OPEN SYSTEMS IS ALIVE AND WELL

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ABSTRACT

Open systems theory has undergone continuous development since the early 1950s. I describe the state of the art, the system of concepts, its building blocks, methods and purpose, the specific changes from STS to the Participative Design Workshop, and the way in which long term cultural change is produced. An analysis of 'STS' shows conceptual and methodological maladaption. But USA social science can catch up and play a role in meeting future challenges.

OPEN SYSTEMS IS ALIVE AND WELL

The apparent outbreak of despair about 'STS' and resolve to revitalize it in the USA is welcome but somewhat misplaced. It assumes that the US has best thinking and practice in the area of open jointly optimized sociotechnical systems theory and practice. It doesn't. Open sociotechnical systems, jointly optimized and not, is a subsystem of open systems theory/thinking (OST) and this has been under continuous development in Australia since 1969. OST, otherwise known as the socioecological approach is an alternative to closed systems social science. Any social science question can be approached by either a closed system or open system perspective.

This paper briefly summarizes the current state of the art in open systems, conceptualizes the maladaption of 'STS' in the USA today and notes some major challenges facing us all. These do not include revitalizing 'STS'. Its time has long since gone. Systemic democratization now takes its place within a theoretical framework which is internally consistent, has considerable powers to explain and predict, and just as importantly, it works.

HISTORY OF OPEN SYSTEMS DEVELOPMENT

The following brief history illustrates the lighthouses of OST's integrated conceptual and practical development and its breadth.

- 1938-9. The group 'climate' experiments - three structures only - authoritarian, democratic and laissez faire (Lippit & White)
- 1950. Incomplete open system - von Bertalanffy
- 1951. First natural experiment leading to emergence of open sociotechnical systems (Trist & Bamforth)
- 1959. 'The characteristics of sociotechnical systems' (Emery F)
- 1960. First Search Conference (Trist & Emery)
- 1965. Completion of conceptualization of open system - 'The causal texture of organizational environments' (Emery & Trist)
- 1966. 'The rationalization of conflict' (Emery F)
- 1962-7. Norwegian Industrial Democracy Project using the method now called STS in USA (Emery & Thorsrud, 1969, 1976)
- 1967. Experimental phase finished, diffusion phase begins. Organizational design principles (Emery F) **NOTE**: STS goes to USA and remains unchanged, minor variations only
- 1971. First Participative Design Workshop
- 1972. First Search Conference in Australia
- 1972. 'On purposeful systems' (Ackoff & Emery)
- 1973. First Industrial Relations Search
- 1973. Democratization begins in education system (Williams)
- 1974. First site agreement signed in Industrial Relations Commission
- 1974. 'Participative design in work and community life' (Emery & Emery)
- 1974. 'Planning our town' (Emery M)
- 1977. Second Industrial Relations Search
- 1976. Communications in DP1 and DP2 systems, etc - 'A Choice of Futures' (Emery & Emery)
- 1976. 'Searching' (Emery M, Ed)
- 1976. DP2 in governance, the alternative to representative democracy - 'Adaptive systems for our future governance' (Emery F)
- 1976. Systems alternative to factor analysis - 'Causal path analysis' (Emery F)

- 1977. Reasons for emergence of Type IV environment (cultural revolution) - 'Youth - Vanguard, victims or the new vandals?' (Emery F)
- 1977. Final conceptualization of ideals, active adaptive planning, etc- 'Futures we are in' (Emery F)
- 1978. 'Searching' published in USA (Emery M & Emery F)
- 1979. Self management in conference and course design (Davies A)
- 1980. Open, ecological learning vs closed system learning of abstract knowledge- 'Educational paradigms' (Emery F)
- 1982. Relation to economic systems etc - 'Sociotechnical foundations for a new social order' (Emery F)
- 1982. Dynamic and behavioural implications of organizational design principles, mixed mode, multisearch, etc. 'Searching' (Emery M)
- 1983. First Accord signed between government and Australian Council of Trade Unions- 'Award Restructuring'
- 1984. 'Systems thinking and macro marketing' (Emery F)
- 1986. Role of the affect system in diffusion - 'Towards a heuristic theory of diffusion' (Emery M)
- 1987. Democratization of university begins at system level (Treyvaud & Davies)
- 1988. The fifth, vortical, environment (Baburoglu)
- 1989. 'Participative design for participative democracy' (Emery M, Ed)
- 1989. Retroduction as alternative to deduction and induction- 'A logic of hyptheses' (Emery F)
- 1991. Concept of active adaptation completed in theory and practice - the 2 stage model (Emery M)
- 1993. 'Participative design for participative democracy' (Emery M, Ed)
- 1994. Policy making in open systems (Emery F)
- 1994. Replaying Rio - a blueprint for grass roots sustainable development (Emery M)

