes of organization															1	6
4 Representative resource cultivation areas															4	1
5 Network of inter-relationships															1	4
6 Intermediate scale organization															1	3
7 Non-linear organization															5	5
8 Variety of forms and processes															1	10

## Tentative adaptation of Alexander's 15 transformations to the psychosocial realm

The following properties or transformations are those listed with brief comment in Alexander's *Harmony-Seeking Computations: a science of non-classical dynamics based on the progressive evolution of the larger whole* (*International Journal for Unconventional Computing*, 2009). As he notes there, it is in *The Nature of Order* that he reports in detail on his observations of these 15 structural features, appearing again and again in coherent systems, and which appear to play a major role in establishing the wholeness of these systems. A necessarily tentative and presumptuous effort is made here, *using italics, to modify or relate his language more clearly to the psychosocial realm.*

1. **Strong centres:** Wholeness is composed of centers, and centers arise from wholeness. A given wholeness is coherent to the extent that the centers in it are coherent. Centers are recursive in structure. Each center that exists acts to strengthen other centers, larger and smaller.

*This statement can be readily understood in psychosocial terms if 'wholeness' and 'centre' are understood in terms of identity -- and the integrative coherence that may be experienced as associated with it. The wholeness of a group may be understood in terms of the identity of the individuals or roles composing it. Equally, for an individual, the personal sense of wholeness and integrity may be related, according to one school of psychology, to the 'sub-personalities' from which it arises. The literature on holons is potentially relevant to the statement.*

2. **Levels of scale:** When a *psychosocial* configuration contains centers, these centers are associated with centers at a range of sizes that occur at well-marked levels of scale. The scale jumps between levels are small: in coherent systems the centers of different sizes are often in size-ratios of 2 to 1, 3 to 1 and 4 to 1. If the jumps are larger - for example 10 to 1 or 100 to 1 - without intermediate levels, the coherence tends to fall apart. This means that in coherent *psychosocial* structures, the ladder or hierarchy of levels has evenly spaced rungs, and is continuous and smooth.

*It is of course the case that scale is fundamental to the organization of psychosocial systems, from the level of the individual (if not the role), through the family, the group or community, to the country, the region and the globe.*

3. **Thick boundaries:** Strong *psychosocial* centers typically, though not always, have thick *psychosocial* boundaries around them. These thick boundaries may exist in 1-, 2- or 3-D, and are themselves made of smaller centers that have the levels of scale relation to the larger centers being surrounded. These boundaries typically form a transition zone of interaction, allowing *social or psychological processes* (rather than physical, chemical, or biological processes) to occur without contaminating the *psychosocial* centers being surrounded. The boundary is often on the order of one scale jump smaller than the thing it surrounds, thus may be equal to the diameter or half the diameter of the thing surrounded. Boundaries help form the field of force that creates and intensifies a center; they surround, enclose, separate and connect.

*The sense of boundary is of course fundamental to social and psychological identity -- notably associated with that of gate-keeping functions (only too evident in the creation of immigration issues). Of particular interest is how openings are created or closed in order to ensure a manageable degree of sensitivity and to avoid overload (Orrin Klapp. *Opening and Closing: strategies of information adaptation in society*, 1978)*

4. **Alternating repetition:** When repetition of similar *psychosocial* centers occurs in a coherent system, the centers typically alternate with a second system of centers, thus forming a double system of centers with a beat or rhythmic alternation, from the positive space between the repetitions. Centers intensify other centers by repeating in a rhythm; when a second system of centers also repeats, in parallel, it intensifies the first system by providing a kind of counterpoint, or opposing beat.

*This could be understood as a generic description of inter-sexual relationships, prefigured by courtship behaviour (and manifested in dance). The pattern of alternation could be understood to be the essence of the democratic ideal, even to be essential to the process of development (*Development through Alternation*, 1983). Curiously Alexander's own description of V-formation flying by migrating geese points (with the rules he adds to those of *boid simulations*) to the necessary alternation of leadership both in social groups and in the dominant role in individual behaviour:*

There is a rule of follow the leader (though boid enthusiasts deny it), but the leader is not an arbitrary 'king'. Instead the wake rule means that birds follow one another, without electing a leader; but at any one time there is a temporary leader who gets defined by the fact that it is the only bird not behind another bird. Being in this position is tiring, and birds try to

avoid it. So there is no permanently elected leader, but there is always a temporary leader, and that temporary leader keeps changing

5. **Positive space:** In coherent *psychosocial* systems, there is no 'background', or figure and ground. Instead, every bit of *psychosocial* space is coherent, well shaped; and the space between coherent bits of space are also coherent and well-shaped.... The positiveness of space is difficult to pin down exactly, but it is like a weak kind of convexity, or quasi-convexity. In systems where the space is positive, the principal elements of space are nearly all quasi-convex, and the pieces of space between these elements are also quasi-convex.

*Much is of course made of 'positive' as a metaphor in psychosocial systems, and of the problematic nature of 'negativity' (Being Positive Avoiding Negativity: management challenge of positive vs negative, 2005). Figure and background are also significant concepts in psychosocial contexts. The implications of convexity are inherent in geometric explorations of thinking and identity (Geometry of Thinking for Sustainable Global Governance, 2009; Geometry, Topology and Dynamics of Identity: cognitive implication in fundamental strategic questions and dilemmas, 2009) and the quest for 'globality' (Metaphorical Geometry in Quest of Globality, 2009).*

6. **Good shape:** This describes a particular, coherent quality of the particular shapes that occur in or around a coherent *psychosocial* center. This kind of 'good' shape is somewhat unusual, and is marked by the fact that the shape itself is made up from multiple coherent centers which together form the shape, and of other coherent centers which together form the shape of the space around the shape.

