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Synergy & Sympoiesis
in the Writing of Joint Papers
(Anticipation with/in Imagination)

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Abstract
This paper is part of a quest for more effective integration of scientific disciplines by making use of other methods of discovery used within design. It explores – by way of metaphor – the synergy in writing a joint paper, and the emergence of surprising insights that transcend what each author might otherwise achieve alone. In truly synergistic collaboration, participants do not surrender their viewpoints or compromise their perspectives. It adds perspective to what they know, and offers new meaning in new contexts. This process can be useful for team building and the creation of new knowledge. It places the locus of interaction on the interface between the interacting disciplines/authors, rather than within them. This involves different modes of involvement than those in object(ive)/subject(ive) discourse. The paper acknowledges the necessary involvement of different levels of consciousness and emotions that are required to 'language' complex decisions, insights, and propositions. Although each perspective may have its own 'dialect' of description, there are no conceptual barriers between intuitive insight, heuristic discovery, analytical inspection, communication of ideas, and practical implementation. These aspects of co-authorship can be mapped as a holistic continuum to bring out the synergistic element of the process. Although it may be less predictable, it can stimulate insights that exceed what authors and readers knew before. The paper argues that 'interfacing' is a good basis for mapping and illuminating collaborative synergy. At the interface, four perspectives interplay as in a dance: 1) the author's individual viewpoints, 2) the relationship between the authors, 3) their inner-inter-action dynamics, and 4) the meaning connoted within the shared context. Synergy needs to be regulated at the boundary edges. It cannot be created by one's specific action, but by all of the participants creating from a common intent

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that normally transcends verbal description. This joint system transcends that of each system element. By tuning into an appropriate 'common carrier wave' the authors can also maintain their own perspectives (i.e. 'local wavelengths'). Because the system's synergy is not based on the components but on their interaction, structural coupling (shared meaning) can be regained after losses caused by (individual) misunderstandings.

Key words:
Synergy, interfacing, anticipation, imagination, memory, creation

1 Introduction

In addressing the topic of writing a joint paper, the authors explore the principles of interfacing between different viewpoints (and in fact disciplines of science) to establish a principle of collaboration (synergy) by which the expertise of either standpoint can be combined, and enhanced, to bring out new understanding. The paper will show that this requires a study of the modes of involvement of the participants/authors, as well as a dynamic process of participation, which supplements the skills of science with those of art. The prime point of this paper is that this is needed to resolve conflicts (of mankind with nature), which are mainly caused by the separation between disciplines of science. The paper proposes an organic understanding (that of disciplines of science as 'organs in a body') that requires insight into the way the boundary between disciplines can be resolved. The writing of a joint paper brings out the principles that may apply. They ask for a reposition of understanding (the locus of control) on the interface, which requires both a shift of involvement from Objective to Subjective (combining and balancing both). It also calls for the realisation that in interfacing different reflex levels (and levels of conscious awareness) are involved than usually addressed and explored in science.

1.1 Backgrounds

There is good reason for this exploration. We know that abuse of natural resources such as petroleum oil and gas are finite resources is causing extensive environmental damage. This is a complex situation that calls for a complex response. The paper suggests that prepare to re-design 'living styles', rather than individual products. Unless we see urban planning, food production, healthcare, transport etc. as an integrated whole, we will fail to reduce the spiralling consumption of resources. However, this calls for a far more holistic, integrated, and therefore cross-disciplinary approach than we have achieved so far. Indeed, the urgency and scale of the task requires us to think in new ways; and to devise a more shareable, positive, and optimistic discourse of change. If society must 'do more with less' we must work at a level that is exceedingly complex, multi-dimensional, emergent and co-contingent. This places the task beyond the reach of what conventional design practice can do. It requires a viable 'meta-design' approach (c.f. Giaccardi, 2005) that that will interpolate both across, and between, many areas of knowledge. At its most ambitious level, meta-design

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must deliver an eventual 'synergy of synergies' (Fuller, 1975) that is accessible both from within the epistemological and the organizational domain. This paper explores one aspect of this process. In reflecting upon their own practices of (co-) writing, the authors are reminded that co-authorship is an under-theorized method of creating and sharing new knowledge and understanding, both across, and within disciplines. Any success in making new sense out of different authorial perspectives may be crucially important, because it may lead to the emergence of new scientific disciplines and/or social, technological, and other responsible practices that may have been inconceivable within existing discourses.

Although academic co-authorship remains an important and accepted practice for science and design, it lacks a practical methodology. For historic reasons, science has tended to focus more on the procedures and outcomes of its actions and methods, rather than the creative, and co-creative processes that mediate them. As a result, collaborative writing is seldom taught within the conventional academic syllabus. This is unfortunate, as it is an effective way to reconcile different or even seemingly contradictory theories or models; and to develop new modes of shared practice. In this paper, the term 'co-authorship' does not refer to the custom of editing discrete specialist contributions together as a single document. It confines itself, rather, to describing a co-evolution of the whole text. Because this type of co-authorship is usually a protracted, dynamic and multi-layered task, it is both an art and a science. The effective co-production of new knowledge in science calls for a reasonably high level of mutual and reflexive self-awareness of each author's personal strengths and weaknesses. Professionals who collaborate effectively must therefore acquire and develop sub-cognitive (e.g. intuitive) skills that are 'co-anticipatory' in order to guide the overall outcomes of collaboration. The 'creative space' of collaborative writing resides in a kind of intermediate zone that is constructed by, and resides in 'between' the author's intentions, rather than within them, as individuals. Often, the dynamic process itself leads to an emergent outcome which that can be evaluated only after it has been attained. Nonetheless, a common form that may otherwise be present in a single discipline is absent, and needs to be generated or agreed. Inevitably, these skills and strategies will be informed by the ideological, cultural, and cognitive preferences of the authors themselves. The process of interfacing (attaining the 'in-between-ness') is a reciprocal hermeneutic process in which both parties strive to reach a common aim or goal. Imagination with/in Anticipation is used to guide the process of developing new options for deeper, joint, understanding.

2) Transcending disciplines and viewpoints

The practical context for this inquiry is a shared interest in designing or, rather, in 'meta-designing' synergistic societies of the future. This quest is inspired by a need to care for the biosphere in a more respectful manner. In order to do so we believe we must introduce terms of reference that can integrate knowledge and expertise gained at all levels of government, society and business. In a world in which resources are being consumed at an accelerating rate we must quickly learn to change our perception of how an ecological lifestyle is lived. We believe that a truly 'sustainable' society will need to interlace, and to interface, many types of action in such a way that wasteful modes of rivalry and competition are

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replaced by an active quest for 'synergy' at all levels. For the authors of this paper, the study of 'synergy' developed out of a critique of the term 'sustainability' (O#o, 1999) partly because it has so far failed to get us living sufficiently 'co-sustainably' (Wood, 2000). The term "sustainability" is often a misnomer: where fishing is possible to a level where the population of fish can sustain itself, the term cannot be applied to mineral resources which by their use become exhausted. Unfortunately, the concept of 'sustainability' has become increasingly confusing and unhelpful since its introduction. Indeed, its lack of precision may be symptomatic of the political need to harmonise business interests with environmental imperatives, after the Cold War. By conflating the temporal and non-temporal meanings of the word 'sustainment' it is, at best, a simple, moral instrument that encourages the well intentioned, rather than operating as a respectful reflection of how Nature works. (C.f. Brundtland, 1987) When business and government treats the consumption of non-renewable fuels and materials as a normal and acceptable practice, then any subsequent use of the term 'sustainability' is compromised. When its meaning is flawed, its usage can be misapplied without much thought or difficulty. Even its use at the highest levels of society is ambiguous (e.g. 'sustainable business' - UN, 2005) or even self-contradictory (e.g. 'sustainable consumption' - UN, 2005). These inconsistencies reflect a deep confusion between business and governance, economics and ecology, and between short-term versus long-term thinking. For example, while governments advocate lowered consumption, advertising insists on higher consumption.

