Strategic Cultural Interventions in Systems Science - Examining the Prospects for the Further Development of Methodological Complementarism

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Abstract

This paper contemplates the prospect of the complementary use of hard, soft, and critical systems methodologies, becoming a more established practice among the diverse company of operational researchers and management scientists in academe, commerce and Government, who have been trained in systems thinking and apply its language and concepts in dealing with organisational problems.

The paper takes the line that because matters concerning methodology always embody deeper structures of meaning, and meanings are largely culturally determined, it is worthwhile drawing upon ideas from the literature on organisational culture to illustrate some of the key factors that are likely to obstruct this and other similar initiatives. From a culture perspective, transitioning from the existing specialisations of systems science towards methodological complementarism is conceptualised as requiring a form of organisational learning. Learning is contingent upon the existence of a broad set of propitious circumstances; a scenario, it is argued, that is not met in this particular case. Although the idea of complementarism is the principal focus of the paper, much of the argument applies equally to other attempts to deliberately intervene in the culture of systems science.

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INTRODUCTION

The aim of this paper is to contemplate the prospect of the complementary use of hard, soft, and critical systems methodologies, becoming a more established practice among the diverse company of operational researchers and management scientists in academe, commerce and Government, who have been trained in systems thinking and apply its language and concepts in dealing with organisational problems.

Because matters concerning methodology always embody deeper structures of meaning, and meanings are largely culturally determined, the paper draws upon ideas from the literature on organisational culture to illustrate some of the key factors that are likely to obstruct this and other similar initiatives. From a culture perspective, transitioning from the existing specialisations of systems science towards methodological complementarism (complementarism hereafter) is conceptualised as requiring a form of organisational learning, a concept borrowed from Lundberg (1985). Learning is contingent upon the existence of a broad set of propitious circumstances; a scenario, it is argued, that is not met in this particular case. Although the idea of complementarism is the principal focus of the paper, much of the argument applies equally to other attempts to deliberately intervene in the culture of systems science.

At the outset attention needs to be drawn to two points. Firstly my personal bias. Basically I am sympathetic to the idea of complementarism, and would like to see it become better established, even to the extent that it becomes perhaps *the* major framework guiding system practice. Secondly, I have not attempted here to locate complementarism within any broader philosophy of systems practice, notably Flood and Jackson's Critical Systems Thinking, of which complementarism is just one element. This is not merely due to the fact that one cannot cover everything in a single paper. Although I also subscribe to much of what critical thinking stands for, I do believe that complementarism can stand as an approach to systems practice in its own right.

METHODOLOGICAL COMPLEMENTARISM AS CULTURAL VISIONING

Cultures can change in one of two ways. Firstly as a result of on-going spontaneous interactions that occur as members go about their daily affairs. Secondly, as a result of influential actors formulating new ideologies, or visions, perhaps as part of a deliberate strategic culture change initiative. Creating a vision of complementarism as integral to the development of the *discipline* of systems is conceptualised here as one such strategic intervention in the culture of systems science.

As an explicit philosophy of systems practice, complementarism first emerged during the 1980's. It responsed to the suggestion that the field was in a highly fragmented state, and held out the promise that systems people could cast aside narrow specialisations, thereby extending their competences and their usefulness to clients. Jackson and Key's well-known System of Systems Methodologies (SOSM), provided its major theoretical thrust.

The SOSM classifies a range of different systems methodologies according to the assumptions made by each on the matter of the complexity of the system in which the problem is located, and on the level of agreement among key participants regarding the purposes of the system. It was the first framework to attempt to categorise some of the key differences between hard, soft, and, more recently, critical systems methods, and, in doing so it laid the foundation for their application in a complementary approach to problem solving.

Ten years on from when the SOSM first appeared, there are enclaves within the systems community where the philosophy and practice of complementarism appear to be well-

established. In spite of this, the approach has not been as influential as one might perhaps have expected given its undoubted intuitive appeal. I submit that the explanation for this takes us to the very heart and soul, or inner culture, of systems science.