*Much use is of course made of 'shape' as a metaphor with regard to the condition of psychosocial systems. Individuals, families, groups, institutions and countries may be described as being 'in good shape'. Concern is currently expressed with regard to the 'good shape' of the global system, now or in the future.*

7. **Local symmetries:** Strong *psychosocial* centers often have strong symmetries, and local parts of space with strong symmetries are typically strong centers. This feature binds together smaller *psychosocial* centers within the whole, further creating coherence.

*The manner in which individuals acquire and hold membership in a group, or groups in larger groups, or countries in intergovernmental groupings, may all be recognized in terms of a form of symmetry. In each case the members are of a kind -- they 'fit'. Their 'fitness' within the larger system is based not only on a degree of similarity, but especially on a recognized complementarity which may be understood as symmetry.*

8. **Deep interlock and ambiguity:** This occurs where coherent *psychosocial* centers are 'hooked' into their *psychosocial* surroundings, making it difficult to disentangle the center from its surroundings. Often there are ambiguous zones which belong both to the center and to its surroundings, again making it difficult to disentangle the two.

*Such interlocking is of course a characteristic of the entanglement of individuals in larger groups (families, communities, etc), and of groups in larger collective associations. Ambiguity is notably to be detected in questions of the loyalty and identification, as in the case of 'divided loyalty'.*

9. **Contrast:** Every *psychosocial* center relies to some degree on the contrast of discernible opposites, and on its differentiation from the ground where it occurs. It is intensified when the ground, against which it is contrasted, is clarified and itself becomes made of *psychosocial* centers: all this differentiation arises from the degree or sharpness of contrast that is attained. Note, though, that too-sharp a degree of contrast is offset by Non-Separateness, below.

*This is evident in appreciation for a richly contrasted psychosocial system in contrast to the monotony of homogeneity. Psychosocial systems, whether their components or as a whole, are held to be strengthened by such variety. The challenge of course lies in how discernible are the opposites, to what degree of polarization this tends to give rise, and how the resulting dynamics are tolerable and appreciated -- even as a fruitful irritant.*

10. **Gradients:** *Psychosocial* centers are generated and strengthened by gradients of size, shape, or quality. Thus any quality among a system of *psychosocial* centers that varies systematically produces a gradient, and this gradient, by pointing to a particular center, helps to build that center and to intensify its coherence.

*This makes a potentially controversial case for a degree of inequality in 'size, shape, or quality'. It is evident in the appreciation of competition as essential to the health of psychosocial systems and for the individuals and groups that compose them. Any array of sporting teams is valued because of the sense of gradient and the engaging dynamics to which it gives rise.*

11. **Roughness:** In coherent *psychosocial* structures we usually find a rough arrangement and repetition of *psychosocial* centers rather than exact repetition in shape, spacing and/or size. Thus apparently similar *psychosocial* centers are different according to context, allowing each part to be adapted to the geometric constraints around it, thus modifying details of the repeating structure as it needs to be. Texture and imperfections are generated, and in part create the possibility of true uniqueness and life.

*This highlights the relation between perfection and imperfection as they are variously appreciated in psychosocial systems. The*

*excess of either detracts from a greater subtle richness in the whole. Rather than eliminating imperfection in psychosocial systems, the Japanese recognition of the harmony of imperfections offers greater potential.*

12. **Echoes:** Within coherent *psychosocial* configurations there are often deep underlying similarities or family resemblances among the elements. These similarities are often characterized by typical angles, and typical curves, so that they generate what appear to be deeply related structures, sometimes so deep that everything seems to be related.

*This points to the manner in which subtle cues in psychosocial systems, and the associated behaviors, help sustain a deep sense of coherence -- typically most clearly recognized by those from other cultures.*

13. **The Void:** In the most profound *psychosocial* centers that have perfect wholeness, there is often at the heart of the structure a void that is large, undifferentiated, like water, infinite in depth, surrounded by and contrasted with the clutter of the structure and fabric all around it.

*References to an empty centre, or a quality of emptiness at the core of the most appreciated psychosocial centres, characterize those most valued or associated with wisdom. This sense is most evident in some personal meditative quests, most notably articulated in Buddhism as [Sunyata](#) and the psychosocial environments in which it is cultivated.*

14. **Simplicity and inner calm:** Essential to the completion of a coherent *psychosocial* whole is a quality of simplicity. Every structural feature that is unnecessary has been removed, so that the remaining structure has slowness, majesty, quietness. Everything superfluous has gone.

*This is most notably recognized and cultivated in [voluntary simplicity](#) movements, as notably expressed in the [Quaker Testimony of Simplicity](#), but most evident in monastic lifestyles favouring simple living.*

15. **Non-separateness:** Connectedness; we experience a living whole as being at one with the world around it, not separate from it. This means that when not-separateness exists, visible strands of continuity of line, angle, shape, and form, connect the inside of a living center with the parts of the world beyond that center, so that it is, ultimately, impossible to draw a line separating the two.

