APITHOLOGICAL SYSTEM DYNAMICS IN STRATEGIC SUSTAINABILITY CONVERSATIONS

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ABSTRACT

When facilitating social learning processes in multi-disciplinary strategic conversation groups for societal sustainability the dynamics of knowledge diversity, identity framing, values conflicts and information inequality will often surface. These can result in both generative and dissipative constructions in the formation of information, collaboration and meaning.

This paper records learning experiences in forming two strategic conversation groups involving twenty-six multi-disciplinary participants to examine macro-sustainability issues in ten distinct sustainability impact spheres. After identical and joint initial formation processes, the participants were divided into two groups of equal diversity in gender, age and background disciplines to work on identical programs. One group was selected for its homogeneity in operant levels of consciousness the other for its diversity in cognitive frames and perspectives. Distinctly different results occurred in the processes and outputs of the two groups.

The reasons for this apparent divergence highlighted contrasts in individual learning intentions, self-perception of information and the commitment to collaboration. The initial productive performance of the homogeneous group was in contrast to the initial dysfunction of the heterogeneous group. Following intervention and the introduction of a specifically designed inquiry process using principles of integral methodological pluralism, the heterogeneous group learned to become process proficient and highly productive even though the conditions for conflict remained essentially unchanged.

The study raises questions about the significance of information paucity, knowledge humility and the perceived value of collaborative inquiry in generating meaningful multi-stakeholder solutions to complex sustainability challenges. The apithological (*generative*) and non-apithological (*non-generative*) dynamics of the two groups altered over the ten strategic conversations held. The presence of an *emergent trichotomy* of formative conditions in the structures of information, communication and intention was concluded as being significant. Various observations are made on the formation of generative conditions to enable successful multi-disciplinary collaborations for sustainability outcomes.

Keywords: systems theory, education, sustainability, generative dialogue

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Background Context

The Sustainability Thinkers Education Program (STEP) is an organizational development program running from 2008 to 2010. That program was designed to take leading thinkers within a corporate utility employing over 2500 people with infrastructure assets of $12 billion and provide them with key skills for strategic sustainability challenges in the future. The Program had a different emphasis for each of its initial three phases, with a specific course being designed for each phase and participants selected accordingly. The graduates from the different Courses in each phase were later combined to form an alumni collaborative learning group. The three initial phases of the Program were:

STEP I: *Meta-Systemic Thinking for Sustainability* – examining meta-systemic models for sustainability management and system change using meta-systems of analysis, including; critical systems thinking skills, inquiry into sustainable futures, personality systems, ethical systems, panarchy and complexity systems, meta-systemic mapping processes, stakeholder values systems, governance systems and meta-systemic processes for facilitation and change intervention.

STEP II: *Strategic Multi-Party Sustainability Conversations* – examining the processes for enabling multi-party solutions for critical sustainability issues framed in dependent levels of organization as a nested holarchy of ten sustainability spheres, being; the lithosphere, atmosphere, hydrosphere, biosphere, sociosphere, technosphere, econosphere, politiosphere, ethosphere and theosphere.

STEP III: *Thought Leadership for Sustainability* – examining the development of personal leadership through individual learnings from the experience of analyzing and resolving complex sustainability trade-offs framed in the context of pragmatically leading successive transitions from unsustainable to sustainable states and potentials.

This paper primarily concerns the STEP II Course for the second phase of the Program, which looked at the system dynamics of strategic sustainability conversations involving multi-party collaborations. The paper discusses the processes for the design of that particular course, the principles used for participant selection, the opportunity that arose for reflective learning about that design and the insights gained. These learnings may inform the conscious design of similar programs in the future.

Strategic Sustainability Conversations

In many city level or regional sustainability systems a phenomenon is occurring where the multi-party stakeholders with responsibility for management of different parts of the sustainability system are not organized as a system of sufficient complexity to meet the sustainability challenges of that system. An evolutionary leadership gap occurs in the capacity of the city to manage its own systemic complexity for enduring sustainability.

Apithological System Dynamics

For example, water management services in city landscapes involve conflicting policies of water supply, catchment management, wastewater treatment, wastewater disposal, urban housing availability, city planning densities, public health concerns, public amenity preservation, terrestrial ecosystem vulnerability, river and estuary ecosystems conservation, marine ecosystem integrity, superficial and subterranean aquifer replenishment, sport and recreation uses, leisure lifestyle values, visual ascetics and intergenerational values. In city-level strategic sustainability conversations, where each of these domains is governed by a different policy body with a diversity of mandates to effect different sustainability aims, using different sustainability assertions, with competing drivers and non-common constraints, a whole of system perspective is often difficult to obtain. The role of multi-party strategic sustainability conversations in disclosing these city-level systemic dynamics becomes crucial for the sustainable management of our urban and non-urban human settlements. Leadership skills are required to manage the integration of these sustainability perspectives as a sustainable system of inquiry. The development of these evolutionary leadership skills was the focus of the STEP II Course.

Bauwen and Taillieu (Bouwen & Taillieu, 2004) outline some of the dynamics that surface for consideration in the design of multi-party sustainability conversations. These include: technical complexity, social embeddedness, absence of stakeholder representation, lack of public authority collaboration, shared problem definition, multi-level coordinated actions, finding common scripts and action strategies, pre-existing adversarial relationships, differing perspectives on presenting problems, vested economic interests, disparities in power or resources, rule absence, informal reciprocity, information probity and exchange, shared constructions of reality, expert and experiential knowledge domains, undiscovered interdependencies, poor boundary management, long term continuous processes, limitations of existing governance, the contesting of values and perspectives, active and responsible participation of membership, deep and double loop learning, differences in backgrounds and disciplines, counter and inter-dependent routines, imbalances and inequities and the need for continuous interactions among different communities of knowledge and understanding which require processes of re-membering, re-minding and re-creating of relationships, perspectives and meanings.