2.1 The need for synergy to transcend disciplinary studies

The paper asserts that in developing desirable, ecologically sympathetic living styles, we need to transcend the problem-oriented aspects of environmentalist discourse. It also acknowledges that we would be unable to adopt the customary procedures of 'design' that we might normally be expected to implement in any fully predictable way. The authors of the paper are collaborating on several related levels of inquiry and discovery. Both are researchers within an AHRC and EPSRC funded research project called "Synergy Tools to Guide the Effective Development of a 'Meta-Design' Methodology" (ds21). This project explores the potential role of 'synergy' within 'meta-design'. Its 14 researchers in 6 countries represent a wide range of disciplines including micro-economics, architecture, eco-design, medicine, renewable energy engineering, design management, theoretical physics, etc. One of the purposes of bringing together so many disciplinary discourses was in order to inform a collective and self-reflexive technique of 'meta-designing'. This is imagined more like a 'seeding' process than as a design process, if we tend to assume that design is an intrinsically 'predictive' activity (Ascott, 1994). Elisa Giaccardi (2005) describes it as "…co-creation: a shared design endeavour aimed at sustaining emergence, evolution and adaptation". The concept of emergence implies the involvement of the interface dynamics, by which a system state is tied in with a process of integration within a context.

This requires considerations beyond the deterministic (object) states, thus involves anticipation and imagination. It calls for active participation in interfacing with different modes of consciousness of the participants. In a broader sense it

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involves mental methods beyond the scope of those of science, specifically those generally known as art. In interfacing we play an active role in participation other than observation. Our involvement it decisive for the outcome; it is the realisation of the role of information in creation which matters. These are the criteria in meta-design. All follow from the transcendence of the known in dealing with the unknown. Unfortunately, terms such as 'co-design', 'co-evolution' and 'co-authorship' have taken a long time to become familiar to all of us, even though they are names for practices that already existed. This is because they are under-estimated within a culture that still emphasises the role of the individual. Similarly, collective activities are too often characterised by efforts that remain shrouded in the custom, practice, and discourse of a particular profession or discipline. This is a very serious problem for the way humanity manages itself within the solitary and fragile domain that constitutes the 'Earth'. Many professions have reflected upon their role in addressing major environmental problems, as yet, with few signs of success. The knowledge we have is fragmented and sometimes inconsistent. As a result, citizens are confronted with contradictory views of how to live. It is likely that no specific discipline can provide an effective solution on its own. Indeed, it is highly likely that some efforts will prove to be counterproductive or sub-optimal when managed in isolation from others. Viable solutions will therefore be trans-disciplinary. We will be more successful when professionals from different disciplines are able to work together in a more radical, co-operative, co-creative, and emotionally conducive milieu. A positive aspect of this challenge is that the boundaries that separate our disciplines are also the interface from which our differences can be bridged in a creative way. This paper therefore has a special relevance for the development of interdisciplinary studies in which the anticipatory component can often only be validated through the emergent aspects of the writing itself, and where a shared outcome may require more intense discussion than is usually needed in the case where a single, shared discipline is involved.

2.2 The concept of synergy

In seeking to optimise several levels of a highly complex system - i.e., in developing the efficacy of meta-design across the broadest operational levels, and at the most subjective epistemological levels we require common terms of reference. Use of the term 'synergy' is viable for several reasons. It is not too technical for members of the public, and it has been routinely used within the business and management communities for many years. One problem is that there is no scientifically accepted definition for it. Buckminster Fuller's (1975) development of what he called 'Synergetics' (rather than 'synergistics') was a pioneering approach, yet it operated more at the level of what Fuller called 'dynamic geometry' and theory, rather than practice. It is well known that the idea of synergy accommodates a range of types, each with its own distinctive qualities and parameters. Fuller described it as "the behaviour of whole systems unpredicted by the behaviour of their parts taken separately" (Fuller, 1975). The fact that synergy is more interesting within complex systems than within simple ones is part of the problem. Ultimately, if – as Fuller's definition shows – synergy is unpredictable and emergent, then we may not be able to design for it in the same way we design for 'performance' or 'efficacy' in specific products and services. At the crudest level, this is because the synergy of each product must

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co-create a network of adjacent synergies. This raises issues that relate to the different levels of complexity at the physical, chemical, biological, ecological, social, cultural, and spiritual levels. For example, although a metal alloy may exhibit 'synergistic' properties, they are unlikely to be as subtle and sophisticated as those we will encounter within, say, fly larvae (Ho, 1998). Nevertheless, up to now, researchers (e.g. Corning, 1983, 2005) have included physical, chemical, biological, and ecological examples within the one broad term of 'synergy'. Although mindful of the difficulties of unpredictability and the importance of context boundaries, the authors offer four generic orders of synergy.

2.3 A four-fold model of collaborative Synergy

Synergy can be increased when the following four elements become enmeshed and/or integrated:

1. The individual viewpoints of the authors
2. The relationship between the authors
3. The inner/inter-active dynamics, of the group of which they are member.
4. The new meanings in their joint context of embedding, extending the context of their original meanings.

These are the four aspects of a system as studied in Systems Theory, where the Object, the Relationships, the Conditions and Embedding-within-Context all need to be simultaneously addressed. All of these aspects come together in the Interface of the Interaction. The action in the interaction, the interface, transcends the system (self) definition. Therefore the principles at play cannot be described in terms of the knowledge or functioning of either system (c.f. the people involved). It requires all involved to extend their awareness beyond their perimeter; this is commonly as anticipation. (Anticipation is a form of mental activity based on perception, inverted as projection. It reflects the past into the future.) Anticipation is part of the mental process of imagination; which is based on our capacities for pattern recognition. Imagination is a two-sided activity: on the one hand it recalls old memories recorded in our body of knowledge, on the other hand it processes this information – digests it – to detect embedded patterns. This is where imagination relates to intuition (the emergent insight of embedded patterns in new forms of realisation). The bridging of the interface requires a different description than that of the fields that lie on either side of it. The same holds for the field, of which the interface itself is based.