*This is widely recognized in the sense of the connections of individuals with each other and with nature. It has been highlighted by recognition of the ['six degrees of separation'](#) between any two people in social networks or on the globe. It also underlies the sense expressed by Gregory Bateson ([Mind and Nature: a necessary unity](#), 1979) in making the point that:*

*The pattern which connects is a meta-pattern. It is a pattern of patterns. It is that meta-pattern which defines the vast generalization that, indeed, it is patterns which connect.*

*And it is from this perspective that he warns in a much-cited phrase: "Break the pattern which connects the items of learning and you necessarily destroy all quality."*

## Systemic comprehensiveness of sets

A key question in considering Alexander's 15 transformations is why 15 -- and not 14, or not 16, or some other number? It is necessary to assume (for this exercise) that 15 has appropriately emerged from the many decades of research he has devoted to these issues. This does not mean that he may indeed have 'missed' some (as a consequence of blindspots), or that some could be more appropriately combined or dropped. The set must however be assumed to be systemically 'complete' in terms of the perspective that he offers -- 'well-formed' and 'robust' in design terms.

The question might also be asked in relation to his early involvement with cognitive psychologist [George Miller](#), author of one of the most highly cited papers in psychology ([The Magical Number Seven, Plus or Minus Two: some limits on our capacity for processing information](#), *Psychological Review*, 1956). This is an argument indicating the number of objects an average human can hold in working memory. Clearly 15 exceeds that number and -- possibly of relevance -- is effectively twice that number. This issue might be considered of relevance to human comprehension of the set of 30 Articles in the *Universal Declaration of Human Rights* -- namely a fourfold increase on Miller's range.

Both such questions have been considered together ([Representation, Comprehension and Communication of Sets: the Role of Number](#), 1978). This offers a context for asking the question how such a set of 15 is to be meaningfully configured to be appropriately comprehended. What indeed are the systemic relationships between the 15 -- or between the 30 'universal' human rights? How might the elements of such sets be appropriately woven together to facilitate comprehension in each case?

The problem is potentially even more challenging in the classic Chinese articulations of value-imbued situations, namely the *I Ching* (64 conditions), the *Tao Te Ching* (81 conditions) and the *Tai Xuan Jing* (81 conditions). There are many commentaries of potential relevance on how such sets may be configured to facilitate comprehension ([9-fold Magic Square Pattern of Tao Te Ching Insights experimentally associated with the 81 insights of the T'ai Hsüan Ching](#), 2006; [Interrelationships between 64 Complementary Approaches to Sustainable Community](#), 2007; [Interrelationships between 64 Complementary Approaches to Sustainable Lifestyle](#), 2007; [Interrelationships between 64 Complementary Approaches to Vision](#), 2007).

With respect to use of a [magic square](#), as previously noted ([Magic Carpets as Psychoactive System Diagrams](#), 2010), if any underlying

systemic pattern is to be found in Alexander's 15 transformations, a mathematical curiosity of possible relevance is that all the dimensions of the smallest non-trivial magic square total to 15:

2	7	6	→15
9	5	1	→15
4	3	8	→15
↙15	↓15	↓15	↓15
			↘15

To the extent that this is indeed of any relevance, the current strategic challenge of the 'nine planetary boundaries' and corresponding 'lifestyle diseases' has been specifically explored elsewhere (*Cognitive Implications of Lifestyle Diseases of Rich and Poor: transforming personal entanglement with the natural environment*, 2010).

## Geometrical configuration of Alexander's 15 transformations

It is curious that Alexander seems to have been content to leave the list (above) of transformational properties as a kind of qualitative 'laundry list' -- without endeavouring to apply any of the design principles with which he is so familiar to its configuration. It is more curious that he suggests that any response to this challenge is to emerge from 'computation'.

Alexander emphasizes that his whole approach is based on **geometric adaptation**. There is a concordance between the implications of the **fractal order of nature**, as articulated by Benoit Mandelbrot (*The Fractal Geometry of Nature*, 1982) and those of Alexander (*The Nature of Order*, 2003-4). This stresses the principle of **self-similarity**, namely a resemblance to the whole of the part -- implying a degree of symmetry.

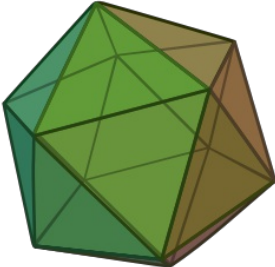
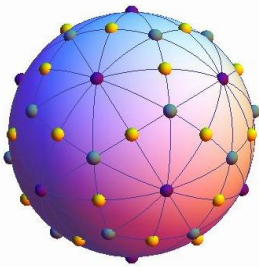
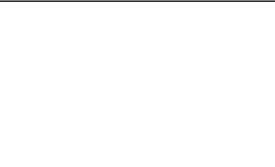
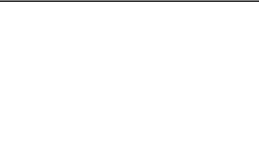
**It might be asked whether the ordered manner of the cognitive engagement with wholeness and harmony applies also to the geometric organization of the set of 15 transformations.** If not, why not? **Assuming the completeness of the set** and its systemic coherence, it is then appropriate to explore how the 15 transformations might be represented geometrically in a manner consistent in some way with the properties and insights with which they are associated.

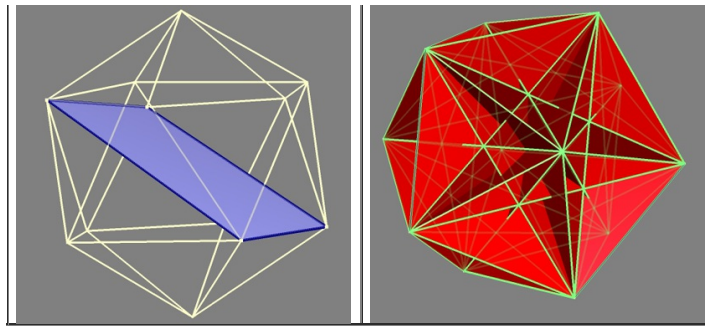
A useful point of departure is the use of the structure of a polyhedron to configure and represent the relationships. This would be consistent with the argument of **R. Buckminster Fuller** (*Synergetics: Explorations in the Geometry of Thinking*, 1975) that every polyhedron can be considered a system (*Systems as Polyhedra*, 2009) . This approach was used in endeavouring to configure the set of, presumably coherent, strategic dilemmas associated with the **UN Earth Summit** in 1992 (*Configuring Globally and Contending Locally: shaping the global network of local bargains by decoding and mapping Earth Summit inter-sectoral issues*, 1992).