The analysis of the myriad of these dynamics leads to a vision of social organizational learning that provides systemic and cultural change through joint participation of stakeholders from multiple levels of activity and concern. To achieve this vision the learning context must allow for all of these conflicting dynamics. Where the existing organizational structures for stakeholders are set in historically generated policy structures as a portfolio of silos of separate interests, moving to an integrated systemic sustainability perspective is often a capability not yet developed by the system in its present form. The presenting sustainability problems may be acknowledged by the policy makers or the community itself, however, the skill for their resolution is only a potential system capability, as yet unformed. Training is therefore required in the facilitation and management of multi-party sustainability conversations to enable the integration needed at the whole of system level to meet societal level sustainability problem complexity. An awareness of the range of dynamics operating assists in informing and facilitating this

systemic evolutionary leadership skill.

The temporary absence of an evolutionary capacity necessary for a system's own resolution of the tensions resulting from a transition to new orders of complexity presents an opportunity for an evolutionary leadership role. That role is essentially the ability to enable the integration of perspectives to resolve complex system problems that are beyond the capacity of individual people or isolated agencies to even identify, much less solve. This role will often naturally fall to an organization with the drivers to take on that integrative role, whether in a mandated role under legislation, or in the benefits gained from relieving the present tensions of systemic unsustainability. Often this will be an organization itself subject to regulatory pressures, unsustainability tensions or threats to its own future viability. One means by which the systemic tensions in sustainability transitions can be resolved successfully is by use of multi-party collaborative conversations. Conflicts in the responses to sustainability challenges can be harmonized in a shift to strategic level conversations from policy level constraints. This process may subsequently enable policy level reform for the future generativity, livability and sustainability of the city-level system as a whole. The absence of the presence of these skills in leading such collaborations potentially limits the system's sustainability and future potential.

Sustainability Systems Education

One of the most frequently occurring dilemmas for systems educators in sustainability systems thinking is how to effectively manage distinctly different capacities for understanding systemic complexity within the one education program. This issue is not unique to the systems education field, and potentially applies to all adult education, as different individuals may be at different stages of development in cognitive complexity and in different phases of learning capacity and commitment (Perry, 1999). However, it is perhaps in the systems arena for sustainability thinking where this question becomes most pronounced and apparent. In the education for the leadership of sustainable systems, system complexity is dictated by the complexity of the system being examined. Simplistic characterizations become clearly deficient when implemented. This issue of the misalignment between cognitive abstractive capacity and system level complexity is greatly highlighted in sustainability inquiries. The misalignment is compounded where there is a requirement for the alteration of government policy institutionalized in separate and autonomous bureaucracies as a structure limiting the capacity for system evolution.

However, the places for intervention where an integration of perspectives may occur are often also the locations of conflict. In the tension of the system in evolution is the means for effecting problem resolution. If we were to name the location of the problems of misalignment in sustainability perspectives these could be called 'epistemic fault-lines', being the places in a social system where knowledge domains and ways of knowing clash and converge in physical, social and philosophical domains. The resulting tremors from these tensions can cause the structural failure of many traditional institutional edifices, often without adequate replacements being in place. The potential is then for system-level failures of governance in the non-responsiveness to emergent sustainability challenges.

Managing in these fault-lines between states of change and across strata of understanding is an evolutionary leadership role. The initial role for the educator in the development of leadership learning for the roles of meta-systemic sustainability leadership is to align present capabilities and questions of concern with the capacities needed in an integration of different systems of meaning. Rather than dealing with a sameness of levels of understanding, the converse is usually true.

Researchers into developmental psychology recognize that cognitive development in adults can correspond to differing levels of abstraction in the processes of reasoning (Commons, et al., 1990; Commons, Richards, & Armon, 1984). Jane Loevinger (Loevinger & Blasi, 1976; Loevinger, Wessler, & Redmore, 1970) and Susanne Cook-Greuter (Cook-Greuter, 1990, 2000, 2002, 2004) in a detailed and ongoing analysis of ego development and individual self-sense have recognized that patterns in individual meaning-making, capacity for perspective taking and one's relationship to temporal complexity indicate definable developmental ego-systems, or action-logics (Torbert, 1999). Robert Kegan (Kegan, 1982) examines the problems and processes of human development and identifies the difficulty experienced in the transitions between six distinct orders of consciousness in subject-object relations theory. Joshua Floyd (Floyd, 2008) shows how the emergent nature of ego development informs an assessment of an individual's capacity for sustainability and futures thinking in different developmental stages of systemic thought. Recent work on the patterns of adult moral development extend the proposition that, while cognitive complexity in adults is distributed in a population and is also developmental, there are distinct patterns to its 'shape' with identifiable stages that appear to have recurrence (Dawson-Tunik, Commons, Wilson, & Fischer, 2005). The conjunction of these various developmental stage theories inform the sustainability systems educator in one of the key difficulties in consciously approaching sustainable systems education practice. Different people are making meaning differently. The complexity of unsustainable situations is continually being perceived in different abstractive levels of complexity. These differences of understanding and appreciation are fundamental. The question presenting itself to educators often is: "How will this learner learn and where are the momentary limitations of their learning?"

The capacity for systems thinking is potentially not discernable from one single dimension of personal or cognitive development (Wilber, 2000). The capacity for *sustainable* systems thinking, with its requirements for moral complexity, temporal extension and integrative abstraction, is potentially even less discernable from stage development assessment tools based on one form of reasoning (e.g. moral scenarios, language construction, task reasoning etc.). Once we have an awareness of the terrain of the full landscape of variations in the capacity for conceptual complexity, then seen as a system of psychosystems, or more precisely individual conceptions within the collective of diverse psychosystem coactions, the sustainability systems educator must make some difficult choices in their approach.