2.4 Co-authorship

The attempt to enhance synergy within collaboration leads us to the key topic of this particular paper: 'co-authorship'. Comprehensive collaboration is useful because it can produce insights beyond what either party might achieve alone. Interestingly, the changes of perspective that emerge from a really successful collaborative process are neither a compromise, nor an amalgamation of viewpoints. Arguably, participants only surrender an original viewpoint or belief when they have learned something new. If not, a new, mutually agreeable position is found which transcends what each knew before. This calls for the integration of seemingly opposite interests. The different perspectives must be combined, integrated, for the conflict to be resolved. This is an ambitious and

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long-term aspiration that calls for a new understanding of co-creative functioning. This paper explores that in the form of collaborative research, and collaborative authorship, such as in the writing of a joint paper. In this paper the authors confine their discussion to the need for synergy in writing a joint paper. They describe their attempt to work both collaboratively and self-reflexively. The subject of their inquiry is the way they come to a shared outcome, and much of this work will therefore, of necessity, be incomplete until this paper has been written. However, the paper addresses the complex process of interface interactions and mutual boundary (self) management, via which they, as authors, interact. Orthodox scientific tradition has sought to preserve the distinction between the 'context of discovery' and the 'context of justification' (Feyerabend, 1975). Although this approach has been in some doubt since the early 20th century, it remains a compelling influence deriving from post-Aristotelian thinkers through the mediaeval scholars (e.g. William of Ockham) and Enlightenment scientists (e.g. Galileo, Locke, Descartes) and up to the present day. This 'hard' research approach tends to invalidate any inspection of complex interpersonal issues that are likely to be more relational than factual. Much of the existing research into co-authorship tends to be macroscopic and pragmatic. For example, where one researcher drew general conclusions from the frequency and number of connections between a set of authors (e.g. Newman, 2004), another (economics-based) study (Hollis, 1992) acknowledged a higher quality of output for collaborative work, but concluded that there is a net reduction in output quantity when funding bodies give support to co-authored works.

3) Joining Perspectives – Integrating Difference

Transcending limitations of viewpoints (or disciplines in science) requires a transcendence of the local system limitations. This requires a shift of perspective, from the system state to the system definition. It also requires an understanding of the interface, both in terms as a system state, and as a system process.

3.1 Co-anticipation and shared discovery

The paper proposes that, from the vantage of the interface, the dynamic process of co-operation transcends the separate personal (state) realisations of the collaborators. This cannot, therefore, be simply a logical process of deduction (logic of state) but, also, a shared process of inductive and abductive reasoning (process logic). From the viewpoint of the collaborators we might say that unforeseen outcomes emerge from a combined drive towards a result that is (or appears to be) common to them. Heuristic, and other cognitive and structural faculties include an anticipatory component that can most easily be construed, post-hoc, as a shared intent. Although the production of a rational proposition may be required, what is produced may seem to emerge as a consequence, rather than as the specific aim of collaboration. This is reminiscent of Heidegger's description of the origin of a work of art that, as he claims, originates from art itself. (Heidegger, 1935) This challenges the traditional assumption of lone 'genius' within scientific production. We may also re-address Heidegger's question to questioning the origin of a scientific proposition. Where do ideas and insights come from? This is a provocative question for science. We may sometimes remember the dawning of an idea, but probably cannot trace all of the key elements that summoned it in its earliest glimmerings. In any case, scientific and

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academic protocols do not encourage us to share with others the unproveable, incomplete, and ad hoc nature of our inquiries. For this reason we are more likely to make cautious claims to the rigour of anything that is verifiable, post-hoc, and veridically self-consistent.

3.2 Imagination as Reciprocal Feed-forward

It is for these reasons that the (scientific) research tradition has tended to overlook the role and significance of the imagination as a shareable domain of anticipation and conjecture. De Nicholas (1986) has argued that Loyola's (1491-1556) emphasis on the imagination serves to remind us where western thought might have led, had it not been so dominated by the categorical and reductionistic tendencies within Aristotelian thought. Whereas, after the Enlightenment, the Arts embraced a discourse of the imagination (experiencing process), science's trajectory took it more towards an analysis of logic (description of states), or to sub-components of how the nervous system 'processes' data. In fairness, we should acknowledge that, where Locke gave science a model of human cognition that disregards time/process, and emulates a simple camera. Kant (c.f. Warnock, 1976) realised that cognition cannot exist without an imaginative component. Warnock (1987) goes further by asserting that our use of memory is a special class of our imagination. Arguably, the notion of a 'scientific imagination' (c.f. Holton, 1978) is a less familiar idea than that of a 'scientific observation' or a 'scientific proof'. Had the atomistic tendencies in western thought been less influential, (e.g. Aristotle's emphasis on categorical reasoning) that we perhaps would have identified more imaginative modes of knowing. Exceptions, of course, can be found in Kant, 1790; Hegel, 1807; Peirce, 1877; Freud, 1900; Husserl, 1900; Einstein, 1905; Dewey, 1925; Hadamard, 1945; Perls, 1969; Bateson, 1973; Bohm, 1980; Krippendorf, 1996.

3.3 Anticipation as Reciprocal Feedback

In the course of this project the authors reflected upon the feed-forward process that precedes the feedback closure that determined the final result. In this process, sub-cognitive faculties of the scientists, seldom acknowledged in scientific studies, help to create the final outcome. Here, it is useful to recall wave-based, rather than atomistic models, as exemplified by Karl Pribram's (1991) use of Gabor's (1947) holography principle in his theory of mind. The paper therefore refers to holonomic models of thought that can be traced to Plato's idea of dialogical thought (395 BCE), and that are a precedent for Koestler's, (1964) generative theory of co-creation that he called 'bisociation'. A more individual-centred way to describe this process is the idea, implicit in the psychological theory of 'cognitive dissonance' (Festinger, 1957) that the mind finds new ways to compensate for apparent inconsistencies that are too immediate or obvious to ignore. This is but one example of a cognitive skill or behaviour that can be said to be a part of what Payne (1985) and Goleman (1995) called 'emotional intelligence'.

3.4 Synergising Different Levels of Knowledge

Really effective co-authorship therefore calls for a greater sensitivity to types of knowledge that may otherwise go unnoticed or unrecognised. Examples include 'implicit knowledge' (Reber, 1965), tacit knowledge (Polanyi, 1964), and

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unconscious desires (Freud, 1900). Although these features may be elusive, or 'accidental' features (Wittgenstein, 1922) of propositions that may nevertheless include formative elements. Crucially, this also draws upon work on the anticipatory aspects of cognition-imagination (Kant, Peirce, Maturana & Varela, Bateson, Velmans) in the context of Anticipatory Systems (e.g. Riegler, 2001; Chrisley, 2004). Instead of an identifiable locus of control within a scientific mind (state), the outcome of scientific research is based on the interplay (process) between or among all people involved. Together they form a virtual 'organism', for which each author can be thought of as an 'organ'. The shared text must be negotiated and developed without thwarting the (collaborative) organism's integrity. Territorial reflexes (in the authors, and the community) thereby are directly contributory to the outcome. This image can also be generalised to depict the findings of science as a discipline, and hence, to the collaboration of all the scientists who contributed to that discipline.

3.5 Sympoiesis (process level, ↔)

We can define 'sympoiesis' as an act of co-creation in which an insightful meaning emerges spontaneously or unexpectedly from the collaborative process. For co-authors or co-designers, true sympoiesis may be characterised by a 'eureka' moment, or by a sense of 'flow' (Cziksentmihalyi, 1990) that seems to eclipse other, more mundane experiences. This is a moment of "Collapse of the State", in which complex understanding is simplified in a new integrative perspective. We may represent this as a horizontal axis that shows a continuum of the shared process that reconciles the critical, intellectual and imaginative dimension (i.e. the shared processes of reflection and anticipation) with the more elusive, somatic and intuitive (i.e. the sources of new of knowledge) aspects.