The simplest polyhedron with the geometric properties that could serve this purpose in the case of the 15 transformations is the **icosahedron**. As indicated in the Wolfram Demonstration Project of a dynamic variant by Sándor Kabai (*Fifteen Great Circles on a Sphere*):

- three **golden rectangles** at right angles to each other determine the vertices of an icosahedron.
- there are 15 different circles through the pairs of opposite edges of the icosahedron.
- these circles are the **great circles** of a sphere circumscribing the icosahedron, since they are in the plane of the golden rectangles, and by one definition, a great circle is the intersection of a sphere and a plane passing through the center of the sphere.

There are therefore 15 intersecting golden rectangles, each edge of the icosahedron being defined by an edge of a golden rectangle. The 15 golden rectangles span the interior of the icosahedron. These rectangles have 30 edges, and each edge pairs up with its opposite edge to form a golden rectangle.

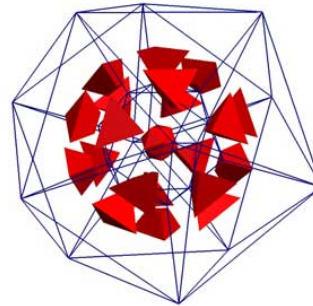
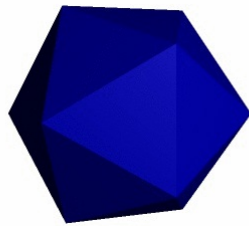
<p><b>Icosahedron</b> (from <i>Wikipedia</i>)</p>	<p><b>15 Great circles of icosahedron</b> (click for <a href="#">dynamic variant</a> from Wolfram)</p>
	
<p><b>Icosahedron</b> showing single golden rectangle (made with <a href="#">Stella Polyhedron Navigator</a>)</p>	<p><b>Icosahedron</b> showing all 15 golden rectangles (made with <a href="#">Stella Polyhedron Navigator</a>)</p>
	



As a structure the icosahedron is:

- central to a **vast array of geometric properties** and transformations which are potential carriers of the kind of significance highlighted by Alexander -- transformations notably articulated by **R. Buckminster Fuller** (*Synergetics: Explorations in the Geometry of Thinking*, 1975); many are evident from the extensive *Wikipedia* entry on the [icosahedron](#)
- central to **design principles** associated with symmetry in architecture (and notably in traditions of sacred geometry, exploiting golden rectangle proportions) which have been the subject of reflection over centuries
- central to a concluding work in **management cybernetics** of **Stafford Beer** (*Beyond Dispute: the invention of team syntegety*, 1994) and its concern with psychosocial design, following his earlier work (1981, *Brain of the Firm*, 1981; *Diagnosing the System for Organisations*, 1985). His heritage as an operations research theorist has been developed in terms of a [viable system model](#).
- the focus of a range of **applets illustrating the dynamics of such transformations** via the web (including that from the Wolfram site). Of particular interest is the so-called jitterbug (discovered by Fuller) which incorporates the icosahedral structure as one phase in a continuous sequence of geometrical transformations (*Jitterbug: Symmetrical Contraction of Vector Equilibrium*, 1997; *Vector Equilibrium and its Transformation Pathways*, 1980; [animation](#))

<b>Example of a simple icosahedral transformation</b> <a href="#">Icosahedron</a> morphing into <a href="#">Dodecahedron</a> <small>(made with <a href="#">Stella Polyhedron Navigator</a>)</small>	<b>Four dimensional simulation using an icosahedron</b> 4D Prisms created on icosahedron <small>(made with <a href="#">Stella Polyhedron Navigator</a>)</small>
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One might even ask whether Alexander's research has led him, unknowingly, to 're-discover' the integrative properties of the icosahedron -- implicit in the geometric configuration of his 15 transformations. It is however extraordinary, given how fundamental such polyhedral forms are to design, that he has not explicitly made reference to them as a potential for the design of the set of transformations he elicited ([Keith Critchlow](#), *Order in Space: a design source book*, 1969). With respect to the above:

- they merit consideration as pointers to an approach to the challenge of 'harmony-seeking computation' as outlined by Alexander:
- it would appear that the work initiated by Beer establishes bridges between Alexander's focus on the built material environment and that of the built psychosocial environment.
- the potentially significant role of Fuller in this respect is more elusive, as has been argued in (*Geometry of Thinking for Sustainable Global Governance: cognitive implication of synergetics*, 2009).