One choice for the educator is whether to design a learning program for a homogeneity or heterogeneity of thinking systems in terms of the cognitive complexity required for the learning environment being created. In the absence of an informed choice, the default alternative is to assume (and hope) for a process of natural self-selection by participants,

with those finding that they are in over their heads instead choosing to explore elsewhere rather than fail at the tasks presented. The problem is slightly different where providing an education opportunity is not the primary objective. Where sustainability systems educational is the selected form of intervention in societal level sustainability development, the failure of one 'student' participant to 'get it' means the system too may fail. Education is instead seen as a participatory and necessarily inclusive experience within a wider and more inescapable goal for evolutionary development. In sustainability governance systems where the member-participant roles are pre-designated, a natural stratification of cognitive complexities and the conjunction of inherent tensions this entails potentially condemns the solutions generated by that system to fall into the chasms of the conceptual landscape's epistemic fault-lines, in situations of conflict, disharmony and partiality. This case study involves a situation where the choice, of designing for homogeneity or heterogeneity in cognitive complexity, involved each being selected for simultaneously, providing an unusual and potentially unique opportunity for their comparison. This opportunity generated new questions regarding the role and practice of sustainability systems education in the evolutionary capacity of large-scale social systems.

Participant Selection for Education Program

Because the Program had strategic intervention purposes the design of the STEP II Course was premised on the basis that participants would actively be selected for based on their level of cognitive, strategic, ethical and moral development. This approach was adopted also due to a personal ethic of ensuring the quality, safety and compatibility of each learning participant's education experience, particularly with regard to the challenging and personally confronting nature of the sustainability content that would be covered. This is not to say that any participants were excluded based on an assessment of levels of development, rather the program would be modified to accommodate the homogenous group of learners that presented themselves for the learning experience offered. The Course format and content was designed specifically to fulfill the aims of the Program based on the assessment of the participants' needs, which would be conducted at the selection stage of the Program and thereafter on an ongoing basis. The Course delivery would then be adapted and evolve on an ongoing basis during its delivery specifically to meet the needs of those unique participants as a dynamic social group. An evolutionary and adaptive approach was taken to the education of evolutionary adaptive change management.

In order to meet the participant's individual and collective learning needs in this way, each potential participant was requested to complete an application for participation in the Program and the Course. The application form included a short self-assessment questionnaire as to capability, familiarity with sustainability, learning intentions and also included specifically designed sentence completion test questions, with cross-correlating inquiries to assess different developmental dimensions. The responses to the applications were supplemented by individual interviews where necessary. Applicants were informed that the application would be used to assess their suitability for the Course and to inform the design of the Course based on the participants' needs expressed in the applications. The survey instrument and interviews allowed for the discernment and differentiation of

each participant's composite capability and suitability for the Course based on multiple criteria relevant to their capacity to engage with the learning experience potentially available.

The application process for the Course involved twenty-six people applying and competing for fourteen places. Of these participants, twelve immediately met the selection criteria for the intended working group. This group was specifically identified as those making of leadership transition from Technician-Achiever in the Torbert Leadership Development Framework (Torbert, 1999). The sustainability education program had been designed specifically to meet the needs of this emerging management group to support them in their future leadership roles. The identification and self-selection of these future leaders from within the total employee group was successful in these aims. The surprise feature of the application process was in the number of passionate and committed sustainability advocates who also applied from other stages of ego development. The option therefore existed to design a specific course for these additional applicants. Two parallel programs commenced with participants selected from these two distinct groups.

The Course began with an induction session with all the participants together as one unified cohort where they were given an identical orientation to the objectives of the education experience they were about to engage in. They were then divided into two groups with a diversity of ages, experience and gender. The primary difference between the two groups was that Group A (Expert Group) was primarily homogeneous in their action-logic development level, where Group B (Solutions Group) covered a broader and (on average) higher range of action-logic development levels in a more heterogeneous mix of cognitive styles.

Outline of Group Learning Experiences

Different learning experiences occurred for the two groups almost immediately from the moment of their formation. Group A (Expert Group) formed into a cohesive group following normal group development processes, with natural leaders emerging and the articulation of a concise, and consensus derived, group learning objective in completion of their initial task together. Group B (Solutions Group), in contrast, struggled to find a clear and meaningful consensus for their group learning objectives in the initial orientation exercise and for some weeks after, extending well into the commencement of the Course. Group A adopted an established format for their learning experience for every session. That structured format, even with the opportunity for play and experimentation, remained essentially unchanged throughout the three-month program. Group B, in contrast, requested and required alterations to the format of their learning experience constantly and while agreeing in default to use a set learning structure for part of the program, continuously altered their learning approach in a process of ongoing negotiation of individual needs and intensions. Group A demonstrated some initial dialogue tensions and in adopting the overall learning objectives of the Course, being to achieve an awareness of the system dynamics occurring in strategic conversations, took steps to mitigate those behaviors within an established group norm that allowed for both individuality and group efficacy. Group B, in contrast, demonstrated initial dialogue

tensions which were sustained and which remained unresolved, notwithstanding the surfacing and exploration of those tensions, through to completion of the program and into its process for post-reflection. The highlighted differences between the two groups appeared initially inexplicable considering the individuals had applied for participation based on identical information, were selected based on identical criteria, used almost identical course content and met in similar situational settings. A learning opportunity presented itself to examine and explore the reasons for these apparent differences.