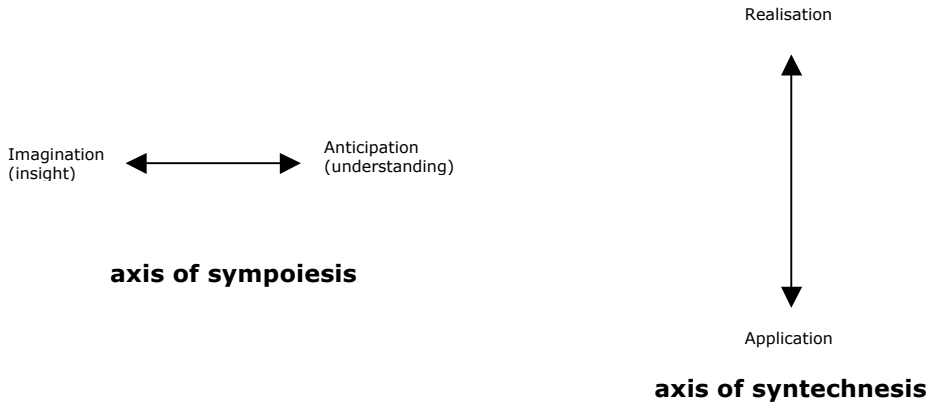

Figure 1: depiction of degrees of involvement and manifestation

3.6 Syntechnesis (object level, ↕)

Syntechnesis is represented here as a vertical axis. Where 'sympoiesis' is a more or less involuntary, spontaneous, unself-conscious, auto-didactic process, 'Syntechnesis' is a more deliberate, orchestrated act of co-creation that may involve working with tools, actions, or materials that require particular skills.

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Whilst it may include a rhetorical aspect of production presentation, and perfection, it is but one aspect of a set of processes that enable tasks to be executed, monitored, and re-aligned.

3.7 Mapping Sympoiesis (↔) with Syntechnesis (↕)

By placing the two axes at right angles to one another we can map a useful range of practices within a cognitive and phenomenological domain. These axes each represent the interface, thus the relationship between a part and a whole, 1) as state in a process, and 2) as distinction in a continuum. These are different dual dimensions of coherence. The first focuses on the interface as Boundary (Separator), the second on the interfacing as a Field (Connector). The orientation of the axes reflects our own mode of involvement, ↔ (Connective) or ↕ (Discriminating). These reflect respectively our identification with a Field or a Boundary (or, respectively, Interfacing, and Interface.) Every Boundary is a Field; they are each other's dual. The difference in interpretation reflects a difference (bias) in our involvement. From a meta-level, both together define continuity in integrity. Therefore, both need to be addressed in order to be able to transcend a Boundary (i.e. resolve the underlying – shared – Field). This is where meta-design, integrating both perspectives, can be applied to transcend limitation of disciplines or viewpoints to come to a more integrative understanding/perspective.

From the perspective of ↔ the viewpoints are polar opposites (with respect to the interface). From the perspective of ↕ they are polarities (of the interface). Always both are the case (because every interface Separates and Connects). Differences in perspective are therefore still realisations of the same reality. It is this understanding that bridges viewpoints of authors, and disciplines of science.

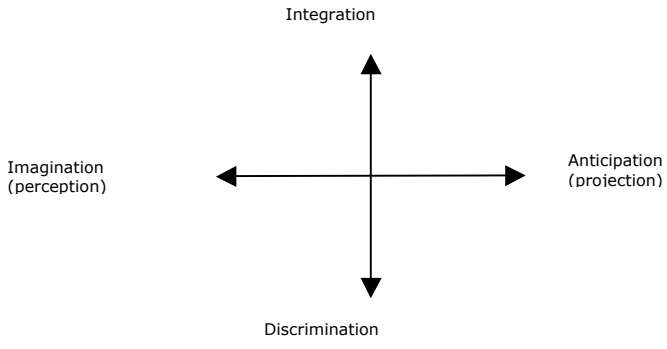

Figure 2: Overlay of involvement and manifestation in interaction.

The use of this quadrant may be helpful for identifying and monitoring specific states of being that are related to sympoiesis and Syntechnesis. As individual human beings, we manage all of these processes by co-ordinating a number of reflex levels simultaneously (O#o, 2005). Our conscious choices operate at a different level (the Head level) than the subconscious motivations at the level of

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relationships by reflex (the Heart level). At a deeper level (the Gut level) still we function by unconscious reflexes that determine our interactions with/in our context. At the deepest level (the Bone Level) our cells operate by natural reflexes that determine the purposeful embedding of our body as part of its habitat. From the perspective of our body's biology we can characterise these reflexes within a four-part schema that recalls our long evolutionary history, i.e. human, animal, vegetative, and mineral (O#o, 2003). Within our 'meta-design' agenda it is helpful to illustrate these four levels in terms of interaction in context. As such, we might think of them as inventor, explorer, communicator and constructor. In this case it might create the illusion that there is a clear distinction between sympoiesis and Syntechnesis.

The two axes (↔/↕) exist in different dimensional domains (i.e. reflect different degrees of freedom). They therefore do not lie in the same (2D) plane, of description. As pointed out (↔/↕) they are dual, and complement each other. This can be graphically represented by the form of a tetrahedron, in which each of the axes between the four vertices of a tetrahedron is at right angles to each other. The edges of the figure therein represent a gradient of the values expressed by the nodes.

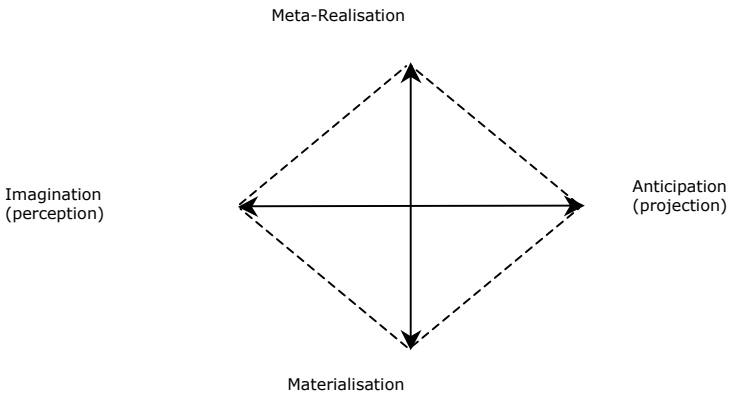

Figure 3: correlating separateness and connectedness in the interface interaction.

3.8 Synergy, Sympoiesis, Syngnosis and Symbiosis

To clarify the understanding of Synergy, particularly of Symbiosis, two new terms will be introduced for the purpose of enhancing the perspective of the interface – to study and understand it in more detail – adding the terms 'sympoiesis' and 'syngnosis' describe the activity of interfacing. Sympoiesis is a special version of the notion of 'autopoiesis' (Maturana & Varela, 1980). It is the dynamic self-organisation of a dynamic system. We can think of this as a process that is essential to the survival of living systems. Unless organisms can 're-build' their 'identities' within a domain that can recognise them they will not survive. "*Sympoiesis*", therefore, is a condition within which more than one 'authorial organism' shares an identity and must therefore work collectively in order to maintain their 'survival' in this mode. "*Syngnosis*" Collective Intelligence' (Pór,