With respect to the challenge of computation, Alexander remarks:

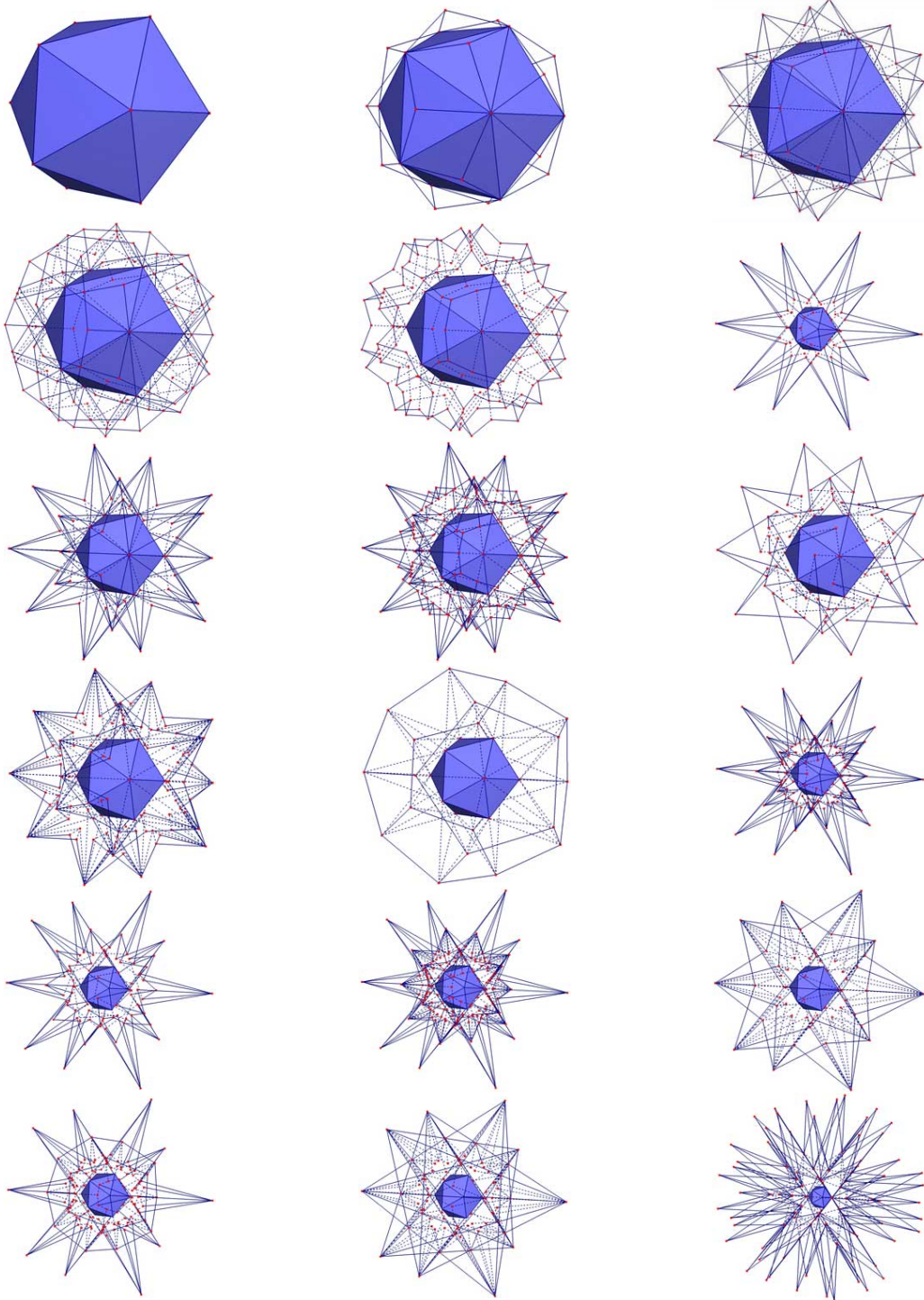
Firstly, the 15 properties, though defined with some level of precision, remain somewhat elusive. Defining computational operations that can induce these properties in arbitrary configurations is a challenging task. Secondly, it is difficult to define them as transformations, since this presupposes a language of configurations that is amenable to the transformations. Thirdly, some of the transformations are easier than others to define operationally in sufficiently concrete terms. For example, **Local symmetries**, **Thick boundaries** and **Levels of scale** are relatively easy. **Positive space** and **Echoes** are harder. **Simplicity and inner calm** and **Not separateness** are among the most difficult.

It is possible that the simplest are most closely associated with even more basic and 'concrete' polyhedra into which the icosahedron can be 'folded'.

What might be implied by geometrical computation designed to seek for 'harmonious' solutions? Is such 'computation' to be considered as the basis for the 'new way of thinking' to which Alexander refers? Clearly the quest by mathematicians for ever more complex

symmetry groups is an indicator of one such possibility -- notably far beyond the three-dimensional framework that is Alexander's focus, or the comprehension of ordinary mortals (*Dynamics of Symmetry Group Theorizing: comprehension of psychosocial implication*, 2008). Hence the substitution in the title of this paper of 'comprehension' for 'seeking' in Alexander's 'harmony-seeking'. It is one thing to seek and find -- another to comprehend.

**Succession of 17 fully 'supported stellations' of the icosahedron**  
 Stellation of a polyhedron creates a new polyhedron which has faces that lie in the same planes as the faces of the original model.  
 (made with *Stella Polyhedron Navigator*)



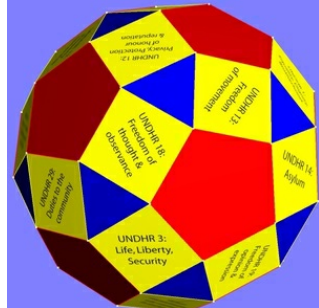

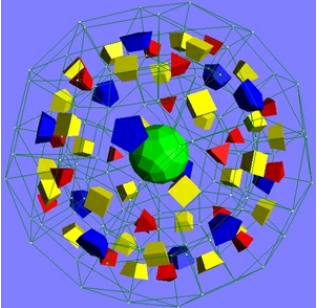
## Relevance to global governance in the psychosocial realm