Examination of Group Differences

It would not be unusual for two different and randomly composed groups of individuals to have very different dynamics due to the pronounced effects of individual personalities on group performance (Nadler & Spencer, 1998). The interesting factor in this unique situation was the conscious selection of the participants for the two groups based on the homogeneity and heterogeneity of their developmental complexity across a range of dimensions. To discern whether the impression that the two groups were in fact different psycho-structurally, rather than merely anecdotally, a simple self-assessment survey tool was designed to provide a midpoint reflection exercise for all the participants in the Course.

The survey tool used six questions, in three question pairs, regarding each individual's own learning intentions. Responses were self-rated on a ten-point scale. The questions were directed towards self-disclosure of each participant's individual intentions regarding the Course, specifically with reference to their openness to learning, their openness to collaboration, and their openness to new information. The specific questions asked of them by way of self-reflection were:

Q1: How much did you know about sustainability before commencing this Course?
Q2: How much do you expect to know about sustainability after completing this Course?
Q3: How is your strategic conversation group performing based on your own expectations?
Q4: What is your own level of contribution to the group's performance (so far)?
Q5: To what extent have you been exposed to different materials and new information?
Q6: To what extent have your views altered as a result of this material and information?

Because all of these participants had self-selected to be participants in the course and had made personal efforts and sacrifices to participate, a reasonable assumption was that all participants would have a roughly correlating level of learning intention based on their desire to make the most of the learning experience available. This would be no different to an advanced postgraduate program in sustainability systems thinking where the participants had committed personal time, at a personal cost, in a personal investment in the process of learning. Variation would be expected in the level of commitment, but within a broadly similar range of orientations in their self-motivation towards learning. What was surprising in the results of this simple assessment was the divergent and dichotomous nature of the results of the two groups.

In response to the three categories of learning intention, the necessity for collaboration, and openness to new information, the discrepancy between the entering intention and the result of their recorded experience was scored. What was significant was not so much the

scale of the expected difference, but rather the direction of the variation (if any) as being either positive (i.e. the experience was expected to be generative) or negative (i.e. the experience was expected to be depletive and unrewarding). The aim was to highlight any difference between the held intentions of the two Groups.

In looking at the results, overall Group A's (Expert Group) responses showed a higher response score and a higher variance in their responses. Group A believed they had less knowledge about sustainability (A3.5/B5.5) and expected to learn slightly more (A7.42/B7.31), contribute more (A6.0/B4.31) and shift in their views more (A6.33/B3.81). In contrast, Group B (Solutions Group) rated themselves on average as more knowledgeable, expected to learn about the same, saw their contribution to the group as sufficient, and while experiencing the same level of new information, expected to shift in their views much less (see chart 1.1). Specifically, it was the variances in the paired questions where the starkest contrast was shown. Group B's average self-assessment score variance was 46.2% of Group A's responses in terms of their expectation for learning growth. Group B's average variance scores were 16% of those of Group A in terms of their expected contribution to group performance. Group B was -188% of the variance of Group A in terms of their expected shift in views as the result of new information (see chart 1.2). In summary, the Expert Group (A) could be characterized on their self-assessments - as open learners. The Solutions Group (B) could be characterized on their combined self-assessments - as already sufficient knowers. To disclose the difference in the dynamics visually was illuminating for the course organizers.

While not statistically conclusive and merely indicative, the mid-point survey data affirmed observations made by the course organizers of the distinct difference in the learning dynamics within the two groups. More importantly, the inquiry disclosed information about the phenomenological motivations of the individuals within each group. These responses supplemented the individual participant's own self-reflections provided as ongoing feedback on their learning experience, which were captured fortnightly for each module on their experiences and changing learning needs.
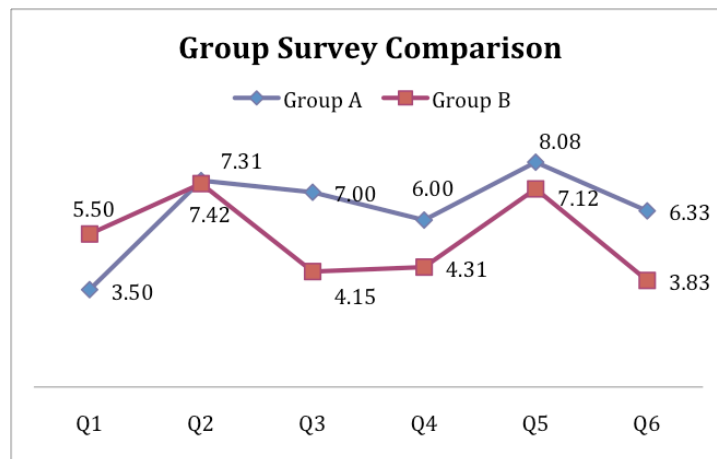

Chart 1.1 – Group A and Group B comparison on question responses

In further confirmation of these perceived differences, on occasion individual members of one group were unable to attend at their usual Group's time and so attended the other Group's session as observers. These observer participants, alternatively attending from both groups, made unsolicited comments to organizers of the noticeable difference for them in the dynamics of the two groups, highlighting the divergence that occurred following the two groups being segregated after their initial orientation. Interestingly, both groups rated the expected level of learning and the level of information made available in the Course highly, indicating that the Course was meeting all participants' needs in terms of a challenging learning opportunity. The major finding from this inquiry was the difference in the potential for learning within the two groups. The remaining question was to identify why this was and what new learning might result.
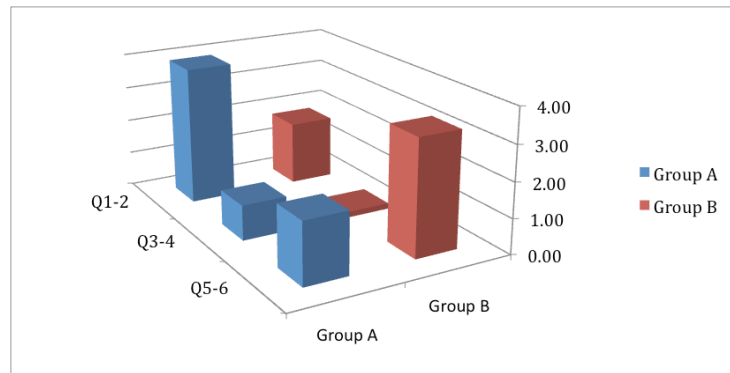

