



# laetus in praesens

Alternative view of segmented documents via Kairos

1996

## From Information Highways to Songlines of the Noosphere

### Global configuration of hypertext pathways as a prerequisite for meaningful collective transformation

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#### 1. Metaphorical impoverishment ?

**Highway and Web:** As a means of understanding and explaining the significance of the emerging information society, metaphor is currently highly favoured in many different contexts. Information "highway" seems to be preferred by those concerned with the development of the telecommunications infrastructure. The most conceptually revolutionary feature of the Internet is described as a world wide "web". Users are inclined to describe themselves as "surfing" the net, or possibly "cruising" the information highway.

It is worth asking whether the dimensions of the information society will be adequately captured by such metaphors -- and whether there are not other metaphors essential to the comprehension of features which may be of greater significance to any desirable collective transformation of society. There is a danger that the mental habits associated with "highways" will simply be replicated in this new context without recognizing their limitations. Lacking understanding of their fundamental implications for society, it is worth remembering that automobiles were first referred to as "horseless carriages" -- and "wireless" was long used for radio.

In a study by Stephen Talbott, the question is raised: "Will the 'information highway' really bring us closer together, or will it perform the same function as asphalt highways, encouraging us to seek the promise of better things in the distance? Will the euphoria that now greets the Internet be replaced in 20 or 30 years with the dismay that now surrounds the once-bright promise of television?" (Talbott, p. xiv)

As with road construction, consortia are emerging which expect to make considerable profit from the development of the new highway. Given the questionable practices common in the state-supported construction industry, it would be regrettable if their application to the information society was facilitated for lack of more challenging metaphors. Similarly it is worth asking whether "surfing" and "cruising" adequately capture the full spectrum of ways of using the new facilities in a society in which there are repeated calls for paradigm shifts in the face of conceptual blandness, self-scattering and complacency. "Cruising" reflects little awareness of excessive resource utilization.

What is implied by "web" -- primarily associated with spiders -- concerning human ability to deal with complexity? Are there "spiders" on the Web -- and who or what might they be? Why are the behavioural characteristics of rodents seen as appropriate metaphors for a number of search tools on the Internet -- Gopher, Archie, Veronica (the last two being abbreviations in which the R stands for rodent)?

As a metaphor, highway tends to be used in its most simplistic form. Its richer implications would recognize the existence of a vast network of roadways, developed to different degrees on different continents. Some permit multi-lane traffic, and are characterized by complex junctions to avoid interrupting the flow. Others are single lane, unsurfaced, and infrequently travelled -- and may not be accessible to more sophisticated automated vehicles. Some "freeways" are subject to toll charges. Some are private or, when they cross frontiers, require a visa, for which a fee is usually charged, if appropriate criteria are fulfilled. Some roads are controlled by brigands and terrorists with a variety of intentions. Echoes of all these features are already evident on the "information highway", including the self-elected "highwayman" of the "Robin Hood" variety.

**Navigating:** More interesting is recognition of the challenge of getting around the information society. The metaphor of "navigating" is frequently used -- especially in relationship to the daunting task of navigating complexity. This reflects a broadening of understanding of the vehicle in which users may be travelling (Benking) -- with at least the implication that complexity may not be characterized by a fixed and intricate network of highways (a "World Wide Cobweb"), but rather may be experienced like the challenges of navigating uncharted seas and outer space, where reference points are not as unambiguous as signposts on roads. But the ability to acquire a product defined as a "navigator" tool, such as the justly famed Web browser, Netscape Navigator, can easily reinforce the illusion that the challenge of

navigating conceptual complexity is relatively trivial.

## 2. Challenge of comprehension

**Differences:** At this point the capacity of the user becomes an issue. Skills are required to move around the information society. People may have these skills to different degrees. Much has been made of Internet snobbery in response to "newbies" and their clumsy attempts at orienting themselves compared to the honed skills of hackers. But this is merely one aspect of the challenges of a learning environment.

The information society must necessarily cater for many kinds of need, many levels of sophistication, and many kinds of understanding - - to say nothing of the many languages which have not yet been adequately represented on the Internet. These will all tend to fragment the information society into sub-cultures, which can usefully be understood through biological metaphors as ecosystems and niches that may or may not be significantly linked to each other in a manner necessary for sustainable global community. How is the transition from simpler, or simplistic, forms of comprehension to deeper, or richer, forms to be understood and represented to those characterized by some particular level or pattern of insight? Some will favour metaphors such as initiation, others will distinguish the equivalent of information gurus and blackbelt information manipulators -- in contrast to the information luddites who find reason to reject the "amazing" advantages of the information society. For such people, those hooked on the Internet are usefully understood as having launched themselves into an orbit of the privileged -- away from the mundane issues and constraints of the earthbound, and of those "beyond the last telephone pole".

**Flat earth understanding:** One of the difficulties with the highway metaphor, is that any road is typically thought of as associated with a more or less flat surface, whatever the topography separating origin and destination. In fact, the higher the grade of highway, the flatter the surface and the less the influence of any intervening topographical features. There is a glib transition to "global" information highway by which the world is transformed into a "global village" -- again implying some form of easy (line of sight) communication or a "flattening" of the globe .