Of particular interest with respect to the psychosocial realm, and its global crises, is the relevance of such global polyhedral geometry (and its aesthetics) to the challenges of global governance:

- the potential merit of exploring the role of polyhedra in more effective strategic engagement with globality (*Towards Polyhedral Global Governance complexifying oversimplistic strategic metaphors*, 2008; *Configuring Global Governance Groups: experimental visualization of possible integrative relationships*, 2008; *Polyhedral Empowerment of Networks through Symmetry: psychosocial implications for organization and global governance*, 2008).
- the need to develop software supportive of such explorations (*Polyhedral Pattern Language Software: facilitation of emergence, representation and transformation of psychosocial organization*, 2009).
- implications for the long-term future of governance (*Aesthetics of Governance in the Year 2490*, 1990)

- understanding how the syntegeation process developed by Stafford Beer is to be understood in relation to 'harmony-seeking' and 'wholeness-extending' (as J. Truss, et al. (*The Coherent Architecture of Team Syntegrity: from small to mega forms*, 2003).

Of particular concern are the implications of restrictive intellectual copyright associated with the use of such models? Will any 'computation' developed by Alexander's team follow a similar path -- effectively holding the world to ransom? (*Future Coping Strategies: beyond the constraints of proprietary metaphors*, 1992).

<p style="text-align: center;"><i>Universal Declaration of Human Rights</i></p> <p style="text-align: center;">The 30 Articles could indeed be associated with the 30 edges of an icosahedron, here transformations are used to other selected polyhedral representations [see <a href="#">others</a>] (made with <i>Stella Polyhedron Navigator</i>)</p>		
30 Articles displayed on 1 face-type of a rhombicosidodecahedron	Experimental transformation into geodesic form	Experimental representation of 4-dimensional view
		

## Associating qualities of harmony and wholeness with geometry

Alexander strongly emphasizes beauty as a driver to 'wholeness-extending' -- qualifying conventional understandings of the 'attractor' of complexity theory as follows

Rather, I suspect that there are, deep in geometry of space, reasons why ring-like structures with this kind of ratio are likely to occur. In current jargon, rings of this particular ratio might be viewed as attractors in some phase space. However, the discovery of geometric attractors in the solutions to systems of dynamic equations is, in my view, only one particular manifestation of the far more general harmony-seeking computations that occur naturally in three-dimensional space.

The challenge of qualitative association is therefore effectively implied by comprehension of Alexander's list of 15 transformational properties ([above](#)). These are proposed as co-existent characteristics of beauty -- to whatever extent the presence of any one (or any combination) is governed by *requisite variety* as determined by an interpretation of knowledge cybernetics (Maurice Yolles, *Knowledge Cybernetics: a new metaphor for social collectives*. *Organisational Transformation and Social Change*, October 2006; *Exploring Cultures Through Knowledge Cybernetics*. *Journal of Cross-Cultural Competence and Management*, 2007, 5). The questions are:

- how do they together, in whatever combination, function as a 'more fundamental attractor', as might be argued with respect to human values in general (*Human Values as Strange Attractors: coevolution of classes of governance principles*, 1993)?
- what are the 'topological' implications -- as an extension of geometry -- given the special association of beauty to a sense of place and how it is configured (*Topology of Valuing psychodynamics of collective engagement with polyhedral value configurations*, 2008)?
- what part do dynamics play in eliciting signifiacnce from configurations (*Dynamic Exploration of Value Configurations: polyhedral animation of conventional value frameworks*, 2008)?

Does Alexander's quest for a new kind of 'computation' involve human cognition in new kinds of way -- as the ultimate 'personal computer' (universally and freely distributed)? Also of relevance is how any such 'extendable' geometrical harmony relates to the necessary enhancement of the 'identity' of the perceiver and enactor of beauty, whether individual or collective (*Geometry, Topology and Dynamics of Identity: cognitive implication in fundamental strategic questions and dilemmas*, 2009). Possibly **a better question in this context is not 'what' is the computation but rather 'who' is the computer** -- however much human cognition is computer-aided in the process (as originally envisaged for computer-aided design).

The challenge seems to be how cognition engages with a form like a golden rectangle -- a matter long considered. Clearly each of the 15 rectangles could be associated with one of Alexander's transformational properties -- and so 'named'. This recalls the process of psychosocial appropriation of a space at the collective level described by the process of *land nám*, coined by Ananda Coomaraswamy (*The Rg Veda as Land-Nama Book*, 1935), to refer to the Icelandic tradition of claiming ownership of uninhabited spaces through weaving together a metaphor of geography of place into a unique mythic story. This territorial appropriation process, notably practiced by the Navaho and the Vedic Aryans, was further described by Joseph Campbell (*The Inner Reaches of Outer Space: metaphor as myth and religion*, 2002):

*Land nám* ("land claiming or taking") was [the Norse] technical term for this way of sanctifying a region, converting it thereby into an at once psychologically and metaphysical Holy Land.... *Land nám*, mythologization, has been the universally practiced method to bring this intelligible kingdom to view in the mind's eye. The Promised Land, therefore, is any landscape recognized as mythologically transparent, and the method of acquisition of such territory is not by prosaic physical action, but poetically, by intelligence and the method of art; so that the human being should be dwelling in the two worlds simultaneously of the illuminated

moon and the illuminating sun.

The process continues to be common whenever dominated territories recover their independence -- as in South Africa where indigenous geographical names are substituted for European names. Variants are to be found in the naming by scientists of theories, equations and processes -- after their originators in the discipline in question. In the case of astronomers and biologists, this extends to stars and species respectively. This offers a more dilute understanding of cognitive property -- unrecognized by law as intellectual property -- by which communities empowered to do so place their (trade)mark upon cognitive space.