Most of the major areas of social science have been investigated. The repetition of titles indicates quantum leaps in our understanding.

THE STATE OF THE ART IN OPEN SYSTEMS

The basis of OST is of course, the open system in environment and at the heart of open social systems are purposeful people. Our open systems social science has a clear purpose and some established means towards it. The big picture rests on some solid building blocks.
This section starts with the building blocks of OST, overviews the system of concepts, its long term purpose and the translation of these into the two major methods, the Search Conference and the Participative Design Workshop. The specific changes in the shift from 'STS' to the PDW are described. The way in which the model produces cultural change is also included.

Building Blocks
A system is defined by its system principle (Anygal 1941) which expresses the unique relation between the entity and the environment. Organizations may or may not be systems. *Environments* are defined as extended social fields with a causal texture (Emery & Trist 1965) where the properties of the extended social field affect the behaviour of all systems within it. This conceptualization provides both a conceptual and historical framework for cultural change and its fluctuating adaptivity.

The open system (Figure 1A) expresses the view that system and environment and their interrelations are mutually determining and governed by laws (L) which are able to be known. The function of a system (designated '1') acts upon the environment (designated '2') This is the planning function (L_{12}). Environment acts upon the system and is known to us through the function of learning (L_{21}). L_{11} and L_{22} express the intrinsic nature of the system and environment respectively. The laws that govern them are implicitly learnt about in the Search Conference.

Directive correlation also expresses the mutual shaping of a system's behaviour and its environment towards an adaptive goal. In the directive correlation mode1 (Figure 1B), it is a necessary condition for the subsequent occurrence of a certain event or goal that two or more variables, environment and system, should at a given time be in exact correspondence or in an adaptive relationship. The environment and system are directively correlated with respect to the goal and the starting conditions (Sommerhoff 1969), that is, system and environment are correlated in terms of direction. They are acting to bring about the same state of affairs from the same starting point.

From the original condition at t_0 which consists of the system and its environment, both system and environment are making changes at t_1. These result in a new set of conditions consisting of a changed system and a changed environment at t_2. In the case of Figure B the changes are directively correlated and, therefore, adaptive. There are of course, an infinite number of cases in which system and environment are not directively correlated and, therefore, stand in a maladaptive relationship.