There is a dangerous metaphoric trap in such usage. With increasing globality, if the metaphoric implication is retained. Horizon effects necessarily render line of sight communication impossible. Such horizon effects signal important barriers to comprehension and communication. The facile assumption of globality, based on linearity without curvature, obscures this. It leads to what amounts to a "flat earth" understanding of "global" communications. This may appear to be viable if there is no need to comprehend the issues of different cultures, disciplines or value systems -- just as it is usually adequate to treat the map of a city or a country as flat. But it leads to severe navigational difficulties if there is a need to travel to other continents and to understand "where they are" and in "which direction they lie", or to adequately reflect experience that others act on radically different assumptions. This is as true of the conceptual world as it is of the physical world -- curvature implies differences in orientation and planes of reference as well as fundamental differences in perspective (although these may not be readily apparent).

**Curvature:** Introducing curvature into maps of knowledge is just as highly inconvenient as with physical maps. Hence the use by geographers of projections to represent curvature on a flat surface by allowing selected types of distortion. In this sense, to preserve the simplicity implied by linearity, people (if they are aware of the issue) may choose to effectively "live on a projection". It is over this flat projection that the information highway is currently understood to run -- especially by its constructors and "power users". The nature of any "edge" and the challenges of "circum-navigating" are not considered.

As yet there is little sensitivity to the severe conceptual distortions that this introduces. Symptoms of this (and its denial) are the complaints of non-English cultures concerning the dominance of English on the Internet and concerns about cultural imperialism. Less obvious perhaps is the false conceptual proximity implied by listing competing schools of thought together on a single Web document. Ease of electronic access to them does not necessarily imply conceptual proximity amongst those concerned -- or that the menu ordering them in any way addresses the challenges of moving from one perspective to another. A telephone directory does not mean a community exists -- it takes no account of who cannot call whom, and who is unable to dialogue with whom. There is every likelihood that conceptual niches are created by the breakdown of line of sight communication.

## 3. Grid systems and beyond

The complexity of the global information highway is already such that it would be difficult to represent it on a grid. Like the physical highway, it is a complex network of telecommunication pathways along which data packets may travel by a variety of alternative routes including satellite links. With the emphasis on terabytes of information per second, there is clearly little concern for the global significance of what is carried -- except possibly by intelligence agencies and hackers.

Internet enthusiasts reject any reservations about its positive implications, as voiced by Talbott (1995), Roszak (1994), Silicon (\*\*). For some idealists, it is intimately associated with a real manifestation of global consciousness. Ken Wilber responds to this view as follows:

"The Net is simply the *exterior* social structure...But what goes through the Net -- well, that involves *interior* consciousness and morals and values, and none of that is even vaguely addressed by those who simply maintain the Net is global consciousness....What computer technology (and the Information Age) means is that the techno-base can *support* a worldcentric perspectivism, a global consciousness, *but does not in any way guarantee it*. As we have seen, cognitive advances are necessary but not sufficient for moral advances, and the cognitive means usually run way ahead of the willingness to climb that ladder of expanding awareness...You focus on the exterior grid and ignore the interiors that are running through that grid. The flatland idea is that the Internet is global, so the consciousness using it must be global. Not even close. And so once again, the flatland paradigm can't even spot the problem, let alone cure it....Neither a global holistic map, nor a global Internet, will in itself foster interior transformation, and often just the opposite, contributing to arrest or even regression. When worldcentric means are presented to less-than-worldcentric individuals, those means are simply used (and abused) to

further the agenda of the less-than-worldcentric individual. The Nazis would have loved the Net." (Wilber, pp. 309-310)

A high degree of information overload is now experienced by many -- and especially by the most informed. The position of this paper is that there is a case for focusing on how significance is distributed, organized and comprehended "globally" (signifying as a whole) rather than on the technicalities of how bits are packaged and distributed "globally" (signifying around the planet). The geographical connotation may be used for the cognitive connotation but should not be confused with it. The challenge lies increasingly with the nature of the emergent global pattern of significance, and its collective comprehension, rather than with the global production and distribution of information, however this may be reframed as the "dissemination of knowledge".

## 4. Knowledge representation for the future

**Academic papers and policy studies:** In a world characterized by innovation and change in many fields, it is strange that there is no thought given to the implications for the future of academic papers or of policy documents. Even the activities of scientists in the far-distant future, as frequently explored by science fiction, continue to be framed in terms of conventional "papers" -- whatever the electronic medium in which they are recorded and communicated. The question is whether there is anything that suggests that the whole notion of any such paper as a knowledge construct should not be completely reviewed -- especially with the prospect of even greater information overload. Will it continue to be appropriate to produce such lengthy papers? What exactly are the functions of such a document in providing: historical context, current challenges, presentation of hypotheses, methodology, experimental data, implications for future research, educational implications, etc ?