Chart 1.2 – Group A and Group B variances in paired question responses

Conversation System Dynamics and Conjecture

The learning experience of Group A reflected the explicit intentions of the Program. The Course and their learning experience proceeded smoothly without undue problems with the Group learning to obtain information, develop their own inquiry questions and self-monitor their own processes for their sustainability conversations leading towards satisfactory resolutions. The principles for the course design and their selection in this phase were affirmed as the appropriate processes for the Course aims. A more interesting learning opportunity for the participants and the organizers was presented by the dynamics occurring for Group B. The Group B dynamics of diversity, individuality, conflict, heterogeneity in agendas and personally invested opinions is probably the more usual setting for sustainability systems conversations that are socially representative. In terms of multi-party collaborative sustainability conversations between city-system level policy regulators, the dynamics of conflict are much more probable than the nurtured learning environment of Group A's approach to sustainability problems. The potential existed for a much richer learning experience for Group B to the extent the participants were willing to explore these dynamics in a safe environment without the pressure of specific real-world outcomes.

The opportunity for that conscious Learning II meta-learning was offered to Group B (Bateson, 1972). While the presence and effects of the Group tensions were recognized

by the group members individually, the difficulty was how to make the psychosystem dynamics visible so as to enable the potential for the self-resolution of those dynamics by the Group as a whole, being the principle learning aims of the Course. The micro-dynamic of Group B reflected the same difficulties that have been identified in multi-party sustainability discussions at the macro-system level (Bouwen & Taillieu, 2004). The learning opportunity involved finding a way to see the dynamics of the unsustainability of the situation created by them, using the same forms of understanding that had led to their creation, being their own cognitive approaches to perspectival complexity. In this systemic impasse some type of meta-systemic intervention was required to facilitate the opportunity for self-learning potentially available (Flood, 1999).

Conversation Complexity and Biomimicy

One of the topics for learning reflection within the program was the value of using biomimicy as a system design strategy in sustainability (Benyus, 2002). The suggestion made to the group was that there might be a biomimicry solution to the inability to find coherence in Group B's sustainability conversations. In examining the system complexities of multi-party stakeholder conversations where there is a common situation of with mutual benefits, yet conflicting individual intentions, capacities and directions, the metaphor of the collective movements of a bird flock emerged. The original work of Reynolds (Reynolds, 1987) in simulating the movements of bird flocks by using computer algorithms was reviewed as an analogy. In this early modeling the simulated flock is generated using an elaboration of a particle systems approach, with the simulated birds being the particles. Under the system parameters the birds choose their own course with each simulated bird acting as an independent actor that navigates according to its own local perception of the dynamic environment. The simplicity of the system rules that govern the behaviors of bird flocks in flight was put forward as a metaphorical analogy to describe and govern the Group's own experience of multi-party dialogues. Instead of conflicting agendas, diverging conversations and circular arguments, the potential beauty of complexity in a circling and continuously shifting dialogue of utility to all individuals was offered as a potentially available representation of their experience. While asserting individuality within a context of meaningful conflict is potentially beneficial, the common desire of the participants was for a system-level resolution to critical and pragmatic questions of sustainability from a detailed and constructive investigation into existing apparently intractable problems, leading to new solutions.

To frame the awareness of the potential for choice to reconfigure the dynamics within which the participants had found themselves constrained, a heuristic matrix of the potential alternatives available to the Group was created. This matrix reflected the differentiating dynamics of the three dimensions used in the mid-point self-assessment survey tool, being the dynamics of *intention*, *communication* and *information*. The format for the heuristic matrix was adapted from E.F. Schumacher's descriptions for the forms of futures discourse in *Small is Beautiful*, a text also used and referred to in the Course (Schumacher, 1974). This form provides for eight combinations in two alternatives (generative:dissipative), for three pairs of variables (intention, communication, information) resulting in a set of 2^3 combinations of the presence or absence of each key dynamic. In this case the result is eight conversation scenarios described as *dissipative*,

dissonant, consensual, aimless, confused, disparate, misleading and *generative*. Significantly for the group only one combination of the three 'system rules' would result in a generative dialogue (see Table 1.1).

Table 1.1 – Generative Dialogue Matrix

Form	Perception	Communication	Intention	Resultant
A.	Informed	Understood	Conscious	*Generative*
B.	Uninformed	Understood	Conscious	*Misleading*
C.	Informed	Misunderstood	Conscious	*Disparate*
D.	Uninformed	Misunderstood	Conscious	*Confused*
E.	Informed	Understood	Unconscious	*Aimless*
F.	Uninformed	Understood	Unconscious	*Consensual*
G.	Informed	Misunderstood	Unconscious	*Dissonant*
H.	Uninformed	Misunderstood	Unconscious	*Dissipative*