A. Open System

B. Directive Correlation
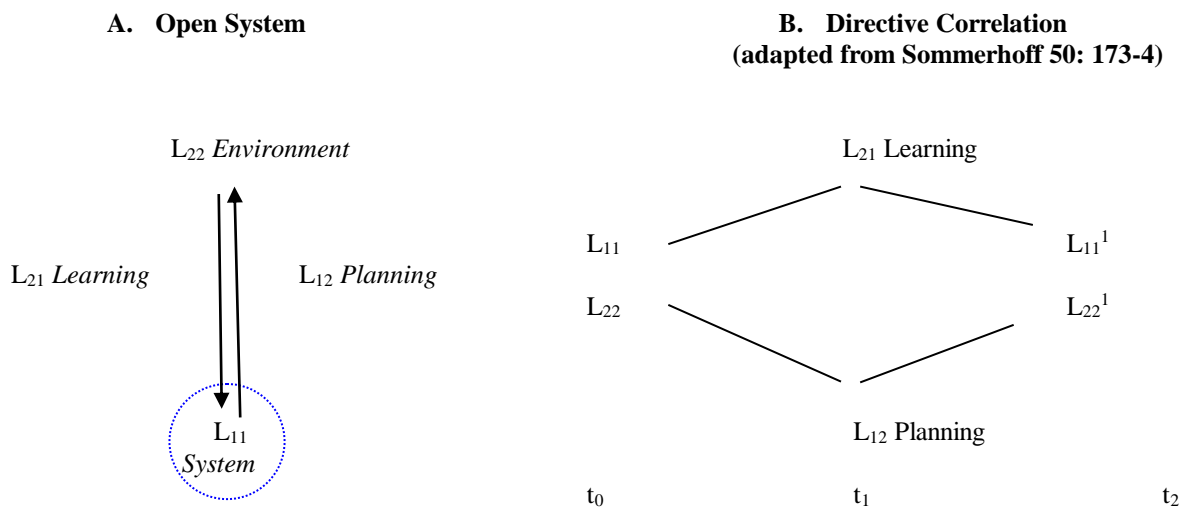**(adapted from Sommerhoff 50: 173-4)**

Figure 1.   The Models of Open System and Directive Correlation

The two critical differences between the two models are that:
1. the open system is a picture of a point *in time* with change expressed through learning and planning while the directive correlation is a picture *over time*, and
2. the open system includes adaptive and maladaptive relations while the directive correlation expresses precisely when adaptation is or is not occurring.

People are taken to be *open, purposeful systems* who "can produce (1) the same functional type of outcome in different structural ways in the same structural environment and (2) can produce functionally different outcomes in the same and different structural environments." They display **will** (Ackoff & Emery 1972: 31). By constantly acting as active, responsible

agents, not simply helpless powerless reagents (Chein 1972: 6), they change the environment. The current environment is a result of the will and power of the people (Emery F 1977). While people as one arm of the basic directive correlation display will and act on their environment, they are also acted upon by that environment. They are part of the whole whether they like it or not. Mental health is "the capacity both for *autonomous expansion AND* for *homonomous integration*". (Angyal 1965: 254) No person is an island. 'Autonomous' means governed from inside. It is a concept of purposeful activity, a general systemic direction towards expansion through coherence. But "life is an autonomous dynamic event which takes place *between* the organism and the environment" (Angyl: 48, my emphasis). Autonomy without corresponding homonomy actually restricts and inhibits personal growth. Focusing simultaneously on the environment (L_{22}) and system (L_{11}) creates the potential for balance.

People are not limited to being purposeful, however. They have the *potential for ideal seeking.* As purposeful systems they can be confronted by choice between purposes and they may choose outcomes which are endlessly approachable but unattainable in themselves (Emery F 1977: 69), springing from our capacity for potential directive correlation (Sommerhoff 1969), to *imagine and expect.* These outcomes are the ideals.

The ideals are *homonomy,* a sense of belongingness and interdependence; *nurturance,* cultivating and using those means which contribute to the health and beauty of the whole and all its parts; *humanity,* expressing what is fitting and effective for us as people; regarding people as superordinate to institutions and materialism; *beauty,* that which is aesthetically ordered and intrinsically attractive.
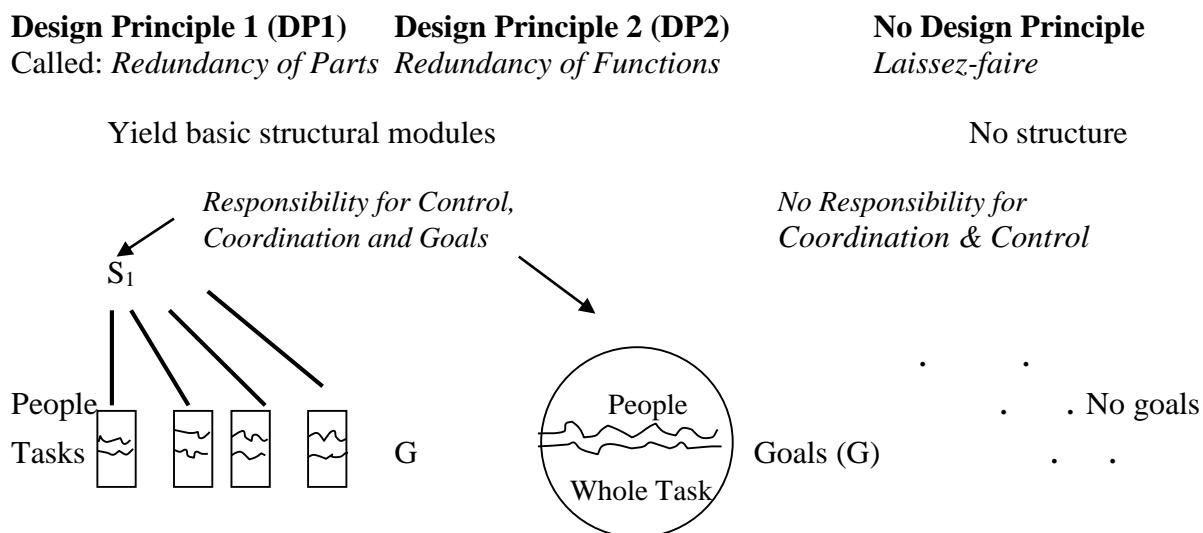
Design Principle 1 (DP1) **Design Principle 2 (DP2)** **No Design Principle**
Called: *Redundancy of Parts* *Redundancy of Functions* *Laissez-faire*