With the breakthrough initiated at CERN, to facilitate communication among physicists through hypertext documents, the question is whether the structure of such Web documents suggests radical changes in the future of knowledge representation -- especially as they affect the reader. How much of an academic paper represents new knowledge? How much has to be read to identify that new knowledge? Freed of its wasteful packaging, what form does this new knowledge take? Is the conventional approach to an abstract an appropriate means of isolating the essence of a paper? And, possibly most daunting, how would any alternative affect economic and career concerns in a "publish or perish" community?

**"Papers" of the future:** Consider a paper of the future based on modules of information -- or even on memes or holons. Some of these modules might effectively be common to other papers, as in the case of the historical context of current work on a topic. Rather than repeat such information (tediously reworded to avoid copyright issues), a hyperlink could simply be provided to other documents devoted to this material. Explanatory padding would be placed (or referenced) elsewhere, to be perused only if the reader wished. In this way the art of writing a paper might become one of writing the absolute minimum within a skeletal framework of hypertext links crafted aesthetically for comprehensibility .

Papers of the future might thus be reduced to a single Web page in the form of a highly structured abstract or clickable image. Authors would be recognized and rewarded primarily for the innovative integrative perspective offered -- perhaps based on an analysis of hyperlinks. Readers could explore that page in a multiplicity of ways, looping out through chains of other documents (or images, etc) wherever appropriate, then returning to the skeletal framework for the remainder of the argument. Current developments in the design of Web pages could therefore lead to new requirements for authors of academic papers or of any policy document produced by the international community. Recent developments in multi-media based encyclopedias illustrate some of the possibilities. It is to be expected that future authoring tools will scan a document and insert hyperlinks to other documents specified as potentially associated. Other tools may extract blocks of text into a hyperlinked pattern of separate documents, reducing the original to a skeletal framework.

CVs, bio's, and even visiting cards (in electronic form), could be affected by such representation of knowledge. Colleagues would exchange CDs of their hyperlinked documents. Home page design is already exploring some possibilities. But how might a life of the mind come to be meaningfully represented, especially when the "*non dit*" may be as important (to some cultures) as what is explicitly stated? Ironically, the pharaohs were already responding to this challenge in their life-long concern with tomb decoration.

**Knowledge representation and learning:** These changes, which are already effectively in process of implementation, will reframe the whole approach to knowledge representation. Readers will find themselves in a complex web of pointers, linking modules of information by many different authors. It will become a moot point as to whether the knowledge is associated with the modules or with the links between them. It will become questionable whether a linear reading of a text is possible or meaningful.

In such a context, what is comprehension in contrast with "edutainment"? What is integrative understanding and emergent insight in contrast with the ephemera of conceptual tourism? How are patterns of knowledge to be appreciated as a whole in contrast to information acquired through guided tours of their parts?

**Insights from poetry:** Poetry appears to offer some important insights on these questions -- hence the reliance on metaphor. Implicit in any poem is a complex pattern of associations. The art of poetry might even be said to be the expression of the richest of patterns with the minimum of words. What opportunities might be offered to poets and their readers on the Web?

The least interesting possibility would be to provide hyperlinks from any points in the poem which called for critical comment -- replacing what is at present done by commentators with the aid of superscripts and footnotes. More interesting for the poet and the reader is to provide hyperlinks between different parts of a complex poem, such as rhyming words or thematic associations, or even to the metaphoric substrates in image in audio form. The associative structure of the poem is thus reinforced by hyperlinks allowing the reader to move rapidly about the poem in a non-linear manner consistent with the poem as a gestalt or a set of gestalts.

Beyond that are a range of possibilities through which the poet could link together several poems into a complex meta-construct with a variety of sub-themes. The challenge for the poet as a creative artist would be to endeavour to give form to complex insights, perhaps tantalizingly beyond any immediate ability to grasp as a whole -- if grasping is the appropriate term. For both poet and reader, it is then

only by repeated exploration of the labyrinth of associative highways and byeways of such a meta-poem that its significance as a larger whole can finally be sensed and anchored in memory.

**Patterns of resonance:** Hyperlink pathways could also be used to map out patterns of resonance between the points of significance in a poetic construct. For it is possible, as with certain chemical molecules (resonance hybrids), that certain configurations of insight could only acquire stability as a gestalt by resonance of their parts between quite distinct alternative structures -- the dynamics of resonance providing the basis for stability rather than any one of the particular structural configuration of pathways (all of which might be unstable).

Yi-Fu Tuan says of resonance in an aesthetic context: "Experience, unless it carries resonance, is shallow and transient. Resonance is the result of the extension of one field of meaning to another -- a change and enlargement of context so that a phenomenon is more than how it first appears. What makes resonance possible is the human capacity for metaphorical perception and thought." (p. 30)

**Overarching patterns of knowledge:** The implications for comprehension of a poem as a gestalt clarify the challenge of knowledge and learning in the future. As in a poem, pieces of information may indeed be provided. They may well be structured into a pattern that can be defined as knowledge. For the uninitiated this pattern may be misunderstood superficially, or may appear so complex that repeated explorations may be required to gain insight into the pattern as a whole. Patterns with the property of globality -- possibly to be understood as wisdom -- may be so complex, however, they do not lend themselves to ready presentation in any conventional linear form. Such a pattern has to be built up in the mind, possibly even as a resonance hybrid between constituent unstable structural alternatives. This brings to mind the Sanskrit dictum: *Neti, Neti* (not this, not that), as well as the poet Keats notion of negative capability (the capacity to be in uncertainty, mystery and doubt, without any irritably reaching after fact and reason). This may be the challenge offered by Zen koans, or by the "mega-insights" that can only be carried in lengthy rituals or dramatic presentations (such as the *Mahabharata*).