SYSTEMS PRACTICE AS THE ENACTMENT OF CULTURE

The rationale for portraying systems practice as the enactment of culture centres upon the idea that, in addition to developing knowledge and complex capabilities in its members, the 'discipline' also weaves a complex web of meanings that strongly influence 'how we do things around here'.

These socially constructed meanings are made up of largely tacit cognitive and behavioural 'rules' that prescribe and prohibit certain behaviours, and, most importantly - in the context of this discussion - abet or delimit new developments. Thus, because values and assumptions channel the attention of members to some methodologies and not others, decisions about methodology choice, as well as most other aspects of the day to day work of systems people amount to the enactment of culture.

Although the focus here is upon how acculturation processes influence methodology preferences and how these are used, acculturation also bears heavily upon other aspects of practice, including where one looks for problems, and how these are seen; what one chooses to include in the research or omit from it; how one interacts with clients; what one believes 'works' and what does not 'work'; whose interests one supports, and how findings are presented. Systems people then, are best conceptualised as contextually and historically situated actors who, by committing themselves to a particular way of thinking about the world in a particular place at a particular time, are severely constrained by the norms, values and assumptions that their various cultural alignments impose upon them

PREDICAMENTS, INQUIRY AND REFORMULATION - CULTURE CHANGE AS ORGANISATIONAL LEARNING

Much of the impact that cultural forces exert upon individuals operates through tacit and sub-conscious processes, and, as a result, it is an unseen and unheard of source of energy. So at the same time that a culture is providing its members with a distinctive way of viewing the world and understanding their experiences, it is also preventing an examination of the content of such meanings and the basis upon which these are created. Under normal circumstances, questions about culture do not appear on individuals' agendas for consideration and debate. Thus 'predicaments' must be faced in order to initiate the cycle of learning that eventually leads to culture change. Individuals must experience a major jolt, a surprise, or an 'out of the ordinary' event that is of sufficient concern to warrant an inquiry into the appropriateness of existing cultural phenomena. Inquiry results in the discovery of new previously unknown and unattended to cultural phenomena, that under favourable circumstances leads to a reformulation of the cultural state where the cycle began.

When culture change is conceptualised as a function of organisational learning, it is clear that in any particular instance the transition from one culture into another will occur as a result of the interaction of a complex array of variables. Generally though, learning seems to require a build up of pressures and tensions within the system. This creates a situation in which members are in a state of receptiveness to particular events, including cultural visioning, that, under such circumstances become triggers for learning.

Assuming, then, that initiatives are being taken to alter culture in a particular domain, it is this combination of background circumstances that determines how receptive the members will be to potential 'surprises', and hence whether or not the learning cycle will be triggered.

In what follows below, we apply these ideas to the situation that is perceived as current in the systems field. The main thesis to be presented is that while it is possible to discern a number of circumstances and activities that have the potential to trigger learning, this is not transpiring because of a generally low state of receptiveness among the group in question.

STRATEGIC VISIONING AND OTHER POTENTIAL 'SURPRISES'

Although I suspect that in recent years the differences between the two domains has become less marked, intervening strategically in the cultural make-up of academic and scientific communities is generally much more difficult than is the case in most businesses. Business managers have to recognise that culture is a socially constructed phenomenon emerging out of historical processes, and therefore they cannot always be guaranteed to get their own way when it comes to deliberately changing the cultural make-up of their organisations. However they do have advantages over their counterparts in the academic and scientific world. They are better positioned to intervene directly within their organisations, and, once they have decided upon an 'appropriate' culture, they are more empowed to put in place sustaining organisational structures, systems and processes. The balance of power also favours managers in the business world. In business, employees frequently have to 'toe the line' for fear of losing their jobs. This can also be true for academics working in particular institutions, and it most certainly is the case for in-house scientists. However, as constituents of a parent discipline or field of enquiry, they generally have more autonomy such that they are better placed to reject or choose to ignore advice, guidance, or new 'knowledge' if it does not suit.