This process transcends the simplicity of labelling, readily applied to the rectangles in a representation of the icosahedron. At issue is how a configuration of such golden rectangles frames a 'new way of looking' -- Alexander's quest and emphasis. How can they be collectively 'looked through' as qualifiers and identifiers of beauty and wholeness? How do the 'correlations' between them work (*Theories of Correspondences -- and potential equivalences between them in correlative thinking*, 2007)?

A valuable metaphoric clue is offered by the manner in which precious stones are cut to 'highlight' their capacity to focus beauty (*Patterning Archetypal Templates of Emergent Order: implications of diamond faceting for enlightening dialogue*, 2002). Precious stones are of course intimately associated with the highest values and are a universal focus of appreciation. Using an optical metaphor, the planes of the golden rectangles as distinct qualities might be understood as coloured filters of the 'white light of beauty' as an attractor -- effectively functioning as prisms to split that light into 15 'colours'.

The extent to which *beauty lies in the eye of the beholder* is a reason for substituting, in the title of this paper, 'engendering' for 'extending' in Alexander's 'wholeness-extending'.

## Beauty as a verb: de-signing the future, human nature and the environment

As noted at various points above, beauty is fundamental to the method Alexander is exploring. With regard to the 'computation' sought in the process of 'wholeness-extending', he notes *Harmony-Seeking Computations* (2009):

It has everything to do with beauty. The harmony that is sought in these computations is indeed what we otherwise call 'beauty'. But the result of harmony-seeking computations are not merely pretty or artistic. In most cases, they are also better functionally and technically. That is why they are important....

As a result, what arises has wholeness, coherence, and beauty. That is the trick, in a nutshell. By continuously preserving and enhancing the existing structure, a beautiful thing arises, naturally. Yet, because each whole is unique, and the idiosyncrasies lying latent in it are also unique, the new whole that springs from this process is unpredictable, original, and creative.

In *New Concepts in Complexity Theory* (2003) he argues with respect to movement in that configuration space (or fitness landscape) of design that:

There is the issue of emerging beauty of shape, as the goal and outcome of all processes...

And what it amounts to in informal language, is that the transformations represent a coded and precise way that aesthetics -- the impulse towards beauty -- plays a decisive role in the co-adaptation of complex systems.... the successful movement around configuration space... cannot succeed unless it uses this technique (2003).

Arguably an assumption is made here that beauty is a **static** attribute of the **static** outcome of a design **process** -- of the resulting 'architecture'. The outcome may indeed call for an appreciative **process**, walking the architecture, admiring the landscape. Missing is any emphasis on the extent to which **beauty is itself a verb** -- beyond the creative, beautifying **process** of designers and architects. **To what extent is the essence of 'beauty' indeed a dynamic**, rather than an image -- as with the many illustrations in Alexander's remarkable overview (*The Nature of Order*, 2003-2004)? To what extent is it most fully experienced in the process of its creation, as argued with respect to poetry (*Poetry-making and Policy-making: arranging a marriage between Beauty and the Beast*, 1993).

As noted above, Alexander's insights may be of significance with respect to the current inadequacy of the design insights applied to 'human nature' and global governance -- as is only too evident from the emerging 'crisis of crises'. Arguably there is an urgency to develop appropriate 'new thinking' to enable civilization to navigate and embody the dynamics of the **adaptive cycle** as highlighted by Thomas Homer-Dixon (*The Upside of Down: catastrophe, creativity, and the renewal of civilization*, 2006). In the earlier review of Alexander's approach (*Magic Carpets as Psychoactive System Diagrams*, 2010), it was argued that the adaptive cycle was necessarily 'a thing of beauty' in that light and that the ability of humanity to navigate it through the crises to come might well call for a shift in cognitive centre of gravity into **circular time** (with its associated logic) as complementary to linear time (Woorama, *Linear vs Circular Logic: conflict between indigenous and non-indigenous logic systems*, 11 June 2006).

As a cycle, engaging with the dynamic of the adaptive cycle may call for recognition of time as in some profound way intimately associated with the challenge of the future (*The Isdom of the Wisdom Society: embodying time as the heartland of humanity*, 2003). The 'beauty' sought as an outcome by Alexander may be more intimately related to the beauty expressed through the dynamic. The identity of human beings -- capable of engaging with that dynamic -- may be more intimately related to a dynamic rather than to a static definition, or the product of lifestyle design (*Emergence of Cyclical Psycho-social Identity: sustainability as 'psycically' defined*, 2007). It is as a verb that individuals may discover the resilience to engage with the ('terrifying') beauty of the adaptive cycle:

- *I Seem to be a Verb* (R. Buckminster Fuller, 1970)

- The fact is I think I am a verb instead of a personal pronoun. A verb is anything that signifies to be; to do; or to suffer. I signify all three. (Ulysses S. Grant)
- *I Think I Am a Verb: More Contributions to the Doctrine of Signs* (Thomas A. Sebeok, 1986)

The challenge may be expressed differently in terms of the contrast made between [apophysis](#) -- mentioning by not mentioning, or 'unsaying' -- and [kataphasis](#) (or cataphasis). The latter characterizes the outcome of definition and, by extension, of design. The contrast clarifies the challenge of identity and identification, notably for the individual engaging with a dynamic (*Being What You Want: problematic kataphatic identity vs. potential of apophatic identity?* 2008).