In this light, an even greater challenge emerges with respect to collective learning and social transformation. This is the prime concern of this paper. The increasing fragmentation of knowledge is widely acknowledged. Any subtle overarching patterns of knowledge are by definition not the province of any particular discipline. Each discipline may hold elements of the pattern but would necessarily have no mandate or competence to weave them together with those from other disciplines. Transdisciplinarity can have no disciplinary legitimation. And yet there is the strong suspicion that it is just such overarching patterns of knowledge -- implying wisdom -- that are required to articulate appropriate policy initiatives for the future.

## 5. Reflecting the nature of an overarching pattern: a pattern that connects

At present a user of the Web, endeavouring to take account of the disparate features sensed as integral to any overarching pattern, would tend to make use of bookmark facilities offered by web browsers. These can be used to access pages reflecting different elements of the pattern. However the user is usually only free to keep the bookmarks as a crude list, possibly with some facilities for hierarchical clustering and nesting. With more skill and adequate software facilities, the user could embody the bookmarks into one or more clickable images that provided a map of the user's current understanding of the pattern. But such facilities are cumbersome and inadequate if the purpose is to indicate a journey along a succession of pathways, away from the starting point, and with some aspiration to "circumnavigating" the globe of knowledge.

**Beyond knowledge grids:** For the systematic, the most convenient clickable image on the Web might take a tabular form -- even a kind of Mendeleev Periodic Table in which the relationships between the essential features were embodied in periodic properties of the table. But there remains the suspicion that the subtlest patterns would be based on essentially incommensurable elements which would not lend themselves to such "pigeon-holing" treatment. This approach, typical of western males (currently the majority of Web users), tends to ignore the cognitive styles of other cultures.

The appropriate question may then be: when should the required "grid" not be a grid? The answer could well be: when it is essentially based on a pattern of aesthetic associations (of which the conventional grid is the most simplistic). Such a pattern, to be of relevance to society as a whole, would have to embody quite incommensurable aesthetic styles and preferences. This would necessarily be beyond the capacity of any individual or group to elaborate or understand, other than partially and in the constraining light of their own biases.

**Incommensurability:** What form might this incommensurability appear to take? At the simplest level it is reflected in phenomena whose explanations cannot be reconciled within simplistic frameworks. More complex frameworks are required. In mathematical terms, more dimensions may be required to demonstrate their compatibility and to formulate transforms between them. But in some cases (especially in the absence of any adequate or comprehensible mathematical insight), it may only be possible to formulate any reconciliation in the form of paradox. Zen practitioners relish the koans which can lead to the appropriate levels of understanding.

This suggests that knowledge, as formulated by each discipline, corresponds to a zone of coherence. These zones are necessarily separated by "no-go" areas in which the methodologies of neighbouring disciplines no longer adequately apply -- and in which they may have no interest anyway. Those who have to call on insights from a range of disciplines in their daily life are however obliged to provide themselves with a framework enabling them to traverse and encompass such no-go areas and to embody the incommensurabilities into their own cognitive style. The challenge of integration for the individual thus mirrors that for society.

This is the challenge for any practitioner or leader continually obliged to make use of conflicting or incomplete advice. They have to give themselves models of the knowledge terrain, at whatever level of conceptual sophistication they are able or choose to operate. Such a perspective in no way denies that subtler insight might provide patterns that weave together what appear, from a more reductionistic perspective, to be incompatible knowledge domains. But for many such insights may in practice be beyond immediate comprehension.

## 6. Keeping the grid "up"

In the light of the earlier points concerning the value of understanding in terms of a spherical grid, this simple model can be used as a means of discussing the challenge for practitioners obliged to draw on knowledge from different disciplinary domains around the Web. The insights of any one discipline provide an essentially "flat earth" understanding of knowledge as a whole -- whose essential globality may be for the user to discover. Beyond any such discipline's horizon, all is irrelevant, if not effectively "beneath" comprehension.

**Tents and domes:** A practitioner has to function a bit like someone putting up a tent. Each support or anchor must be held in a kind of grid pattern of countervailing supports or anchors. By getting the balance right, the tent can be gotten up and stabilized to define and encompass a new cognitive space. So it is with the countervailing insights offered by different disciplines.

More ambitious than a humble tent, are the space-enclosing domes used for major exhibitions. Again there is a logistic challenge in getting the grid of a multitude of elements in place so that the whole can be got up and kept up under adverse environmental conditions. Getting a continent-wide power grid up and running presents similar challenges, as does an inter-continental telephone grid or the Internet itself. But although these metaphors are suggestive, the implications for a knowledge grid remain elusive -- and perhaps necessarily so.