To a greater or lesser extent the 'cultures' that emerge in the world of knowledge and ideas, are continually in a state of flux as a result of spontaneous activities and interactions. However, deliberate interventions also occur periodically and these are usually initiated through visioning processes. In cultural visioning, opinion leaders typically reveal the inappropriateness of existing cultural phenomena and present as alternatives new 'better' systems of meaning. Thus Beer tendered his viable systems model as an improvement on much classical OR partly on the basis of his antipathy towards the reductionist tendencies of OR; Checkland his Soft Systems Methodology as inherently superior to systems engineering approaches in dealing with problems arising in purposeful 'human activity systems'; and Rosenhead's often passionate appeals to the OR community to widen its client base. All of these interventions are 'cultural' in the sense that they are not merely arguing the merits of particular techniques relative to others, but they are imploring systems people to subscribe to new sets of meanings. This is also true for complementarism. Its case is not championed solely on the basis of the idea that using hard, soft, and critical methods is *better* than any single domain approach. It also invokes changes in meaning, and it is these deeper meanings, that I believe will cause problems.

The point is that these visioning processes are tantamount to 'strategic cultural interventions' enacted by influential leaders of opinion. Often having experienced predicaments themselves, and undergone self-inquiry and reformulation of cultural values, they are descriptively shaping an image of a new organisational culture, and inviting others to subscribe to their own preferred set of meanings.

Visioning can occur in parallel with other activities, that, under favourable circumstances, can initiate learning. Changes in the external environment of the system that leads to a decline in 'performance', is one of these. For example, visionaries can capitalise upon real or imagined crises that threaten the viability of the system. Ackoff's (1979) paper perhaps represented the zenith of the impending disaster period in the systems field. Ackoff, and others proclaimed that because external circumstances were no longer comparable with those that prevailed during OR's period of major development in the WW2 and immediate post-war era, then unless radical steps were taken, it would inevitably continue to decline. This view has been rehearsed extensively elsewhere, and it is implicit in both the content of complementarism, which also proposes a form a radical surgery, as well as the way in which complementarism has been presented to the members of the systems community.

Technological innovation is another circumstance that can trigger learning. 'New' methodologies are arriving on the scene; SSM, Interactive Planning, Strategic Options Development and Analysis, Strategic Assumptions Surfacing and Testing, Critical Systems Heuristics, are de-facto technological innovations that have undoubtedly triggered learning, although one could not argue that any of these have radically altered the shape of the entire systems field. Certainly it is

possible that Flood and Jackson's imaginative inter-linking of metaphors with the SOSM and individual systems methodologies in Total Systems Intervention, may provide the technological catalyst that sparks the process by which individuals become motivated to learn more about the deeper 'cultural' layers embodied in the idea of complementarism.

Having outlined some of the events and circumstances that, under favourable circumstances, could invoke learning, it is now appropriate to assess whether the circumstances are, in fact, favourable or not. Put another way, the question is, "how receptive is systems science to the vision of complementarism?"

The organisational culture literature identifies a number of factors that combine to determine the extent to which a system will be receptive to visioning. The first three of these - minimal coupling, the availability of spare resources, and stable and influential leadership, are discussed below in the context of the obstacles caused by the existing fragmented culture of systems science. The fourth - the amount of change - is discussed later.

Minimal coupling, spare resources, and leadership

Without question, complementarism is invoking profound changes in systems practice. Its' message to bring about a closer operational linking of hard, soft, and critical methods is not being dispersed as an incremental change in modus operandi to a highly specialised unit located in a narrowly-bounded organisational setting. Rather it is being broadcast widely throughout the systems community and presented as a generic approach in dealing with complex organisational problems. The issue at hand, is whether the existing cultural configuration of the discipline will facilitate or hinder such a process. In answering this question it is important to make some basic observations about what this culture entails.

There is no doubt that the overall culture of what we know as 'systems science' is complex. Broadly it contains a loose amalgam of individual sub-cultures. These have emerged over time in particular historical and organisational settings, often under the tutelage of influential leaders. Because systems people are widely dispersed around various academic and scientific communities, and tend not to interact as one large group, the overall picture is one of a large number of sub-cultures many of which subscribe to their own distinctive shared meanings. Some have developed their own ideologies and created their own cultural form embodying distinct paradigms that focus upon different phenomena. Hence the priorities of these groups, their theories, preferred methodologies and viewpoints, tend not to be replicated across the complete discipline.