This argument may be applied to an understanding of design, as argued previously with respect to 'de-signing' (*Designing the 21st Century through integration of the arts and sciences*, 1995; *Definitional Boundary Games and De-signing the 21st Century*, 1995):

A comparison has been made between French and Japanese cooking in the following terms. The most eminent French chef is known by what he does to the food. He is recognized by the tastes he adds to it in the form of sauces -- in which his hand is to be experienced at every turn. By contrast a Japanese chef is known by the impossibility of distinguishing his hand in the food that is offered. His work is to reduce the interface between the eater and the food to the strictest minimum -- allowing the flavours of the food to emerge of their accord. The question is whether the designers of the 21st century are to be of the first kind or of the second.

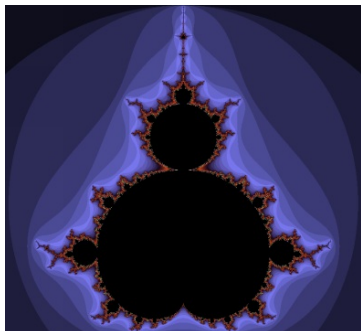
Designing can be understood as removing the significance of the underlying experience of nature. In this way architects and planners have eliminated the experience of nature. Essentially they are of the French school, and the influence of French planning after the Revolution is not incidental to the recent history of urban planning. In this way it may be understood as de-signifying.

However design may also be understood as removing the architectural graffiti imposed by architects and planners on nature. Production of graffiti is a way for some to impose their tag or sign on any available surface. In this way de-signing may be understood as the removal of such defacement, namely of the artificial signs imposed upon nature rendering it invisible. The 21st century will undoubtedly witness the battle between these two schools of thought -- and presumably there will be others. Whilst nature may be affected by this process, it will adapt in its own way. This may not be to our liking, and we may choose to claim that it is denatured or dead. But even if the human race is survived by the rats and the cockroaches living in a wilderness of devastated megalopolises, they will continue to be a manifestation of nature.

The process of de-signing may be understood in contrast to design (as a projection of form), namely as a process of engagement -- possibly to be compared to 'dancing' with the 'other'. It follows from views expressed by authors such as those cited above (Henryk Skolimowski, *The Participatory Mind: a new theory of knowledge and of the universe*, 1995; Douglas Hofstadter, *I Am a Strange Loop*, 2007; Gregory Bateson, *Mind and Nature: a necessary unity*, 1979). This engagement with the 'other' may be explored through the metaphor of a mirror (*Stepping into, or through, the Mirror: embodying alternative scenario patterns*, 2008) or as a form of intercourse (*'Human Intercourse': 'Intercourse with Nature' and 'Intercourse with the Other'*, 2007).

## Application of 15 transformational criteria to a rendering of the Mandelbrot set

As author of many papers on Alexander's approach and their application, [Nikos A. Salingaros](#) has used the 15 transformations in the evaluation of iconic buildings (*Life and Complexity in Architecture From a Thermodynamic Analogy*, Physics Essays, vol. 10, 1997, pp. 165-173). Given how Alexander had elicited such principles of 'life' partially from carpet design, Salingaros also tested them on carpets (*The Life of a Carpet: an application of the Alexander Rules*, paper presented at the 8th International Conference on Oriental Carpets. *Oriental Carpet and Textile Studies V*, 1999). Given the recognized relevance of fractal organization in *The Nature of Order* (cf Nikos A. Salingaros, *Fractals in the New Architecture*, *Katarxis*, 3, September 2004), it is appropriate to explore how the 15 transformations might be recognized in a rendering of the [Mandelbrot set](#) -- as an exercise in 'geometric adaptation'. Its recognized beauty suggests that a magnificent carpet could use such a design -- the larger the carpet, the more explicit the fractal design.

Tentative evaluation of Mandelbrot set in terms of Alexander's 15 transformations			
<i>Transformations</i> (linking to comments above)	<i>Present</i>	<i>Comment</i>	<i>Rendering of Mandelbrot set</i> (arbitrarily presented here rotated 90 degrees from its conventional form; extensive explanation and animations in <a href="#">Wikipedia entry</a> ; a fractal zoomer can be downloaded from <a href="#">Xaos</a> )
1. <a href="#">Strong Centers</a>	x	of the cardioid and 'bulbs'	
2. <a href="#">Levels of Scale</a>	x	characteristic of fractals	
3. <a href="#">Thick Boundaries</a>	x	evident	
4. <a href="#">Alternating Repetition</a>	?	.	
5. <a href="#">Positive Space</a>	?	through convexity?	
6. <a href="#">Good Shape</a>	x	.	
7. <a href="#">Local Symmetries</a>	x	characteristic of that set	
8. <a href="#">Deep Interlock and Ambiguity</a>	x	.	
9. <a href="#">Contrast</a>	?	.	
10. <a href="#">Gradients</a>	?	.	
11. <a href="#">Roughness</a>	x	zooming into the boundary	
12. <a href="#">Echoes</a>	x	.	
13. <a href="#">The Void</a>	x	cardioid centre	

14. <a href="#">Simplicity</a>	x	of the overall form
15. <a href="#">Not-Separateness</a>	x	through connectivity of the whole

Completely missing from the static rendering of the Mandelbrot set is the dynamic process through which it is generated (by 'computation') and open to exploration. It is much appreciated for what can be discovered in navigating it to great detail. Given the argument above regarding the dynamic nature of 'beauty', it is appropriate to ask in this case whether 'it' lies in the algorithm, the iterative process by which the rendering is generated, or the process of 'its' human exploration and appreciation. The further challenge of course lies in the implications of engaging with it (*Psycho-social Significance of the Mandelbrot Set: a sustainable boundary between chaos and order*, 2005).

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