Further insights can be obtained by exploring the implications of tensegrity structures as progressive spherical approximations (Judge, \*\*\*\*), notably in the recent initiative of Stafford Beer (1994) in the design of communication structures with associated electronic protocols.

**Requisite variety and necessary differences:** In the domain of knowledge, what might be understood as effectively "keeping a grid up"? The tent metaphor suggests that it would involve some kind of balance between those forms of knowledge that pull together -- reinforcing each other --- and those forms which oppose each other as incompatible -- being somehow mutually exclusive. In this sense both forms are necessary to sustain a diverse pattern of knowledge. Efforts to focus only on the first kind, and to systematically exclude the second, lead to naive forms of universalism which are unsustainable in practice -- however attractive they may appear as an ideal in which everything is positively complementary.

This approach draws attention to the value of differences and notably those which appear intractable and irreconcilable. Society is currently tortured by various forms of polarization which many hope to avoid by emphasizing one pole and denying the other. Policy-making is inhibited and undermined by value dilemmas. And there are calls from realists to manage differences between parties rather than to strive to eliminate them. This suggests that, as in the tent metaphor, opposition could, and should, be used to "keep the grid up", namely to sustain the whole pattern of knowledge.

**Collapsing distinctions:** It is strange how differences have become an anathema in society. Valuable distinctions are avoided in the hopes that somehow knowledge can be "collapsed" into universal harmony and synthesis. Unesco, as the mandated intergovernmental guardian of science, culture and education (and transdisciplinarity), has as one of its key principles "the elimination of discrimination in all its forms". Although conceived to address racial and similar forms of discrimination, by emphasizing "in all its forms" (therefore including those synonymous with discernment), this principle effectively precludes any meaningful discrimination between different forms of knowledge, methodology or belief. And yet it is precisely by distinguishing such differences that requisite variety (in cybernetic terms) is ensured in any global pattern of knowledge. Failure to discriminate collapses the grid.

**Competing forces:** It is vital to recognize the many competing tendencies in the emerging information society. The much publicized push towards globalization, with all it implies in terms of homogenization and impersonal generalities, is matched or opposed by a pull towards localization in the form of regional, national and sub-national cultural expressions. Asia is resisting imposition of western understandings of human rights (curiously indistinguishable from universal rights). Individuals in all cultures are resisting top-down imposition of ethical and other patterns of knowledge which could be seen as a new form of totalitarianism.

Inability to discriminate makes it impossible to articulate universal patterns which are distinct from totalitarian patterns. But this said, it is also useful to recognize the contribution of globalization in opposing the fragmentation and balkanization of society, knowledge and understanding. In this case, as in other examples of polarization, both tendencies are vital to a healthy society -- and to "keeping the grid up".

## 7. Grasping for identity and the challenge of integrative knowledge

**Property:** Globalization is drawing attention to other necessary tensions in the information society, namely those associated with intellectual property rights as opposed to the need to disseminate knowledge to those in desperate need of it. Aside from any natural incompatibility between disciplines, concern about property rights is also fragmenting systems of knowledge through commercial secrecy and systems of restricting access to "classified" knowledge "in the national interest". National intelligence networks are being redeployed to ensure national competitive advantage in trade. The future may see the current zero cost access to the libraries of the world via the Internet as a naive honeymoon period.

**Competition:** Globalization, through the tremendous pressures it creates to compete, is highlighting the pressures towards articulating collective identity. The effort by countries to grasp market share is intimately related to their effort to grasp, maintain and develop collective identity. As presently configured, this is a desperate race with few possible "winners" and a multitude of "losers" for whom any sympathy is at best tokenistic. The explosive question of whether there will be enough "market share" to share amongst those who aspire to participate in this race to sustainability is carefully not addressed. Countries, like people, may become unemployed and unemployable.

**Monopolization:** Globalization processes have to date been closely associated with "consolidation" of economic interests into monopolies and cartels, however carefully disguised by creative labelling. The impact on knowledge is seen in the tendency to lock users into particular products, notably in the case of software and other proprietary knowledge-ware (as marketed by consultants). Basically if it can be commercialized then it has already lost its integrative function -- it has become a product rather than a "contextualizer". But analogous efforts are made to lock people into particular ideologies and belief systems -- a practice long-cultivated by the religions of the

world. Academic schools of thought are also assiduous in deliberately training students to carry on a particular tradition and to oppose, even by dubious means, the explorations of alternative schools. It is in this environment that the frenzied global competition for Nobel Prizes in various domains of knowledge takes place. Clearly it is not within this framework that there can be any hope for a meaningful global competition for Noble Prizes in Wisdom.

**Conflated understanding of "universal":** The challenge seems to lie in disentangling conflated levels of understanding. Dealing with daily reality seems to demand increasingly specialized and fragmented domains of knowledge -- and increasingly engenders dependence on those with the necessary expertise. At the same time, the crises resulting from inability to coordinate and integrate such fragmented knowledge in response to complex crises provokes anguished calls for both "universal" theories and languages, as well as "global" strategies, programmes, and ethical systems.