Even the notion that there exists a single dominant culture based upon hard systems thinking supported or countered (depending upon one's point of view) by soft and critical sytems thinking sub-cultures, may be an over-generalisation. While the differences within these groupings, for example between British and North American OR, or between the approaches of Checkland and Eden in the 'Soft' school, may not be as great as the differences between the three domains, they are significant, and should not be discounted.

Inevitably then, one has to question whether there exists the minimum coupling that the organisational culture literature claims is a pre-condition for triggering learning out of visioning processes. The visioning may be astute and intelligent, but one wonders whether the message is being heard by the audience to which it is being directed. The difficulty, one suspects, is that although the message is being widely broadcast, many of the potential audience is attending different conferences, reading different journals, and, as a result, dealing with quite different and distinctive cultural phenomena.

While interaction processes account for both the emergence and transmittal of cultures over time, explaining why particular cultures develop in particular 'organisational' settings requires an understanding of two key factors. The first is the 'business' that an organisation is in.

Most systems people are involved in problem solving of one sort or another and they subscribe to a common language. However this is not tantamount to the existence of a common sense of

identity. Invariably the cultural bearing of groups of systems people is 'business' specific, and, localised 'business' demands often fully occupy their attention. This applies as much to an in-house OR person as it does to an academic who specialises in doing work of a particular sort. Hence, even if the visioning message is heard, providing there is a continuing demand for particular expertise, it is unlikely that the provider will perceive the call to change as a predicament. Even if they did, they may not have the spare capacity to engage in the learning that the change would require. For example, although the 'business' circumstances surrounding the development of many classical OR techniques, notably the war effort and post-WW2 reconstruction are now part of history, in many quarters there is still a big demand for the services of specialists in techniques such as linear programming, systems analysis or queing theory. These experts may hear the message, but one suspects that the rallying cry will not create predicaments for many of them, and even if it did, continuing pressures of work may preclude learning.

The second factor that has a major impact upon organisational culture is the values and assumptions of 'founding fathers'. Most readers of this paper will not need reminding of the impact that influential leaders can have upon the direction taken by particular systems groups - Woolsey at the Colorado School of Mines, Forrester at MIT, Beale at Scicon, Rivett at Lancaster, Churchman at Berkeley, Ackoff at the Wharton School, Checkland at Lancaster, Eden at Bath and Strathclyde, Friend and Jessup at the Institute for Operational Research, and there are others. Although not all systems people have come under the tutelage of such well-known leaders, even less well-known leaders at a local level are able to create distinctive cultures. These people have direct access to their staff, they can physically intervene if necessary, and they control scarce resources such as research funds and promotion that can be used to sustain their own, often narrow and specialised, interpretations of the world. Consequently these narrowly bounded sub-cultures often create more of a sense of cultural identity for members than does the somewhat nebulous body of knowledge and ideas that frames and informs their work.

In constrast to 'local' leaders, the odds seem to be heavily stacked against visionaries promoting discipline-wide change from the 'outside'. To some extent at least, the visionaries' level of perceived credibility and therefore influence, will depend upon the 'culture gap' that exists between where the audience is right now, and where complementarism would like it to be. If the gap is large, then the visionaries may not be recognised as leaders at all, and they will have little influence. In addition the inability to physically intervene, through developing close personal relationships with colleagues or the inability to control resources that impact upon others' careers, will make the situation even less propitious. Relative to local leaders, these visionaries are in a weak position. Notwithstanding the desirability of this, creating a more integrated culture of systems science, a systems *discipline*, out of a large number of diverse sub-cultures through the somewhat indistinct powers of persuasion and mainly relying upon the written media to get the message across, is likely to be difficult.