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1995) describes practices that identify more successful outcomes than those described by 'group think' (Janis, 1972) in which shared decision making results in poor collective judgements. Syngnosis describes a more successful mode of consensus and group thinking. In order to be able to interface inanimate objects, a matching of their border dynamics often suffices. In living beings (determined by their internal freedom of choice) the system's singularity settings need to be compatible and matched. This requires that the mental processes are compatible and matched also. Evidently this needs to account for the ever-present freedom of choice in each involved person. Syn-gnosis describes this mental attunement within a process that includes, and goes beyond the conscious levels of awareness. Syngnosis is therefore, potentially, a symbiotic process. Symbiosis is the standard term for the mutual co-operating living of life forms, in which the presence of the one supports the existence of the other. (See Margulis, 1967)

Synergy can be exemplified as the energy that is liberated by the sharing of a new (joint) carrier wave when two systems align to engage in common process. The achievement of synergy through collaboration can be illustrated by considering the fusion of two musical notes. Together they create a higher *and* a lower harmonic that can be considered to be 'new forms' that did not previously exist. At a practical level this implies that what is under-stood by both (i.e. the 'language') is complementary to the new meaning that emerges. The two notes have become subordinate to a new and emerging sound that is not just a simple combination of the two notes. The lower harmonic is a new carrier wave that is shareable by both of the original notes. When reviewed in this context, the process of sharing therefore adds significance to what was there before. If we try to apply this metaphor to a conversation, the presence of synergy is a consequence of the immergence into an underlying common 'carrier wave' within the conversation, from which emerges new insight and meaning. (Cf. 'heterodyning' of the two notes/perspectives.). This can be considered to be a new, and larger, common context, within which the views of each of the authors can now be applied. What they already knew, individually, now has acquired extended meaning that is valid for both. A virtual boundary that previously limited the extent of their understanding has seemingly 'collapsed' (cf. collapse of the State Vector). The Event Horizon of their (joint) Consciousness has expanded.

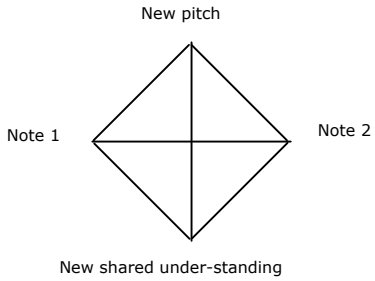

Figure 4: Correlating the interaction pattern with a musical interference pattern.

In the metaphor of the merging of the two musical notes, it is the new higher harmonic that determines the new form of the discourse. It offers a new sharper focus on the issues addressed by each of the authors. It thereby leads to a new form, which may differ from what each new before. It is only to be expected that in the bridging of disciplines, new 'languaging' will need to emerge to negotiate

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the terrain of what was previously the space between them.

3.10 Languaging Interfacing
Aside from describing the aspects of the interfacing it is relevant to have terms for the *relationships* between the fields that are joined by the interface. Traditionally these are describing as singular (separate), concatenated, nested and embedded. In an ecological context these terms are always relative. Every (singular) closed system is part of an open system, in which it is embedded. The way we define the system's boundary therefore reflects an observer bias (↔/↕). It describes the way in which the observer relates to what s/he observes. This creates a leverage by which the participation in the context is defined. The variation of the participant's involvement is elaborated in this paper. By having a choice in our level of participation we affect the conditions of interaction and thus influence the outcome.

This can be made explicit in terms of different modes of interaction:

1) **Predatorial (**disadvantaging each another in pursuing exclusive selfish advantage)
2) **Parasitic** (high dependency on the fitness of one, rather than both partners)
3) **Synergetic** (mutually supportive collaboration; system interaction)
4) **Symbiotic** (mutual optimisation of synergy; systemic embedding in context)

The focus of each of these aspects of interfacing is on, respectively the,

1) **Object**
2) **Process**
3) **Interaction**
4) **Integral outcome** {meta-design}

These are experienced subjectively in different body centres:

1) **Head** - conscious
2) **Heart** - subconscious
3) **Gut** - unconscious
4) **Cell** - beyond-conscious

They are recognised as different experiences of our context, and expressed in different art forms

1) **Thinking** - visual arts (painting)
2) **Feeling** - auditory arts (music)
3) **Doing** - expressive arts (dance)
4) **Being** - creative arts (landscaping/architecture)

The notion presented here is not a shift from traditional ideas of 'objective' to 'subjective', but a transcendence of the inter-subjective to achieve a kind of 'meta-subjectivity' that may offer some advantage to all persons/beings involved. The same four facets that are identified above for the system interface can also

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be used to acquire more understanding of each of the above levels of system embedding. The term " Meta-design" is used to describe the application of this understanding.

3.11 Ecological synergies

It is surprising that there appears to be no single, clear definition of synergy beyond that of a rudimentary notion that the totality of factors within a 'whole' usually exceeds the combined sum of its parts. In reality, the synergy we seek will need to operate as an ecological system. The term 'Synergy' describes the energy that is liberated by process sharing of separate systems. The idea of liberating energy is attractive to anyone concerned by the increasingly conspicuous and profligate waste of energy that we have witnessed over the last few hundred years of industrial development. By connecting up, the share the same interface, due to which the interfacing energies can – under appropriate conditions – be combined, and thereby reduced for each system. Also, some of the energies related to the integration of the separate sub-systems into the shared context can be condensed, and thereby reduced. This is the case in general, but of particular interest in living organisms which are characterised by the ability to change their internal degrees of freedom. This involves dimensional changes of state, corresponding with differences in the operational logic.

In seeking to develop the idea of 'design synergy' we propose the following orders of synergy:

1st Order Synergy: Invariant
Where the synergy within an environment is, in comparison with ecological systems, informationally inert. The key parties or elements benefit from the shared situation, and contribute to the shareable benefits unknowingly.

2nd Order Synergy: Variable
Where the synergy within an environment is, in comparison with ecological systems, is informationally alive. The key parties or elements benefit from, and intelligently contribute to, the shareable benefits of the situation.

3rd Order Synergy: Interactive
Where the synergy's distinctive features are sustained by information-sharing capabilities that can modify or inform the self-identity of some of the participants. The key parties or elements benefit from, and knowingly contribute to, the shareable benefits of the situation.

4th Order Synergy: Integrative
Synergies whose distinctive features are upheld by information-sharing capabilities that can modify or inform the self-identity of both individual and collective features of the participants; and in which the key parties or elements benefit from, and knowingly contribute to, the shareable benefits of the situation.

3.12 Re-designing design as a superset of itself: meta-systemic hyper-incursion

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The metadesigners project asks whether a discourse of 'deep synergy' might bring about a more enlightened approach to the design of eco-centric systems 'living-styles', governance, and ways of being and becoming. This will also require us to devise new professional practices because, at present, designers, planners, architects, technologists, etc. are too specialised for orthodox modes of 'meta-design' to be able to operate at a sufficiently collaborative and interdependent level of thought-action. Here, the idea of 'meta-design' is symptomatic of the perceived need for a discourse and methodology that will encompass systems of an exceedingly complex and volatile nature. It would probably include the (re) design of the design process itself. It can also stand for a trans-disciplinary mode of design that combines and integrates different design fields and practices in a flexible and reflective manner (c.f. Giaccardi, 2005). In an environmentalist context we may inform these definitions by asking how designers can redesign the way they design in order to 'un-manage' the self-sustaining nature of Nature?