Such universal frameworks are then promoted as relatively simple without recognizing the challenges to understanding that they represent -- even if they could be meaningfully articulated amongst the best and the brightest. For they would have to be more complex than the behaviours they are expected to regulate (in the light of the cybernetic Law of Requisite Variety) and as such are a major challenge to both individual and collective comprehension. The need for a different order of understanding is not recognized. Its nature is confused with simplistic understandings of universal and global.

## 8. Imagination and aesthetics as vital resources

**Living myth:** Paul Wildman (1996) notes that "Civilizations that have lost a system of living myth seek to hold themselves together by means of rational planning, contrived programs and projects, and organization." In criticizing the limitations of such modern strategic planning as blinkering creativity and imagination, he argues that: "Today we use information to feed the emptiness created by the absence of imagination. The information myth is that we need information to improve our lives." He cites T S Eliot's words: "Where is the wisdom we have lost in knowledge? Where is the knowledge we have lost in information?"

**Symbolic space:** Yi-Fu Tuan explores the way in which symbolic space is integrated into a larger and more complex whole, namely the state. Symbolic space is viewed as one of the systems of symbols, in this case territorially organized, without which society cannot function. The state is seen as an aesthetic-moral construction on a grand scale. Viewed as a serious effort to articulate excellence for society, politics is itself a moral-aesthetic aspiration, and its achievements are properly deemed artworks. (p. 182). But he demonstrates that modern democracy is antithetical to the aesthetic "because it is -- or can seem to be -- nebulous, protean, egalitarian, partial to the average and hostile to the exceptional. But although it may be disposed towards these attributes, it is not confined to them." (p. 209) Such considerations might usefully be extended to the structure of the information society and the nature of the aesthetic which sustains it.

**Aesthetic configuration:** How might continuing future reflection on what seems to be required be assisted by the **configuration of hypertext pathways on the Web?** What might this mean -- or is the question only relevant to "spiders"? It is intriguing that "thread" is an important metaphor used to identify a particular sequence of comments in a discussion -- which may also contain other discussions. This may be restricted to a thematic thread, or its meaning may be broader. How threads get interwoven, and by whom, is another matter. Where are the Internet spiders to make the new mandalas?

Any such "higher" order of understanding must necessarily be carried by structures and patterns which do not lend themselves to proprietary exploitation in the interests of the few. Preoccupation of vested interests may well be with how spheres of influence are carved out of the information society in imitation of the past. But for it to serve any function as the "pattern which connects", any new order of understanding must necessarily provide bridges between incommensurable and proprietary domains of knowledge -- whether of schools of thought, corporations, or individuals. As formulated by Lao Tse \*\*\*\*\*. For environmental architect Christopher Alexander (1979), it is the central "quality without a name".

The question is whether such insights can be embodied into any configuration of hypertext pathways on the Web. What these quotes seem to imply is that what is of greatest importance cannot be effectively articulated. It can however be partially articulated and tangentially approximated -- and creative exploration of the unknown in every domain will continue to be drawn to do just that. Configuring such tangents therefore offers a window of opportunity through which operational significance can be given to the larger pattern that connects.

## 9. Spherical knowledge grid: discontinuity and emptiness

One approach to configuring tangents is to focus on spherical geometry and the nature of a spherical grid -- since these are at least accessible to the imagination (even though other forms of greater complexity may be more appropriate in mathematical terms). Unlike use of latitude and longitude, in this case the emphasis is on the user's choice of preferred grid pattern -- unless some standard pattern is acceptable. There are many ways to carve up a spherical surface and the user can effectively "delink" from efforts to impose universally accepted patterns. People do not need to resonate to the frenetic urgencies and rhythms of "power users" for whom month-old information is already long obsolete? Future privacy may lie in other orderings of space and time.

**Laying down a grid:** But to be commensurate with the challenge to comprehension, it is beneficial to recognize the limitations of the rational ("urban planning") mentality associated with "laying down a grid", even on a sphere. The use of a rational pattern is indeed possible and may be preferred by many. It however precludes many possibilities of holding insights into incommensurable features -- other than through the horizon effect mentioned above.

A choice of reference points must be made around the sphere by the user -- although it is effectively this choice which defines the sphere. The user is not obliged to do this through a geometric metaphor. The reference points could even be a palette of colours or a pantheon of gods. It is the fundamental act of distinction and separation that is important (\*\*\*) -- and the configuration of those

distinctions into a pattern on a sphere (although other surfaces with such finite but unbounded properties could be used).

**Embodying discontinuity:** The links between the points so chosen could indeed be represented by continuous lines. But this would fail to capture the conceptual discontinuity that characterizes the relationships between domains of knowledge. The lines might be better understood as discontinuous or broken by "operators" such as are found on a circuit board (condensers, resistances, etc). It might also be useful to allow the lines to periodically switch polarity to reflect the ways in which initiative or priority can switch from one domain of knowledge to another in response to changing circumstances. Web pages could be designed with such properties.