In summarising the argument to this point, I am suggesting that the fragmented cultural landscape of systems science would appear to create a number of difficulties for the champions of complementarism who are seeking to initiate discipline-wide organisational learning. Weak intra-organisational communication links reduce the likelihood of the message being heard. On-going commitment to the concerns of their local 'businesses' coupled with continuing demands for their specialised services, places investing considerable time in learning new approaches low on the list of priorities for many members. Finally, the visionaries have limited powers of influence in communicating predicaments, and most importantly neutralising the counterveiling and often conservative force of local leaders. We can now turn our attention to another important related factor that the organisational culture literature identifies as having an important influence upon the level of receptiveness to visioning, and that is the amount of change that the vision would invoke.

The amount of change

Following Trice and Beyer (1975), it is possible to identify four independent dimensions that allow us to assess the amount of any culture change. These are *pervasiveness*, *magnitude*, *innovativeness*, and *duration* of cultural changes.

Pervasiveness

The *pervasiveness* of an envisioned change is the proportion of activities in a particular cultural arena that will be affected by the change. This is determined by two major factors - the number of members whose cultural bearing is expected to change, and how often they will be called upon to behave differently in carrying out their work.

Because the case for complementarism is nearly always presented within the context of a disatisfaction with narrow specialisations and the fragmented state of the discipline, one has to assume that it is being tendered as a credible approach across the full width of systems science. It does not come across as an approach that could sit comfortably as an abberant sub-culture alongside the present specialisations where the majority of systems people remain within the boundaries of either the dominant hard domain, or the less well-populated areas of soft or critical systems thinking.

Complementarism questions the legitimacy of narrow specialisations. The SOSM, for example, is premised upon the onto-epistemological assumption that there are multiple equally legitimate perspectives on what any problem situation *is*, and therefore competing logics about what *needs to be done*. Thus, because the possibility that problem situations may announce themselves unambiguously is rejected, it would seem inconceivable for analysts to offer their services as methodology and situation-specific experts. The same conclusion may be reached by following the logic of enquiry laid down in Flood and Jackson's Total Systems Intervention. TSI explicitly requires the analyst to deploy a range of different metaphors prior to determining, in consultation with the various stakeholders, which metaphor(s) is dominant in the situation of concern. This then informs the process of making decisions about methodology choice. Because one has no means of knowing, in advance, which metaphors are likely to emerge as dominant in a particular situation, then analysts have to be multi-methodology literate. In the event that an analyst's favoured methodology does not emerge as appropriate or relevant to the intervention, it is always possible that they could withdraw gracefully from the scene and defer to some other 'expert'. I submit that this is unlikely however, for all sorts of reasons, not the least of which is the self-perception that there could be damage to the analyst's perceived credibility and a decline in their standing in the eyes of the client.

It would be unreasonable to suggest that those promoting complementarism believe that converting the broad mass of systems people into multi-methodology literate problem solvers is feasible. However, because methodological specialisation is anathema to this way of thinking, one must conclude that the *intent* has been to influence across a broad front.

The second factor that impacts upon the pervasiveness of change also leads one to the conclusion that the envisioned change is substantial and therefore difficult. This concerns the proportion of time spent engaged in the new activities. Doubtless, this should be viewed as an empirical question, the answer to which will depend upon a number of factors. Certainly there will be local variation. For example it will depend upon whether the individual in question is employed in the 'operational' or the 'managerial' domains of systems science, or whether they are closetted in some research setting engaged in abstract theory construction or technique development work. The vast majority of systems people though, fulfill 'operational' roles to a greater or lesser extent, by which I mean that they are engaged in applied problem-solving. Inasmuch as problem-solving is what most systems people *do*, and it is largely 'methodologies' that frame this activity, then it would be difficult to envisage major aspects of their day to day work that is not touched by methodological concerns in some way or another.

Magnitude

The *magnitude* of an envisioned change refers to the distance between the old understandings and behaviours and the new ones members are expected to adopt. There are a number of issues here that surface as likely obstacles to the development of complementarism, and most arise as a consequence of our need to conceptualise the concept as invoking changes at 'deep' levels of culture.