3.13 Irrational reason

At the height of the Enlightenment era – the 'Age of Reason' – mathematician Blaise Pascal had the insight that "the heart has reasons that reason cannot know" (1670). If we are to take this seriously we might begin to look for a logic of the heart (O#o, 2005). What might this mean? Perhaps it relates to the emotional modes of reasoning, or what Payne (1985) and Goleman (1995) termed 'emotional intelligence'. Michael Polanyi's (1958) term 'tacit knowledge' may be a similar idea, although the word's etymology suggests that it is more to do with the sense of 'touch' than with the 'heart'. His term has subsequently been used to describe aspects of reasoning that enable us to see things more holistically. Polanyi asserted that all knowledge is tacit 'if it rests on our subsidiary awareness of particulars in terms of a comprehensive unity'. Tacit knowledge is therefore deeper than we know because we cannot grasp it fully. Neither can it be discussed in a conscious and explicit way. This can be illustrated by the way that doctors deal with a complex condition like an illness. Many people have criticised (western) medical practice when it appears to base diagnosis and cure on only a handful of seemingly disconnected indicators (e.g. rash, temperature, vomiting, fever) rather than using an inclusive, broadly comprehensive map (Kvitash, 2005). Polanyi (1969) describes a doctor's skill in diagnosing disease by its 'physiognomy'. In explaining this he quotes Immanuel Kant who coined the term "unformalisable powers", and who spoke of "an art hidden in the depth of the human soul". It would seem that Diogenes (412-323 BCE), who was the first of the Cynics, appeared to work from a kind of 'gut logic'. At the most basic level our functioning is based on the vital dynamics of our cells; and the way they form part of our natural context (via an extended development of a series of living organisms of which development we are all part). The levels of awareness of Head, Heart, Gut and Cell form and integral whole and together interface between the abstract (information) and specific (matter) as individual (boundary) and collective (field). This integrity can again be represented by the tetrahedron shown above. Our body thereby offers a key to understand how we are aware of processes of which we are part.

3.14 Syngnosis: The integration of different modes of synergy

Here, we may consider the comprehensiveness of appropriate knowledge and

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skills to be a kind of 'wisdom' that is probably too complex and emergent to be representable in an enduring form. (This form will always change in adaptation to an ever-changing context.) The high level of knowledge and skills required to achieve this make the practices of collaboration vitally important. Nor is it likely to be consciously comprehensible by individuals because the dynamics of our interfacing, our interaction with/in our context, and our embedding (oneness) with the biosphere is operated by, respectively, sub-conscious, unconscious and beyond-conscious reflex levels. The importance of a co-creative approach is clear, since the problems to be addressed are beyond effective remedy unless the remedy is highly imaginative, entrepreneurial, and multi-dimensional. Unfortunately, most of us, whether we practice as scientists or designers are trained as specialists. As such, we may find it hard to communicate and collaborate creatively with others, for whom the discourse is far from clear. Equally importantly, there needs to be a 'synergy' of communicable ideas within, and beyond the team itself. In addition, there also needs to be a synergy of actions and decisions between these first two levels. Again the tetrahedron can represent the relationship between our conscious, subconscious, unconscious, and beyond-conscious modes of involvement in our context. Together, they form the basis for "syngnosis". (Joint understanding.)

3.15 Towards a 'synergy of synergies'

The problem of co-authorship is therefore a long-underestimated aspect of design for complexity. It is, at least, symbolically and symptomatically related, not only to the need for 'synergies' at the level of food and energy production, but also in terms of interpersonal and trans-disciplinary relations. (Not only between human beings, but also all life forms on Earth.) Richard Buckminster Fuller (1975) has referred to the notion of a 'synergy of synergies' in which different modes of synergy are able to 'synergise' with one another. Hence, where physicists and metallurgists can work at a low order of (physical) synergy to produce synergistic alloys such as nano structured 'gum metal' (Saito & Toyota, 2003), we may need to understand much more about the higher orders of synergy that we find in living organisms, in which the embedding in the context operates at more, and more complex, layers and scales.

3.16 Symbiosis: Synergies of Life

We have already suggested that mankind's inability to deal holistically, with its immediate environmental problems results, to a large extent, with a legacy of analytical and de-contextualised thinking. It reflects bios of Object oriented (↕) over process centred (↔) forms of involvement. The rise of algorithmic thought (e.g. algebra) stemmed from the heavily reductionist and axiomatic approach of the pre-Socratic thinkers. Although their excessive claims were elegantly repudiated by near contemporaries such as Zeno and Heraclitus, they proved their spectacular success when applied to linear mechanical models. Invariant systems of representation may be able to deliver accurate prediction under limited conditions it is unable to do the same thing for living systems, which are always affected by their context at any given time and place (Maturana and Varela, 1980). Indeed, just as the survival of a single organism depends on its ability to interface effectively with/in its context, so humanity's fate will depend on its ability to re-attune to the ecological 'realities' that co-sustain it. For our

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societies to become 'co-sustainable' at the practical level of material resources, actions, processes, and machines we will need to become more 'open' to what Heraclitus called the 'Logos'. This word has often been (mis)translated as the 'Spirit', or 'Word'. Arguably, it refers to a kind of 'Natural discursive flux' that permeates the World that we both know, and yet do not know. It corresponds to Fuller's idea of a 'Synergy of Synergies'. It is a kind of 'integrated complexity' that puts us beyond the scope of control.

4) A Practical Approach to the Synergy of Co-Authorship

In practical terms, the above arguments tell us that no ecological issue can be resolved without referring its context, i.e. by asking how the system in question is 'embedded' within an/other system/s. For example, by producing smaller cars with lower toxic emissions and better fuel-efficiency we have made cars more desirable and affordable. The net result is that cars are consuming more fuel than ever before. Similarly, even if we were to insist that all new houses must meet the most stringent ecologically benign building standards, with zero-carbon emissions, locally-sourced materials, autonomous services such as water, gas, or electricity. If, however, we continue to drive long distances to work each day and to fly further and further for our holidays, we may still fail to meet our 'Kyoto Agreement' targets. Integrative thinking is required: the part as well as the whole need to be considered. The logical frame of reference is therefore the interface, connecting the system with its context. The required operant mode of thinking is not (analytic) Objective but (Integrative) Subjective. This shifts the focus from that of scientific models to social life styles. Research has shown that the societies who have the smallest ecological footprint also have spiritual and cultural values that sustain the 'style of living' that produce it. A key feature of these kinds of society is that conflict is reduced to the minimum, because it is potentially wasteful of precious resources and energies. It leads to conclude that synergies at the material levels must be synergized with synergies at the phenomenological, social, cultural, somatic and discursive levels.

Is it possible to operate our society by the harmonious principles cited for those small cultures? Let is consider social systems in terms of their differences in constraints of mutuality and potential (Fairclough, 2005). The interface between a closed system and open system can be characterised in terms of the boundary transition between them. (It is this interfacing condition that needs to be understood to relate e.g. one discipline or author to another) This can be interpreted as four levels of possible collaboration as ranked by their value to the society for which, and in which, they operate. The tetrahedral model described before can be applied for this purpose. In addressing the unknown, the known must be transcended. This requires a boundary transition, not only in our understanding, but also in our involvement. We move between the roles of 'insider' and 'outsider'; 'creator' and 'observer'. Both aspects are needed to obtain an integrative perspective (O#o, 2005b). Meta-design applies this understanding in practice.