Travelling from one domain of knowledge to another around the sphere thus becomes as fraught with uncertainty as in any adventure game. It is essentially a learning exercise, a journey in the personal development sense, or even a process of initiation. There are conditions to be met -- puzzles and paradoxes to be mastered, doors to be unlocked -- as partly reflected in transiting through password-controlled databases. Unless this is done, any movement around the sphere is purely formal and of minimal significance. Electronic access to a document, or possessing it, does not indicate comprehension of its content or its significance in a wider pattern.

This approach offers the possibility of reflecting the ways in which the parts are effectively protected from the whole, and the whole from the parts. Simplistic globalization is a reductionist illusion whatever it is hyped up to be by vested interests and enthusiasts. Ultimately the reality of what can be meaningfully expressed becomes a matter of the moment -- as acknowledged in various mystical traditions.

**Honouring emptiness:** A danger of grid systems is the implied enclosure of the domain of knowledge. From any longer term perspective, this can only be premature and presumptuous. It suggests a colonization of the future against which the next generation must necessarily revolt -- and a "generation" on the Web may be a matter of months. It denies any sense of mystery by giving no place to the unknown or the possibly unknowable. The advantage of any centro-symmetric system (Judge \*\*\*), especially a sphere, is that the grid runs on the surface leaving the centre empty, both as an unreified point of reference, around which current understandings and explorations can be configured as tangents, and as a form of openness. Such features respect future creativity and any sense of implicate order from which new patterns emerge. They reflect the cited concern of Lao Tse.

## 10. Sustaining aesthetics: songlines, leylines and dragon lines

According to Yi-Fu Tuan: "The power of the human senses to organize the world takes diverse forms, shaped by the larger cultures in which they operate... Yet all possess an aesthetic-moral aspect -- as revealed by their drive toward significance and form -- and all demonstrate the power of the imagination to transcend group values held at a certain time by incorporating values from another group and thereby grow." (p. 121)

Given the well-hyped emphasis on the multi-media features of the Web and the competition for attractive home pages, what might be described as the sustaining aesthetic of the Internet at this time? Much is implicit in "surfing" and "cruising" (cf *Easy Rider*). For some the aesthetic has elements of a vastly complex set of "monkey bars" in the ultimate playground.

In opting for a "global" representation of knowledge, there is a strong case for exploring the aesthetics of the landscape around that globe (Schama, *Landscape and Memory*, 1995). Why buy into crude attempts to develop and cover it metaphorically with human artefacts? And, without committing the opposite error of romantics, why not develop insights from a variety of traditions that honour the globe in other ways?

The coherence of the Australian Aboriginal world derives from the centrality of belief in a dreamtime during which powerful beings walk the earth, establishing topographic features, calling the natural species into life, and instituting the rules of group and individual behaviour. They "wrapped the whole world in a web of song" (Bruce Chatwin, 1988, p. 82). Creation occurs by means of song. It is therefore as though the landscape is a musical score, and the traditional tracks are what have been termed songlines. These are themselves a powerful memory aid to navigation over the earth and to the location of essential resources, as well as providing a continuing rehearsal of cultural history. A songline is therefore "a succession of sites" along a track, "vibrant with incident, power and meaning" allowing for a dramatic and aesthetic participation in the environment. (Yi-Fu Tuan, 1993, pp. 125-7). "Music is a memory bank for finding one's way about the world" (Chatwin, p. 120).

"Pathway" is already used as a basic metaphor in the exploration of hypertext. To what extent could a sequence of pathways be usefully understood as having some of the qualities of a songline? In Chinese culture, very great importance continues to be given to "dragon lines" from the perspective of *feng shui* and geomancy. Western traditional cultures attach importance to leylines linking "sacred sites" -- which are increasingly a focus of tourism. Again "site" is part of the basic Web terminology -- and with the arrival of the Vatican on the Web, maybe some of them might even be considered "sacred". Leylines are understood as covering the globe in a triangulated gridwork whose form is of considerable interest to those concerned with sacred geometry. Traditional pilgrimage pathways to sacred sites are commonly associated with leylines. Internet magazines typically offer monthly recommendations that users visit selected sites labelled "hot" or "cool" -- perhaps a modern equivalent of what is sacred for some. But "hitting" sites is far from the aesthetic associated with the laborious learning journeys of a pilgrimage or the sensitivity to landscape implied by leylines or songlines.

## 11. Songlines of the noosphere

Songlines have suggestive features. A song, for the Aborigine, is both a map and a direction finder. Knowing the song, enables a person to move across country, from sacred site to sacred site, on seemingly unmapped territory, through language-barriers, regardless of tribe or frontier. Those encountered on the songline nevertheless share the traveller's worldview (Dreaming). The traveller also has the responsibility to maintain the landscape by singing it into existence -- a fundamental act of creative aesthetics. Essentially the land first exists as a concept in the mind and is given form through the singing (Chatwin, pp. 15- 17).

Given the network orientation of the Web, it is also intriguing that individuals only inherit a limited number of contiguous stretches on a songline. Their limit is marked by a "stop" -- at which responsibility for stewardship of the songline passes to someone else, and where other songlines might intersect. As with any network, however, stops cannot be meaningfully linked "horizontally" to denote a conventional political frontier. Each songline is sustained by a different melody. In effect, as with birds, territorial boundaries are defined by song (Chatwin, pp. 66).