This particular set of combinations representing different dimensions of generativity and dissipation, in vicious, virtuous and incoherent circles of communication, represent what are known as trichotomies in the field of apithology (Varey, 2008). An emergent trichotomy is the one combination of three systems dynamics that leads to generativity. The contributing forms are identified at the level of the causative dynamics that result in the structures of the system while in the process of formation. The format used in the matrix tool adopts an apithological construction, highlighting generative and dissipative combinations of the presence and absence of different formative dynamics so as to generate different potentials for coherence. Being applicable primarily to human systems, the three variables conventionally represent dimensions in the psychological, sociological and physiological domains. In this discipline, emergent trichotomies are not simply random trilogies and require a process of identification by directed inquiry using an apithological systems perspective and inquiry practice (Varey, 2009b). The heuristic of the trichotomy matrix of alternatives highlights the effect in either the presence or absence of the dynamics necessary for the potential for generativity. In many cases their

conjunction in generativity, while desired and sought after, is the only combination of forms that an unconscious structuring of these dynamics does not generate randomly. The trichotomy matrix is then used to enable attention to be drawn to the vicious circles of non-generative dynamics while the participants are caught in them, leading to group self-awareness and the potential for increases in evolutionary social capacity. The awareness of these dynamics becomes an essential evolutionary leadership tool.

To assist the Course participants with an understanding of these abstract dynamics, the system rules for bird flocking (i.e. *flock centering, collision avoidance, velocity matching*) were adapted to provide specific and meaningful guidance for the parameters for strategic sustainability conversations characterized as being generative for this Group. The system rules used to base their generative sustainability conversations were described for these purposes as: 1) Maintain an equal distance with those around you (don't bump into your neighbor and cause a crash); 2) Turn when your neighbor turns (don't divide the flock); 3) Head towards the forward median space (go where the flock is going). From this analogy, the generative conversation system rules developed were: *1) Offer additional information to enrich views (don't impose alternative views in conflict); 2) Acknowledge value in opinions and explain why value is seen (stay aligned and different, but not divisive); 3) Follow the theme that is occurring (don't disrupt or break the conversation chain, but offer direction)*. These reflected the particular dynamics unique to Group B's conversations.

These two heuristic devices, of the system rules and the dialogue matrix, provided a visual way of making the internal system dynamics in which the participants were immersed visual to them, both in metaphor and in actuality. This provided the means for the Group members to take a meta-systemic view of the conversation dynamics. The participants could see the system rules and see the result of the application or non-application of the system rules in their contributions to the conversation within the dynamics of the group as a whole. This balancing of the components of the contributive dynamics became the process for determination of Group functionality in their sustainability problem solving conversations. The quality of the Group B dialogues shifted appreciatively with practice. The determinate factor leading to greater functionality was then seen as the choice of each individual participant in their own commitment to the learning process.

Solutions Matrix and Framing Tool

While learning about the dynamics of their strategic sustainability conversations, the Course objectives still required the development of high-level problem solving skills on real-world sustainability content. Simple questions, in familiar territory, using familiar frameworks for routine problems do not usually require sophisticated dialogue techniques. In contrast, large-scale system-level sustainability problems of great physical or conceptual complexity require the level of systems inquiry appropriate to the system goals. The Course was designed to develop new capacities and skills in examining sustainability issues for the complex hydrology and ecology of water and biodiversity management of a city of over one million people facing dramatic, enduring and near-term climate change effects. These are the sorts of problems that generate conflicting
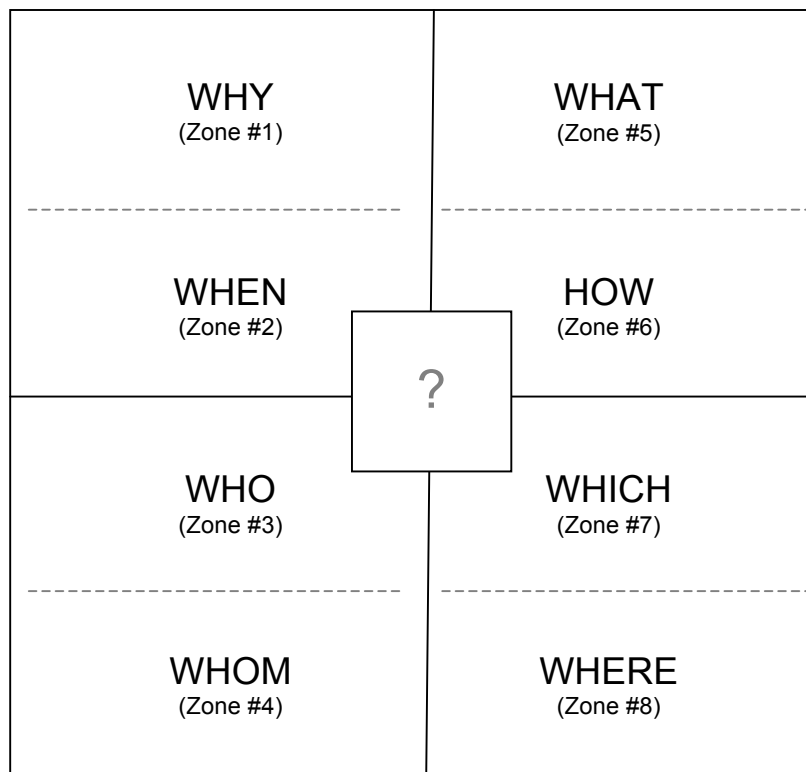
perspectives, from engineering, biological sciences, social policy, biodiversity conservation, energy supply strategy and community equity positions as constraints.

Being self-identified as a solutions-focused group and particularly concerned with gaining outcomes that were obtained efficiently, a further conversation process was introduced to facilitate the participants of Group B finding an integration, rather than just a surfacing, of the competing views of this diverse group. Such an integrative process would need to reflect the multi-party, and multi-level, complexity of the strategic sustainability questions they were working on. Drawing from the principles of integral methodological pluralism (Wilber, 2002, 2006) which characterizes a complete approach to the analysis of complex questions as involving different perspectives in a conjunction of eight main methodological domains, an integrative collaborative dialogue process was developed.