The paper seeks to integrate two different traditions of practice in an outcome that satisfies the authors' conditions for synergy, where:

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- *Work achieved is of a quality that may be higher than the best work by each author*
- *Work that embodies emergent qualities or outcome that are surprising and/or unpredictable by either author*
- *Work that remains recognisable at a generic level to both authors*
- *Work that connects/integrates richly with interests outside the collaborative task itself*

In developing some practical approaches to the development of tools for meta-design, the authors - in collaboration with 12 other ds21 researchers - developed a system that offered specific roles for each of four inter-communicating teams. The teams met in order to co-draft a document that explores aspects of co-design within meta-design. This is the emergent level that can appear when the boundaries in the system are resolved. This is found not in the juxtaposition of the four aspects of the boundary, but by their integration, which implies a dynamic. Relevant in this dynamic is that all facets reflect and uphold each other. This is where the notion of synergy stands central: the interfacing boundaries are dissolved, when the participants transcend their own self-definition and limitations in supporting each other (symbiosis). This calls for imagination and anticipation (i.e. resolution of the shared pattern of understanding and shared functional dynamic). In the ds21 project the work group was asked to operate in four groups, each of which represented one of the four aspects of boundary integration. Within the context of this project they were called:

1. **Creation/Innovation** (origination level)
2. **Inspiration/Envisioning** (relationship level)
3. **Communication** (interaction level)
4. **Manifestation/Realisation** (object level)

The above categories were devised as a practical way to enable the most effective collaboration with a variety of designers and others with a very wide range of different types of knowledge, skills, and temperaments. In working with this model we came to re-think the categories within the context of how the body organises itself. The rationale is that all aspects of the interface (of the interaction) need to be addressed, thus represented. It implies that the different reflex levels by which we function all need to be appropriately addressed. Thus sensed by the people involved. This insight can be applied in a proposal for tools for synergy. These can be applied at the level of the individual scientist, such as in the writing of joint papers. The same concepts can likewise be used for integrating the insights of disciplines of science (where again it is by the trans-disciplinary collaboration between the scientists that the integration will be attained).

4.1 A holistic approach to collaboration

The following describes how the principles of synergy are more basic than may appear from what was written above. It informs the development of a practical approach to co-authorship. Humans are integral part of humanity (humans can be compared to the 'cells' of the 'body' of humanity). Symbiosis is a natural aspect of our existence. Synergy can therefore be seen at many levels of our

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symbiosis as a culture. Future tools for collaboration will almost certainly need to offer more levels of involvement at the level of communication, experience and co-creative realisation. For the participants this is experienced as a complex interplay between 'thinking', 'feeling', 'doing' and 'being'. We may analyse this figuratively in terms of the 'visual' (head), the 'auditory' (heart), the 'kinaesthetic' (gut) and the 'propriocepsic' (cell). All play a role, together with the different modalities of consciousness they represent. The imprint they offer on memory differs accordingly. The visual 'traces' of the written media, the 'felt' imprint of conversations, the 'tangible' experience of (inter)action all combine to Gestalt the lived realisation of (co)creation. The choice of media can be made according to the need of concretisation of the project. The *visual* helps to make concrete representations of Imagination. The *auditory* is more conducive for resolving anticipation (as this generally involves transcending one's own limitation, thus the interaction with others. The *kinaesthetic* is more practical for achieving new realisation (results). While the *proprioceptic* (individually and collectively) is essential for the vital evaluation (if the result is viable for al involved and out context). This cannot be obtained from the standpoint of a remote, or privileged observer, it needs to include the aspect of personal (responsibility and) involvement (↔/↕). Arguably, the traditional scientist as 'outsider' model has proved to be damaging for humanity and the biosphere. A better understanding of co-authorship is therefore a step towards a more shareable and self-reflexively responsible approach to science. The 'writing of joint papers' can thereby serve as simile for the integration of different disciplines of science.

4.2 Experiments in collaboration

It is well-known that frequent face-to-face meetings can aid the communication process necessary for collaboration. Unfortunately, this is often unpractical or even impossible. Our 14 (ds21) researchers are typical of this problem in that they are scattered across 6 different countries. Our work with the group therefore explored different modes of communication. Communication takes place at many levels of involvement, both conscious and unconscious. It involves 'seeing', 'feeling', 'doing', and 'being'. This was the most challenging aspect of the project, because although it would have been useful to integrate all possible levels of communication, they represent very different 'comfort zones' for individual participants. The co-drawing of diagrams and pictures proved invigorating and helpful, although researchers tended to forget what they were about, unless some textual interpretation was made, quite soon afterwards. If we compare the reading of, say, facial expressions with that of dancing it may be clear that each has a different level of participatory involvement. Nevertheless, we found that certain dance exercises had a positive effect on subsequent collaboration. After our 14 researchers had met for the first time and (literally) rubbed noses with each of the other thirteen in an open space, we noticed a heightened willingness of the researchers to engage at other levels of interaction.

4.3 Suitable tools for co-authorship

The ds21 team envisaged certain features of a digital communication system as helpful or essential. However, our experience was similar to that of other comparative studies in that, although the digital methods looked promising, we did not achieve full agreement on their use; and this took attention away from

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the main subject of inquiry, and, therefore, the flow of the collaborative process. Experience and consistency with the collaboration tools is therefore important. Ideally, 'the tool must not get in the way of the job'. Unfortunately, existing collaborative cross-platform software has yet to evolve to the point where we found any one product really helpful. This problem is well documented. Traditional (HTML) websites are 'presentational' and can rally interest, but are 'read-only'. E-mail and discussion groups tend to be less 'human' than a face-to-face meeting, or even a handwritten letter. Their often rather terse style can sometimes create emotional conflicts because it can make simple messages appear to be more hostile or unfriendly than intended. We experimented with one cross-platform system ('SmartGroups') but found it too 'modal', and therefore unappealing for our purposes. Similarly, Web log (Blogs) may work as a virtual 'notice board' for long tracts, they are still too unwieldy for co-authorship at level far above simple joint-editing. We designed a 'wiki' site (http://attainable-utopias.org/DesignSynergy21) that we found to be more helpful because it facilitates a shorter, more densely woven style, within which any author can intervene in the content, layout, and 'links' to different contexts. One of the most effective tools for augmenting the 'wiki' site collaboration was 'Skype' software. This enables pairs or groups to share ideas on their computer screens whilst discussing them via a high quality acoustic telephone system. Some available collaboration software packages integrate these. Imminent technological developments will provide a basis for further research.

4.4 An example of group synergy

One of the unforeseen examples of Synergy in the writing of Papers emerged at the CASYS conference itself, where this paper was presented. Rather than addressing intentional synergy, it illustrates group synergy, as a result of a development of the field of research. In Liège, the conference CASYS 2005 brought together insights of a kind most people are unaware of; and few are willing to accept. (Faster than light. Mathematics of consciousness. Multiple dimensions of time.) Yet it is this kind of science that not only shifts the boundary of our understanding, but also reconnects science with consciousness, and life. Shifting the interface – as explored in this paper – is a central concept. The following shows how many people individually work on research that – by their seemingly separate presentations – can be seen to be part of a collective effort. For brevity only two aspects of the presentations are described: Dimensional Space, and Time (other presentations addressed the same relationships for Energy and Consciousness). In each case, a description of State, process, transformation and Integration (the tetrahedron model shown above) was presented. There was no premeditation on behalf of the authors, nor was there any requirement on behalf of the conference organisation by which the coherence between the presentations was brought forth. The example illustrates that in all we do there is a latent synergy at work, which at times becomes explicit. This phenomenon may be brought out and enhanced when raised to a conscious level and applied with intention. The writing of joint papers might be one of the ways towards this.