Yield basic structural modules   No structure

Figure 2. The genotypical design principles plus their absence

The two organizational design principles. The first (DP1) is called 'redundancy of parts' because there are more parts (people) than are required at any one given time. Its critical feature is that responsibility for coordination and control is located at least one level above where the work or planning is being done. DP1 yields a supervisory or personally dominant hierarchy. The second organizational design principle (DP2) is called 'redundancy of functions' because as many skills and functions as possible are built into every person. Its critical feature is that responsibility is located where the work or planning is being done (Emery F 1967; Emery M, 1993). DP1 actively deskills and demotivates (Emery & Emery 1974).

The version of DP2 in Figure 2 is appropriate when multiskilling is possible.   When multiskilling is not possible, the basic module must be modified as illustrated by a group at the strategic, policy level (Figure 3):
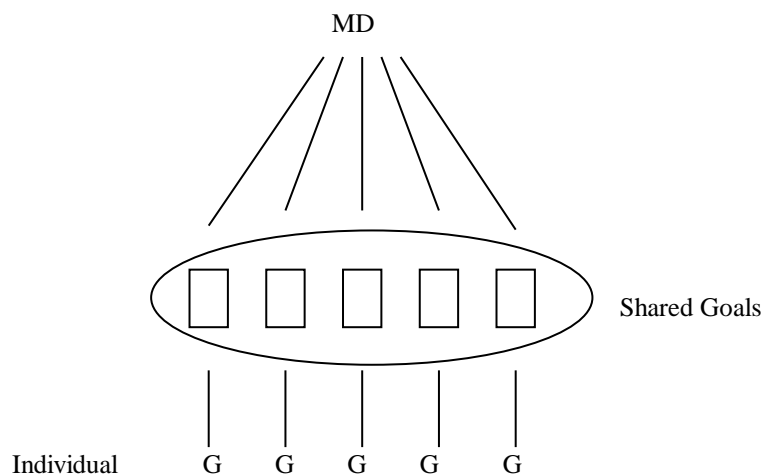

Figure 3. When multiskilling is not possible

In the variation of DP2 in Figure 3, control and coordination are split with control remaining with the individual while there is still shared responsibility for coordination and section goals. It is applicable for any setting involving specializations or transdisciplinary research, diversified management groups, some project teams etc.

One Level Organization

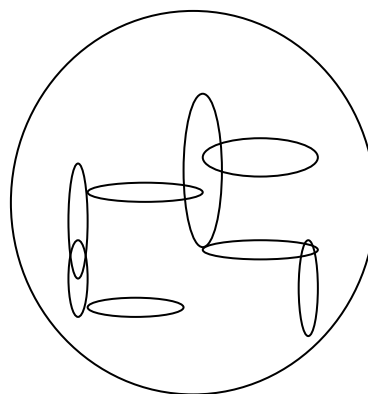Whole organization is decision making body composed of temporary overlapping project teams

Figure 4. DP2 for unstable activities

The form of DP2 in Figure 4 can be used for sections of an organization or whole small organizations. There may also be one or two multiskilled groups operating in the same section or organization doing clerical work for example. All forms mix and match.