In an integral methodological pluralism approach any situation can be seen as manifesting perspectives in four quadrants of experience, in the phenomenological, cultural, behavioral and systemic, being the interior and exterior perspectives of individuals and their collective associations. From these four domains, eight primary disciplines of methodology are used to integrate the range of perspectives in different levels of inquiry. The eight horizons of meaning are notionally associated with different designated zones of inquiry (i.e. Zone #1- Zone #8) (Wilber, 2002). A process was designed specifically to enable the generative analysis of complex multi-party sustainability problems from a conjunction of these domains of potential experience. An Integrative Solutions Tool was created to guide the experience and detailed instruction was given to participants in the theory and practice of its use (see Table 2.1).

Table 2.1 – Integrative Solutions Tool

WHY (Zone #1)	WHAT (Zone #5)
WHEN (Zone #2)	HOW (Zone #6)
WHO (Zone #3)	WHICH (Zone #7)
WHOM (Zone #4)	WHERE (Zone #8)

?

The participants of Group B decided to openly trial this new process as the focus of their learning experience. The first step in the new process was to identify a sustainability problem of complexity. This was phrased as a topic for investigation without forming a statement of the problem or the solution in the question posed. The Group was divided into four sub-groups, each of whom selected a different odd numbered zone (i.e. Why, Who, What, Which) and proposed four or five descriptions of the problem from the perspective of that zone. For example, if the individual-exterior domain was used (Zone #5 – What), specific limitations in the physical materials of the system might be defined as the problem. The sub-groups each explained in turn their reasoning for their problem definitions in that zone to the entire group. The Group participants then rated each other sub-group's problem definition options by way of multi-rater selection. From the highest rated problem definitions a single statement of the problem, covering all four domains, was created. This completed the first stage of the inquiry, being a conjunctive definition from the individual perspectives of a common and conjunctive problem definition. In sustainability conversations often agreement on the description of the problem in a complete form is the most difficult step. This process consciously worked with the dynamic of individual opinion and perspectival privileging, allowing each person's own suggestions equally and efficiently, while constraining the forcefulness of these individual opinions by using a peer deliberative democracy (meritocracy) process for selection.

In the second phase of the process, the Group again formed into four sub-groups. The sub-groups were asked to propose four or five descriptions of the solution to the defined problem from the perspective of an even numbered zone (i.e. When, Whom, How, Where). These even numbered zones introduce the meta-perspective of temporal change dynamics into the static domains of the odd numbered zones. Importantly, the sub-groups were not asked to solve the problems proposed previously by them from within the odd numbered zones in the first phase, only to supply components to the solution to the whole integrative problem statement as defined by the whole group. This involved a conscious shift in focus and dynamics. The sub-groups then explained their reasoning for the zone-based solutions they had proposed to the entire Group. The Group participants then rated each other sub-group's solution options to complete the process of selection. From the highest rated solution options a single statement of the sustainability solution covering all four domains was also created. The presenting problem statement and generative solution statement were then recorded in a form covering all eight zones. A collaborative discussion, using the system rules for generative conversations, then explored the possibilities within this integrative framing of all perspectives. In this way there was a separation of the parts of the problem, from the partial solutions in personally preferred zones of inquiry, into a conjunction of perspectives. The self-defeating dynamic of the Group was reconstructed by a re-combination of its parts, while utilizing its strengths, to provide structure for a new form of inquiry. This approach in apithology, looking at the generative dynamics towards a desirable goal in redesign, as opposed to looking only to the pathology, being the systemic problem and the dysfunction in the system as designed,

was consistent with the Course aims and orientations in discovering collaboratively sustainable solutions that enhance a system's capacity (Varey, 2009a).

The commitment of the participants in Group B was to trial and practice their learning of the use of the Integrative Solutions Tool and Generative Dialogue Matrix as a means of facilitating and potentially resolving deadlocks in non-functioning multi-party sustainability conversations. Group B used these processes to look at issues of biodiversity management of coastal wetlands, asset infrastructure and technological investment overspends, water pricing conflicts and the future of sustainable water policy regulation. The process had been specifically designed for systemic problems larger in complexity that the ability of any person individually or the parties collectively to resolve. The strength of this approach is it works *with* the dynamics that cause multi-party conflicts, generatively, rather than assume their continued existence is necessary, or is necessarily constructive. Using their different dialogue processes, both Group A and Group B successfully concluded the entire course, using different approaches and producing discernibly different outputs while using identical learning contexts, identical content and working on identical topics of concern.

Reflections and Conjecture

The unique experience of this direct comparison of two groups selected by the same process, for the same purpose, for the same education course, using the same content, in the same cultural context, yet yielding radically different alternatives provides the opportunity for speculation on the dynamics of difference. The primary differentiating factor between the two groups in this context was the intentional heterogeneity or homogeneity in the operant levels of consciousness of participants. The wider range in levels of development of Group B meant that the participants found less common ground and mutuality in their understanding of how to approach, and even define, the system description of the presenting problems. Tensions were noted in the conversations due to framing in different levels of abstraction, particularly with reference to the task of forming even the initial entering questions. The participants were continually in conflict as to their definitions in different scales of complexity, content of complexity and quantities of connections. Significant drivers at one level were dismissed as simplistic constraints at different levels of cognitive abstraction. Like geological strata, the complexity of perceptions in levels caused distortion, pressure and morphology of the structures beneath, particularly where epistemic fault lines revealed, in the difficulty of the problems examined, a structural weakness in the operating assumptions.