(These finding of unpremeditated coherence between the conference's presentations are presented in anecdotal form. For the contributions of the

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authors mentioned, see the published conference papers in these same proceedings.)

4.4.1 Dimensional Space

One of the basic shifts is that of the inclusion of Dimensions in the considerations. This is where realities emerge, or cease to exist. Shipov presented his model of 3 connected Torsions (a.k.a spinors, vortices or (from Sanskrit) chakras). Not mentioned in this approach is that 3 vortices together engender a 4^{th}. Together they create a system where right and left, top and bottom, front and back can be in balance: and turn inside-out. This is the basis of a Dimensional Pulse. (A notion which is so alien to many that few are willing to take this idea into account.)

In the conference there were 3 others dealing with this issue. Bernard Diaz proposed a formulation for a Dimensional Point. (A "Gabor Point"). It is a point in which a Dimensional shift can take place. It is also a point in which the reality as a whole can turn inside out. As Diaz pointed out, such a point can be as simple or as complex as you like. In fact, any point in any space can be a dimensional point; in fact, is a dimensional point. But this can be realised only when this point is used for a dimensional shift, which requires conscious involvement. Without that, the point is a normal natural point in the space of observation; not a point of creation. Realised as a point of creation, it can open one or more dimensions; as much as you care to consider. Which means that the Dimensional Operator, D, is at the same tome a scalar, a Gabor Point, a Gabor Vector, or a Gabor Matrix of any (N) dimensions.

John Conway in a way addressed the same issue. He too looked at the interface of creation, and showed that it is our involvement that leads to the distinctions that we know of. In his approach, the number zero is the starting point of all numbers; of all kinds. Because the zero-point is the interface where we make our distinction. This relates to the work of Spencer-Brown and others: once you make a distinction, you change your realisation. For Conway this leads to a systematic unfoldment of different forms of involvement, the interface of discernment seen as a fractal, and as a result the complete system of Surreal Numbers. This is where the discernment of qualities is the logical basis of the quantities that can thereon be defined.

Peter Rowlands had the more elaborate description, of the way the Dimensional Unfoldment can be interpreted in a more encompassing sense. Shipov's Dimensional Pulse, Diaz's description of the Dimensional operator, D. Conways addition of the different qualities that ensue from this unfolding perspective of involvement, come together in the operations of the nilpotent operator of Dirac, in the work of Peter Rowlands. In this approach, our degree of involvement is actually seen in the way it reflects as different degrees of manifestation. For example: when we immerse in the discernment between differences in logical organisation, our entrainment in the process dynamic is experienced as the 'emergence' of an added material density dimension in the equations. (Such as when fermions and bosons are discerned.)

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4.4.2 Dimensional Time

These forms of description are related to other notions; those of the dimensions of time. What Shipov presented as the triple torsion vector, Jean-Pierre Garnier-Mallet showed as the relationship between the other representation of the same: the involvement of the 3 real time dimensions. Time is a perspective on process, which depends on a characteristic form of dynamic involvement. As a result, subjective and objective observations do not match, in time. This leads to a need to integrate the two perspective, which is experienced as a time acceleration, at the moment that the different perspectives are seen from an integral understanding.

Uri Fidelman dealt with the equivalent of Diaz' presentation, but now also in Time: Where Diaz described the Dimensional Operator, Fidelman described that likewise we need to account for a multidimensional time. This is evident: when any point in any space can be an emergent Gabor Pont, than that point (and its time perception: the spinor rotation) will be multidimensional also, as described for the D-operator above. This means that any dimensional point can be a fulcrum for any, many, processes of emergence (or immergence). This was described in the concept of Dimensional (de)Compression.

Susie Vrobel described the equivalent of the presentation of Conway: where he addressed the fractal nature of the interface of perspective, she described it as the fractal nature of time. In a complex system, such as the cells of a living body, each cell has its own time frame, yet all of those are connected. To address time as a fractal construct is a logical reflection of the way all these time domains (and their root formulation as spinors) are all interconnected. This was described in the 4D of time.

In a more abstract mode the relationship between different degrees of involvement and different formulations of time, as system of organisation, was described by Winkler. His formulation could as yet be made much more explicit, if for the relationship between subjective and objective realisation the model of Rowlands were used. Schempp had in fact in his own way done this, by showing that the Heissenberg Uncertainty is resolved when the interface of observation is coupled to the observing observer. As a result, the Collapse of the State Vector does not take place, but the interface of temporal unfoldment can be followed, in its own fractal (de)acceleration (dimensional (de)compression) and the probabilistic uncertainties also are resolved, by the need to make no distinction. In a parallel to the model of Conway: all surreal numbers thereby become real. This is the dynamics of Realisation, which Schempp used for enhanced imaging in MRI devices.

4.4.3 Meta-design in conferencing

The conference likewise brought out the similar integration of perspectives for Energy and Consciousness (which will not be discussed here). It shows that humans implicitly function in the 'organic mode' mentioned above. We are all 'cells of the body of humanity', and in working towards the goal of the whole bring out different aspects of that integral process. By this, seemingly separate (conference) contributions are interconnected. This study points out that there is

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benefit is realising that this takes place, and to enhance this by adding mutual support to the standard conference practice of personal presentation. This calls for a more integrative perspective on conference co-ordination, for which the concept of meta-design, mentioned above, has practical use.

5) Conclusions

Science is based on the work of scientists, who by their interaction are able to transcend the limitations of their understanding, and come to new insights. When these are founded on a deeper understanding, the results have a more general validity than the understanding of each contributor. The foregoing describes how this involves the transcendence of the (self)limitations of the people involved. This can be described in the graphic representation of a tetrahedron, by which the properties of an interface as Boundary (Separator) and Field (Connector) can be combined. This makes it possible to address the boundary transition from Unknown to Known; which simultaneously describes the process of communication between one person and a collective. Apart from the State of the individuals, the group Process determines the outcome. Where the first can be described in terms of science, the latter can only be experienced as art. Specifically the emergence of new insight is not deterministic, but the consequence of interaction, taking place at different levels. A natural cascade in changes in realisation can be seen mirrored in the functioning of our body; in which our dealing with newness (thus the unknown) is part of our daily practice of living. The text describes how this is experienced within us. Different levels of involvement, different forms of experience, different modalities of consciousness, and different forms of communication are all interrelated and can all be represented by the same schematic: a tetrahedral model. This understanding makes it possible to apply this understanding in the design of communication techniques, which can be equally well used for the writing of joint papers, as well as the fusion of different disciplines of science, to bring out new insight with more general meaning. Some communication tools and techniques were described. The metaphor of the merging of two musical notes was presented to show how the dynamics may be understood in terms of the model of waves. Synergy can therein be understood as the energy that is liberated when two systems share the same carrier wave, thus interface field. An example was presented that the principles for the eliciting of synergy can be designed and applied (as was the case in the writing of this paper) they can also be discerned as part of the natural symbiosis as seen in our culture. This understanding seems to be relevant at present, as the separation between disciplines of science has caused many ecological problems; which may be resolved by understanding our integral interconnectedness with nature. By applying the principles mentioned in this text it is foreseen that it is possible to integrate the different disciplines of science and resolve the problems which some disciplines in separation can create. It also shows that science is an art: it is the involvement of the scientists, and the interactions between them, that determine the outcome. Meta-design is proposed as methodology to study and apply the principles addressed in this paper.

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