Note: There are no team leaders, coaches or trainers (TLCs) in a DP2 structure. There may be one or more self managing groups of resource people to train in the short term. They are

not a separate level of management. A more detailed description of the operation and effects of the design principles is given in Emery & Emery, 1974.

The changes involved in change of design principle are systemic and will ultimately require the redesign of virtually all subsystems because these have been designed for DP1 structures. The most obvious is that career paths must change to a pay for skills held system and old classification systems don't work either, nor do individual performance systems.

Within DP1 structures, errors amplify (Emery F 1977). Not only are people not able to set their own goals and challenges, the structure also militates against them getting accurate and timely feedback on performance. These organizations cannot, therefore, be environments for learning. DP2 structures, however, provide for all basic psychological needs including being able to learn and go on learning. They attenuate error over time and, therefore, only DP2 produces a *'learning organization'*, "structured in such a way that its members can learn and continue to learn within it" (Emery M 1993: 2). There is no implication here that organizations can learn.

The design principles operate at all levels and sectors of society. They underlie the nature of political or governance systems in the same way as the structure of single organizations. Representative political systems derive from DP1. DP2 alternatives, participative democracies, have existed and currently exist.

Ecological learning comes from our inbuilt adaptation to our world and our ability to immediately and directly extract meaningful knowledge of it (Emery F 1980). This perceptually based learning applies to human behaviour as well as the physical environment. When placed in DP1 structures which inhibit their potential, people directly perceive this and make and act upon 'group assumptions' (Bion 1952, 1961) about what must be done to ameliorate the effects. These further paralyze communication and learning. In DP2 structures which maximize opportunities for development, people adopt the *'creative working mode'*, become cooperative and task oriented which promotes communication and learning towards shared purposes.

We accept the *joint responsibilities* of social science - to help improve the human condition as well as adding to social science knowledge. We, therefore, use the *collaborative mode* which occurs with DP2, based on the ^A_XB model, not the academic or consultative (Emery F 1977) which flow from variations on DP1. This ensures that our theoretical developments work.

Our development is explicitly based in the *world hypothesis of 'contextualism'*. Its basic working hypothesis is that there is a whole changing over time and that we know it through a series of historic events within the changing context of the whole. World hypotheses are simply systems of assumptions flowing from root metaphors, i.e. they are hypotheses about how to approach the world. The other three adequate hypotheses assume a closed and static system. Most relevant here are 'mechanism' which assumes that everything is and works like a machine, and 'organicism' based on constant integration of data into wholes.

Mechanism springs from the assumption of a closed, static mechanical universe and consequently views people as goal seeking within closed systems generally (Wertheim 1995). Theories of learning based on mechanism assume a fragmented perceptual or sensory system from which it is difficult to conceptualize the production of fully meaningful knowledge, particularly abstract knowledge. Within mechanism, there is a place for everything with everything in its place. Rather than flexible structures within open systems, there is rigid unchanging dominant hierarchy, the expression of DP1. People are viewed as only goal seeking and unable to extract meaningful information about their world. When people become prisoners within these systems, they gradually become unable to make the purposeful creative effort required to affect the nature of their extended social field. If they cannot do

this, they cannot bring this field under their control in such a way as to preserve the health of people-in-environment. Mechanism precludes active adaptation. So too does 'organicism' which is currently manifesting itself in a rash of mystical theories such as self organizing universes.

The integrated system of concepts which are subsumed under contextualism lead to the possibility of active adaptation. If all systems are open to their environment and if the people within them can directly extract meaningful information from, and learn about it, there is constant change and the possibility of purposefully designed change. If human systems are structured on DP2, the learning and creativity of their members is enhanced. Even the most complex ecosystem can be subjected to intensive learning towards creating an adaptive and mutually beneficial relationship between system and environment. Therefore, both in theory and in practice, we can only sensibly explore and establish active adaptation within the world hypothesis of contextualism.