Another observation of the difference in the conversation processes of Group B was how when suggestions of the system problem were proposed by one member, they were often re-framed by another to represent how the problem was perceived to them on a more satisfying basis personally. This occurred notwithstanding that the structure and purposes of the Course was to provide, in each module, detailed content on the sustainability issues, approaches to problem definition, widely used terminology, and tools for analysis from the leading disciplines and thinkers in those fields as points of common reference for the constructive dialogues. The multi-disciplinary nature of Group B compounded these dynamics, with some participants privileging their own knowledge domains

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exclusively, finding themselves unable to adopt another perspective even in attempting to do so consciously. Interestingly, within the homogeneous nature of Group A, there were also the dynamics caused by a diversity of perspectives and personalities, yet within a common understanding and objective, they made allowances for those tensions, working with the common knowledge and individual learning styles contributively.

By using the Integrative Solutions Tool and Generative Dialogue Matrix, working with small groups, in technical conversations, using multi-party raters of significance, many of the tensions of having different levels of systems conceptions were mitigated. While this process would lead, each time, successfully to the structured analysis of the problem and a collective insight being developed as to the resolution, being a systemic solution that was composed of all parties perspectives, this result was satisfying to no individual personally where their intention was to privilege their own view individually. This approach of integrating dimensions of analysis did nothing to alter or enhance the fundamental group dynamics, only the functionality of its outputs and the surface features of respectfulness. The intention was that the generative dialogue process using the system rules for collaborative conversations would allow for generative meaning making to occur around the integrative solution discovered. However, while the dialogue process made the dynamics of conflict visible, it did not necessarily resolve them.

Members of Group B found they were unable to contribute productively to the collaborative discussion of the integrative solution, even having been involved in the process of its creation. There was something unsatisfying to them personally in the constructivist reality of integral perspectives, notwithstanding its validity. Interestingly, the solutions proposed by Group B were technically rich, diverse, sophisticated and insightful and potentially they were closer to the level of complexity required for the problems presented than their counterpart group. The interesting cause of their conflict, was apparently not in their diversity, it was in their individuality. From the observations made intimately of the two groups with awareness of these dynamics, the functionality of the conversations did not appear to be entirely explained by the diversity in the levels of consciousness. Rather than the degree of consciousness operating, which was to an extent determinative of the level of solution gained, it was the *quality* of consciousness that appeared to be the determining factor in the sophistication of the dialogue attained.

Conclusions

All participants rated their experiences of the learning program as having enhanced their knowledge beyond their expectations. Not surprisingly, those participants in the Course that predicted that they already knew a lot about sustainability, were unlikely to gain new information, and had no desire to receive the benefit of collaborative learning, found they contributed less, received less from the course content and possibly learned only a little more than they would from their own inquiries. What appeared to be determinative of the quality of the learning conversations, rather than the functionality of the processes for the complexity held, were the participant's own entering intentions. The identical content of the Course was perceived differently by the individuals and was informed (if not constrained) by their pre-existing orientation to the material. This observation of the reciprocal nature of reality perception and historical experience is consistent with those of

values systems theorist, Sir Geoffrey Vickers, in the development of what he named an 'appreciative system'. Vicker's (Vickers, 1983b) described how a person's receptivity to a new inquiry is based on the values already held, which influences directly the facts of reality that one expects to perceive, and reciprocally, how those facts are received. Foreshadowing the theory of formative conceptions and emergent trichotomies in apithological theory he wrote:

> "I have called this pattern of concerns and their simulated relevant situations 'an appreciative system'. I regard an appreciative system as a work of art, both personal and social, one that is constantly revised or confirmed by the three needs. First, it should correspond with reality sufficiently to guide action. Secondly, it should be sufficiently shared by our fellows to mediate communication. Third, it should be sufficiently acceptable to ourselves to make life bearable. It is thus a mental construct, partly subjective, largely inter-subjective, that is based on a shared subjective judgment, and constantly challenged or confirmed by experience." (Vickers, 1983a)(p. 55)

In this passage Vickers identifies that *information, communication* and *intention* as components of the physical, sociological and psychological co-construction of reality provide the key dynamics of formation that in conjunction create uniquely individual self-systems of perception. In this characterization, the values of individuals and societies are essentially determined as being aesthetics held personally, rather than being collective values generated purposefully (Vickers, 1970). The appreciative system of readiness determines for the individual what they regard as 'welcome or unwelcome, important or unimportant'(Vickers, 1983b). Simply, the primary distinguishing feature between the two Group's conversations was that some participants were open to learning collaboratively, beginning from a presumption of knowledge humility, while others were already fixed in a preferred view, being their own in knowledge superiority. Where the majority of a group was not appreciative (and appreciating) of the information, views and opportunities for insight being presented, generativity was prevented for all those participating. In this respect, providing an integrative and generativity creating process to deal with the perspectival complexity did not enable a satisfying experience of collaborative inquiry where the participants themselves had not formed this as their entering intention. What this study shows is the solutions to our sustainability questions are within our collective perception. The challenge is to discover if they are within our present appreciation, and if not, to learn to open our appreciative systems, appreciatively.

The question this study poses for evolutionary leadership development in sustainability is: *To what extent is one's orientation of consciousness, rather than level of development or capacity for systems complexity, determinant of the potential for mutually meaningful outcomes?* This raises the proposition that the focus of societal level sustainability conversations maybe better placed, not on the level of systemic understanding attainable, but on understanding the system of understandings that are operating. Perhaps, in an evolutionary systems leadership context, rather than focus solely on the evolution of our systemic understandings, we must also develop equally our deepest mutual appreciations.

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