Strategic cultural interventions can focus in upon any or all of the various 'layers' that make up the culture concept. These layers include physical, verbal, and behavioural artefacts at the 'outer' surface layer of culture, through values, norms, and beliefs, to more permanent and enduring basic assumptions that reside in the central core of any culture. Whereas it is relatively easy to alter cultural artefacts, and somewhat harder to change attitudes and beliefs, the most optimistic scenario for modifying basic assumptions is that it is likely to be a difficult, long, and drawn out affair. Because these non-conscious underpinnings of the other levels of culture, emerge out of lengthy socialisation processes, many attempts at assumption modification do not succeed.

The issue of the 'level' of culture that complementarism targets is important because it provides a key indication of the likely feasibility of change. Hence if one presents the idea on the basis that soft and critical methods could be incorporated within the prevailing sets of meanings associated with the hard systems domain, then the feasibility of it triggering 'learning', of a sort, is enhanced. Introducing this form of complementarism should not present any great difficulty. I suspect that many systems people have been practising it for a long time.

When someone chooses to use a particular methodology, it will embody meaning for them. These might include beliefs about its value in dealing with problems, about when it should be used, and about how it should be used. These beliefs are manifestations of even deeper sub-conscious tacit assumptions about the world, about problem solving, and the role that the analyst should play in intervention. The problem is that no-one can determine in advance what meaning will operate for a particular user. Neither can meanings be legislated for by any external party. So when a suitable occasion presents itself, there is nothing, for example, to prevent a mathematically-inclined practitioner from the classical OR genre from 'doing' soft or critical systems projects, even if they steadfastly refuse, or are simply unable to question the meanings one normally associates with the hard systems paradigm. For that individual, the 'new' approaches are amplifying (arguably) their ability to deal with the rich variety in problem situations that have to be dealt with in the external world. The fact that they are effectively only using these methods as artefacts adorning existing and (under this scenario, *inappropriate*) sets of values and assumptions, may not be construed by the user as a problem.

However, the true meaning of complementarism, (and therefore the *culture* of complementarism), involves more than this. Flood and Jackson claim that "different methodologies express different rationalities stemming from alternative theoretical positions which they reflect. These alternative positions must be respected, and methodologies and their appropriate theoretical underpinnings developed in partnership". Of course it is possible that I am doing Flood and Jackson a gross diservice here, but it is this notion that "alternative (theoretical) positions must be respected" that confirms my belief that they are invoking changes in the deeper layers of culture. When one conceptualises complementarism operating at this level, one can understand why it involves what one might call 'real' cultural change. One can also see why it is likely to initiate major changes at the level of practice, the magnitude of which needs to be spelt out.

Take SSM for example. In using SSM it is widely accepted that this does not merely require individuals to become familiar with a new set of routines and techniques. Shifting from a hard to a soft systems mode triggers fundamental changes in both the content and the style of the intervention. The primary task shifts from problem solving to problem structuring; system optimisation is replaced by iterative learning, engineering consensus and system 'improvement'; the interest domain shifts from objective 'facts' to subjectivities and multiple rationalities; qualitative techniques replace quantitative techniques; the discipline basis shifts from

mathematics to the social sciences, models of perceptions (holons) replace models of real world entities (systems); interventions occur more at the strategic levels in organisations than at operational levels, implied metaphors are political system and culture instead of machine and organism. This list is not exhaustive.

When complementarism is understood as necessitating fundamental changes in cultural bearing as well as the acquisition of new and additional technical competences, the difficulties of bringing it about become crystal clear. Reformulating values and assumptions has to nullify the pervasive impact of accumulated past experiences and often ingrained sets of meanings. This is not to suggest that such changes cannot occur. There are enough prominent members of the systems community who, for example, have admitted undergoing radical alterations in the way in which they see the world and their role within it, or admit to having experienced 'epistemological breaks' in which the assumptions of one paradigm are replaced by another, to believe that it is possible. Beer, Ackoff, Checkland, and Rosenhead are well-known cases in point. However, long-held basic assumptions and values, have a habit of retaining their sub-conscious influence even under circumstances in which they have been publically repudiated. Thus, in an incisive critique of Soft Systems Methodology, Rennie (1989) shows how Checkland's engineering and hard systems background has undermined the onto-epistemological assumptions upon which SSM is said to be based. If such an influence may be discerned in someone who has devoted many years to a single approach, and who has frequently proclaimed the virtues of being true to the intrepretive philosophy upon which the method is built, one wonders what hope there is for the rest of us.