Overview and Purpose

Adopting the world hypothesis of mechanism suppressed our group life and capacity for ideal seeking, reducing our collective purposefulness and ability to work adaptively with our extended social field. Its many legacies include the widespread introduction of DP1 in which people are treated as cogs in a machine. This design principle has affected every institution and facet of our lives. The epoch of mechanism created what is known as the Type III environment, a disturbed reactive environment characterized by competition. Its life expectancy in the West was inevitably short lived as it conflicted with predispositions to the earlier Type II environment, the most long lasting and adaptive option yet tried by the human race, in all ways different to the Type III. The Type II, called placid, clustered, was characterized by cooperation at all levels. Figure 1 shows that while the concepts are pure, the reality of transitions is that there will be remnants of previous epochs carried through into the new. The old learnings from this time are being rediscovered. These learnings have a common core which amounts to a culture, described here as associative, joyful and wise, a new form of Type II.

But since about 1955 we have been living in a new environment, the Type IV, which is the result of the unintended consequences of mechanism, a breakdown of its assumptions and structures. People have reacted to the Type III environment, increasingly taking things into their own hands (Emery F 1977a). They are sorting out their values and the Type IV environment is characterized by rapid value shifts and discontinuities. It is an intrinsically dynamic environment which induces *relevant uncertainty*. This makes it unpleasant and unhealthy. There has been a growth of maladaptions, particularly dissociation and superficiality (Emery F 1977b), indicating reluctance to engage at a meaningful level. Obviously just simply reacting to this Type IV will exacerbate its nature and effects. Some have trod this path, attempting to reassert the authority of the mechanistic way. But some have accurately intuited adaptive moves and over time, these trends have also strengthened. The mix of opposing trends has created even greater uncertainty within the field itself. Clearly deliberate interventions to create adaptation out of maladaption must carefully elevate them as a unitary phenomenon above the confusion in the field. Fortunately there is evidence that they can achieve adaptation and a new cultural way. In terms of cultural history, therefore, our work is framed against the sequence shown in Figure 5.

Purpose of OST. Figure 5 provides the context for the long term purpose of OST (Figure 4). It is to change the current fast changing environment characterized by high relevant uncertainty to a more stable one through cultural change at all levels.

Type II Placid Clustered	**Type III** Disturbed Reactive	**Type IV** Turbulent	**Type IV->New II** Transition	**New Type II** Associative, joyful and Wise

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50,000 yrs BC	Industrial Revolution	ca 1950	Today	Future

Where # means DP1 and teaching abstract knowledge, * means DP2 and Ecological Learning

Figure 5. Environmental Texture and Cultural Change Over Historical Time

To shift this environment requires the creation and maintenance of an *active adaptive culture* which I describe as 'associative, joyful and wise'. Within this culture, people are creative and motivated to diffuse their culture. To do this, they require conscious, conceptual knowledge. We are aiming for an end state, *participative democracy**, where *all* entire systems are and want to be purposeful and responsible, continuously learning and practicing active adaptation within this more stable environment. (The convention we have adopted is that PD stands for participative democracy and PDW stands for the Participative Design Workshop). Socioecological means 'people in environment' and active adaptation is being in a constant state of purposeful change appropriate to both the nature of people and a continuously changing environment. Learning and dynamism are inherent to open systems.

Purpose

L_{22} *Environment:* Extended Social Field of Directive Correlation
Type IV→Type II(pockets)→Type II

The Work of the Search Conference

L_{21} Puzzle *Learning* (based on ecological learning)

L_{12} Active Adaptive *Planning* (through ideal seeking)

The Work of the Participative Design Workshop

L_{11}

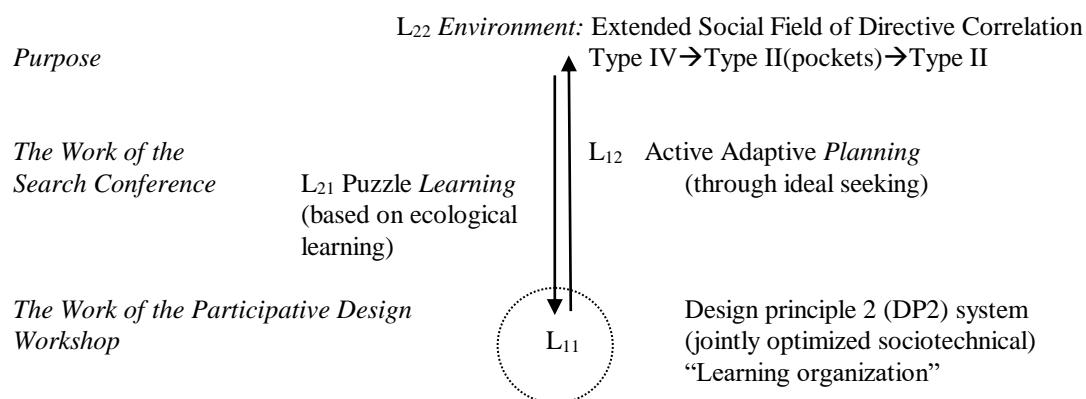Design principle 2 (DP2) system (jointly optimized sociotechnical) "Learning organization"