Given the major concerns about intellectual property on the Internet, the Aboriginal view is intriguing. For them, trade routes are songlines because songs are the principal medium of exchange, rather than "things". Individuals inherit stretches of the songline, with their "verses" constituting title deeds to the territory. These could be lent or borrowed (enabling extension of the individual's song map), but not given or sold away (Chatwin, pp 64-65). Users on the Web are already at the point of trading site information as a valued commodity. What is missing is any sense of the "melody" which defines a succession of pathways, namely a line of sites through many different domains. It is the melody which is the heuristic. For the Aborigines, and despite their many languages: "Regardless of the words, it seems the melodic contour of the song described the nature of the land over which the song passes" (Chatwin, p. 120). In learning terms, this is the defining quality of a particular cultural Grand Tour -- or in global terms, a great circle route around the body of knowledge. In this light, the key to thriving on the Web may eventually prove to be sensitivity to a melody or metaphor which guides passage across incommensurable domains. Without it, a user governed by the "hitting" metaphor, like a traveller lost in the desert, may be effectively trapped in a search domain -- condemned to walk in relatively small circles within it.

Consider the possibility that global configuration of hypertext pathways could be the result of interlocking great circle routes of learning journeys. The pattern of intersections would effectively position, and significantly separate, different domains of knowledge. But although apparently a spherical grid, it would above all be characterized by the challenges to comprehension along the different journeys and the responsibility for the stewardship of parts of those journeys -- maintaining the melody. For, given that any hyperlink is to another location offering multiple links onward, the choice of link at any location to continue the journey needs to be governed by a subtle rule (more sophisticated than any left-brain indication to "always take the third" hyperlink or menu choice). What is the heuristic "melody" governing consistency of choice that ensures movement along the learning pathway around any of the great circle routes? How are encounters to be handled with information offering subtle enticements onto some alternative route -- onto a different melody? As at a hub airport, or a station at the intersection of a variety of transport lines, "changing lines" may involve a major reorientation. Effectively it involves a change of metaphoric framework or vehicle.

## 12. Globality of the noosphere

Beyond recognition of the ability to circumnavigate the globe along such great circle routes, lies the larger challenge of gaining some understanding of globality in relation to the noosphere. The challenge can be described "mechanically" in geometric terms but, as argued earlier, it is probably only in "aesthetic" and metaphoric terms that any such comprehension can be acquired and sustained.

One approach might be to explore the possibility of some form of "resonance" between elements of the different great circle songlines -- resonance pathways around the globe. The aim would then be to seek ways to comprehend how the globe of knowledge can be made to "ring like a bell". Physically this was explored by Nikola Tesla as a standing wave effect of 7.5 cycles / sec through which he endeavoured to distribute power around the globe and more recently in some curiously unpublicized weaponry. A mandala may be understood as a point on the globe surrounded by a pattern of three, or more, different great circle elements. It is the fact of their status as part of great circles which is the challenge to understanding of their significance.

In poetic terms, as an exercise in poesis, there are intriguing challenges in the poetry of spherical associations enabled by metaphor -- corresponding to the resonance effects noted above. In both cases, the challenge is to reinforce significance through resonance. As in a magnetic bottle (to enable nuclear fusion by containing the plasma), the challenge is to avoid "quenching" by contact with the container. On a learning journey, around a cycle of hyperlinked documents, it is similarly necessary to maintain onward momentum and prevent the learner from either being trapped and "enthralled" by the significance of a particular document, or distracted and "scattered" onto unrelated experiences which do not reinforce the greater cycles or their interlocking -- thus inhibiting any possibility of their transcendence. But, as in a particle accelerator, any such "bouncing" around a great circle involves a discipline quite different from "hitting" a random array of sites in the surfing metaphor -- or is this always the case? Ultimately it is only the individual who can determine the adequacy of any such container to the alchemical processes of learning and transformation.

Both music and poetry, in their reliance on resonance, suggest the possibility of "higher" harmonics and resonance effects which could prove capable of carrying other orders of significance. Metaphorically this possibility is fundamental to the significance of the interference effects of Tibetan bells and overtone chanting.

Comprehending the spherical structure of the body of knowledge through tensegrity approximations, based on configurations of polar elements sustaining continuous great circle pathways, suggests the possibility of "twanging" such polarities to engender resonance effects. The body of knowledge may in this way be comprehended as being "played" like a wind harp by the many polarized discussions that inhibit comprehension of the global pattern which they effectively sustain. Pythagoreans would delight in noting the proportions required for chords of particular harmonic significance.

It is ironic that Isaac Newton leaned heavily on human insight into gravitas (then understood as the human experience of heaviness) as a metaphor to enable comprehension of gravity -- thus establishing the basis of modern physics. Perhaps this creative misuse -- gaining new meaning by using words to state suggestive falsehoods (Talbot, pp. 300-301) -- should now be reversed, using understanding of gravity to enable comprehension of the forces acting on the individual psyche, travelling the noosphere, by a global configuration of knowledge.

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