The major difficulty for complementarism is that if people are going to be true to the spirit of the concept, it is highly likely that the new practices, values, and ideologies will be viewed as being somewhat distant from meanings they already hold, and this is going to have a huge impact upon whether or not the learning cycle is triggered.

The point is that for a hard systems person who has remained cocooned for years within the boundaries of, for example, classical operational research (or even one of its sub-specialties), these changes represent huge disturbances to the status quo. Because complementarism does not seek to displace hard systems thinking and methods, but instead advocates complementing it with more emphasis being placed upon soft and critical systems approaches, one could not assert that adopting complementarism would amount to a complete destruction of the existing culture. Nonetheless, the distance between the 'old' and the 'new' culture is enormous. What is perhaps more important, is the fact that some existing tacit assumptions about the world, especially those of an onto-epistemological nature, are clearly incompatible with the assumptions upon which the methods of the 'new'culture are premised. Changing one's view about whether 'reality' consists of 'hard', observable, 'concrete' facts, to a 'softer' interpretive position, where reality is viewed as the product of cognitions, is not impossible, but it is also not something most people will take lightly. Undoubtedly paradigm shifts do occur, but when they do it is often a painful experience for the individual concerned, as perhaps decades-old 'truths' are dispensed with and replaced by alternatives. Even if it were thought desirable (and I am not going to delve into the paradigm incommensurability thesis here), one has to question whether most systems people will have the inclination or the wherewithal to make these sorts of paradigmatic shifts on a regular basis.

Innovativeness

The *innovativeness* of the envisioned change refers to the extent to which the new understandings and behaviours are unprecedented, or have some similarity to what has happened elsewhere. Generally, the process of culture change proceeds more smoothly in situations where there is some internal or external precedent for what is proposed. Under such circumstances members can adapt what others have learned. If the desired culture is genuinely innovative, then change is often difficult, uncertain, or even impossible. Originality will be required to create new cultural forms including new networks of ideologies and values to give it substance.

We have already drawn attention to some aspects of existing systems practice that amount to complementarism of a sort. Although the general picture is one of a fragmented discipline, from time to time members do cross the boundaries between the three major domains. Many, for

example, combine hard and soft, and possibly even critical methods in their daily work. Others may primarily operate in a single domain, yet, as a matter of routine, incorporate insights from other domains to enhance their overall level of competence. Thus, Bryant (1988) reminds us that while many classical operational researchers, particularly those from the more pragmatically-inclined British genre of OR, concern themselves mainly with the technical aspects of problems, they do posses an acute and sometimes intuitive awareness of processual matters that one normally associates with soft systems methods.

As I suggested earlier however, the search for true precedents must look beyond episodes of interventions in which analysts merely*use* a range of different methods. It must seek to discover practices and interventions where methods from different domains are clearly grounded in a theoretical-cum-philosophical understanding of the paradigm to which each belongs. It is only when it is possible to identify situations where individuals embrace the full ramifications of a new paradigm when they enter it from elsewhere, that one may meaningfully claim that a precedent exists. At this stage, I have no means of knowing whether such precedents do exist in any great numbers, although I suspect that they do not.

A search in other disciplines and fields of enquiry for precedents where as a matter of routine individuals are required to cross paradigm boundaries, is also unrewarding. The vast proportion of theory generation and research in most such areas of knowledge, emanates from within the boundaries of a single paradigm. Thus effort is concentrated in a relatively narrow area that is usually defined as the dominant orthodoxy within a particular field (Burrell and Morgan 1979). Often, competing perspectives exist within dominant paradigms or they reside elsewhere, but rarely do they develop beyond the stage where they are perceived as deviant or the work of an aberrant or eccentric minority. If these arguments about the absence of precedents for what complementarism proposes have any validity, then the envisioned change is highly innovative.