Figure 6. The 2 Stage Model for Active Socioecological Adaptation

The 2 stage model expresses the complete concept of active adaptation in practice. There are two parts to active adaptation, between system and environment and internal to the system. There is a reliable, carefully designed method for each part (Emery M, 1999).

Major Methods

If OST is to fulfill its purposes it must in every way treat people as defined above. Our methods, therefore, encourage people to act purposefully to create and take responsibility for their own futures, express ideals through all their systems which they must be able to design as learning planning communities, functioning as and providing an experience of, and learning for participative democracy.

The Search Conference (SC) establishes an active adaptive relationship between the system and the environment through the creation of a new system principle. The system principle is contained within the new set of strategic goals, the Desirable Future of the system. The Search uses our inbuilt capacity to directly extract meaning from the environment and creatively combine that meaning with our ideals. It answers the question 'where and what do we want to be in year X?'

The Participative Design Workshop (PDW) produces an active adaptive (DP2) system, one in which all people are responsible and motivated to produce quantity and quality, and who know how and why to maintain it. Unless the system affords the learning and support for learning that is required for implementation of the system principle, the work of the SC will ultimately be wasted. The PDW, therefore, answers the question 'how do we organize ourselves to ensure that we reach our Desirable Future?'

While the methods are complementary, they are totally different in their design and management. Both require preparation and planning and detailed attention to their introduction and design in any particular organization, community or system more generally. The better the preparation, the better the outcome. These are not trendy recipes but flexible methods designed to make lasting change based on tested principles. Every aspect of their design and management has been researched in order to make them highly reliable.

The Search Conference. A Search is a carefully designed integration of external and internal structure and process which function to provide for the practice of ecological learning. Each of the major theoretical frameworks are translated into practice and integrated to form an internally consistent whole.

The external structure (design) of the SC is a translation of the open system into practice (Figure 7). The content consists of learning about (and also learning how to use) the environment (L_{22}) and system (L_{11}), and integrating them for active adaptation between changing system and the changing environment. The process consists of integrated learning (L_{21}) and planning (L_{12}).

The SC is designed and managed on DP2. There is a strict division of labour between the participants who take responsibility for the work and the outcome, and the SC manager(s) who take responsibility for the design and management of the learning process and environment. Duration is usually 2 days and 2 nights.