Duration

The final element in the mix pertaining to the amount of cultural change is its *duration,* in other words the length of time that a change effort is likely to take. Although all substantial changes in culture takes time, some are more protracted than others. Against this background, it is hard to avoid drawing the conclusion that if change *does* occur, then it will be as a result of a long and drawn out process.

Irrespective of whether one operates primarily in the hard, soft, or critical domains of systems science, building up one's knowledge of methodologies residing elsewhere, is the result of a cumulative process of investigation, learning and hands-on experience. When one then introduces the requirement that user's fully appreciate the theoretical and philosophical assumptions embodied in a particular approach, then the extent of the task becomes crystal-clear. Even if the analyst is committed to the idea of complementarism, developing methodological competences across the three domains while being true to each's theoretical presuppositions is going to take time.

CONCLUDING COMMENT

The main thesis presented in this paper is that while the possibility of the sort of culture change that complementarism would require certainly exists, the probability of it happening among the diverse group of systems people discussed here is somewhat remote.This is because of structural and other impediments within the system that imply an overall low level receptiveness to visioning.

Because at the outset, I expressed enthusiasm for the complementarism idea, it is inevitable that like-minded colleagues will level the accusation that the tone of the paper has been unduly negative, and not consistent with the spirit of systems thinking which is to do something about problems, not just say what they are. In anticipation of this I offer some brief concluding comments.

Like any cultural phenomena, it is possible that complementarism will emerge spontaneously over time. More likely, some form of strategic intervention will be required to bring it about. The question is what. What strategy and action plans should those who support it invoke? Visioning, I have argued, will probably not work for the broad mass of systems people. Although there have been tremendous theoretical and methodological advances during the last twenty years or so, and at times the visioning associated with these has been intense, the prevailing culture of systems science appears to be largely intact. The prospects for change are probably much better among the ranks of practising managers who often do not carry the sort of scientific cultural baggage that systems people do.

The strategy for bringing the vision about must be grounded in a realistic understanding of what is possible and what isn't. Thus I believe that a more indirect and long term approach is likely to be more effective than one that draws upon the powers of direct persuasion. The intervention needs to be less direct and unobtrusive, otherwise it runs the risk of creating the sort of predicament that does not lead to learning, and that is conflict. Under this scenario, entrenched interests seek to preserve their territory, their self-esteem and imagined threats to their future security.

Krefting and Frost's (1985) notion of culture change as 'surfing waves' provides a pointer - wait for the right wave to occur *naturally* and then ride it for all it is worth. Attempting to alter cultures through the powers of persuasion when the majority are not in the audience, and those that are, are not really listening, is a bit like trying to create waves in a huge swimming pool without the forces of wind and tide, it is very hard work. The problem for the visionaries is that creating a good wave to bring about culture change depends upon a large number of factors many of which are not under their control.

But they do have some cultural leverage. For example they are highly influential in some quarters, especially where they interact directly with people. Already sub-cultures of like-minded people have emerged. These now need to become more widely dispersed through the community so that there is a gradual accumulation of these ideas occuring at the grass roots level. This would help to alleviate the problem of minimal coupling. The prospect of competing views about 'how we do things around here' developing would then become a real possibility. Because they also have influence over what is taught in the universities, they are able to nurture the development of newcomers into the systems community who are capable of performing across a broader front than has been the case hitherto. Moreover they can facilitate the entry of people from non-traditional backgrounds into the field. These sorts of actions are not going to change the shape of the discipline in the short term. Over time though, one would expect this to increase the build-up of tensions and pressures within the system, and create circumstances under which visioning is more likely to initiate learning, even among those who have previously resisted change.

The difficulties are still formidable. As Jackson said recently "The creation of a systems *discipline* is an immense task and one which still lies before us" (Jackson 1993). And Flood (1993) "I believe that the *summit* of complementarism is worth *struggling* (my emphases) towards' The paper concludes by agreeing with both sentiments, and reiterating the point that in spite of what has been said here, cultures do change.

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