Searching for a better world via mutual adaptation of environment and system can only be valid when the environment is consciously perceived and known. The Search Conference is the method which specifically features the L_{22} as a critical component of making adaptive change through strategic planning and related activities. Without this major feature or even with a token inclusion of it, an event or method really isn't a SC. Above all else, it was the inclusion of the L_{22} which originally marked the SC as unique and still distinguishes it from many other methods of planning. Phase 1 of the SC collects data about the L_{22}, analyses and synthesizes it into Desirable and Probable Futures. Phase 2 deals with the L_{11} through a history session, an analysis of the system today and building on that, a creation of the Desirable System. Phase 3 integrates the learning from phases 1 and 2.
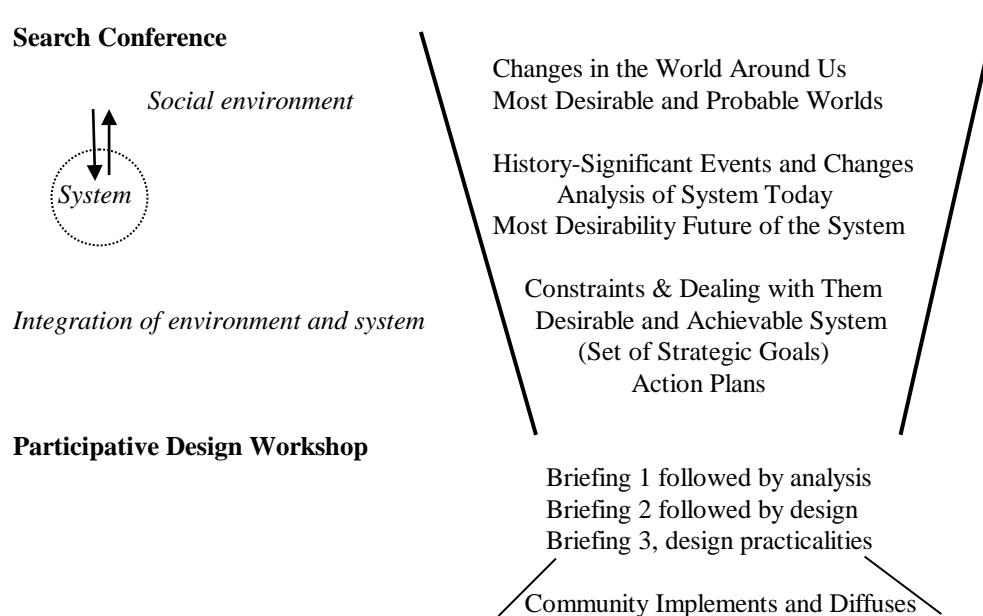
Search Conference

Social environment

System

Changes in the World Around Us
Most Desirable and Probable Worlds

History-Significant Events and Changes
Analysis of System Today
Most Desirability Future of the System

Integration of environment and system

Constraints & Dealing with Them
Desirable and Achievable System
(Set of Strategic Goals)
Action Plans

Participative Design Workshop

Briefing 1 followed by analysis
Briefing 2 followed by design
Briefing 3, design practicalities

Community Implements and Diffuses

Figure 7. Schematic Design of 2 Stage Model

The Search uses *puzzle learning* which is the appropriate form of learning for a Type IV environment where ends cannot be assumed. The analogy is the jigsaw puzzle where the next piece is determined by the shape already on the board. By contrast, problem solving assumes an end point.

For learning (L_{21}) people use their perceptual abilities of *figure ground* relations and their *reversals* (Koffka, 1935). We can recognize an object as a figure on a background and a background as an object, and make reversals in this figure ground perception. This is a critical concept for learning about and planning in relation to the extended social field (L_{22}). This ground is brought into focus as figure. The most effective method for enhancing this ability to see the environment as figure is to focus on the *embryos of social change* (Emery F 1967). These are the emerging systems which may indicate value shifts and develop into major social movements. Identifying these embryos and keeping an eye on them is a powerful form of preparation for change and adaptive responses.

Through these two practical concepts, the L_{22} becomes the figure of creative learning. Then the intrinsic character of the system becomes the figure. Through this process of figural reversals, the learning/planning process produces powerful learning about system-in-field transformation.

The external structure shown above is schematic allowing for great flexibility. Each SC is custom designed, from the above irreducible minimum. For example, there may need to be a 'task environment' which lies between the L_{22} and the L_{11} (Williams 1982), sometimes a Most Probable Future of the system needs to be included. The design is a carefully researched plan, not a linear program. As its purpose is to build a *community*, as much work as possible takes place in the large, community, group. Small group work is used only to speed work up, put in detail and validate conclusions. The SC is a wholistic method for whole people. It generates feelings of excitement and joy. Without the energy generated by these positive affects, there is no diffusion (Emery M 1986).

Similarly, strategic planning in a Type IV environment must be done by the people who have to live with the consequences of the plan. When people plan and take responsibility for their own future which embodies their deepest selves, they often make radical change. This gives the lie to the saying that people fear and are resistant to change. They are fearful and resistant

only to change which is imposed upon them. Because of relevant uncertainty, planning must use the *strategy of the indirect approach*. This, the oldest strategy in the world, entails manoeuvring, constant monitoring of the environment and constant active adaptation.

Every aspect of the SC as environment for creative work and learning has been researched. It incorporates management of *the conditions for influential communication* (Asch 1952), and prevents outbreaks of the *basic group assumptions* (Bion 1952; 1961). It uses the *rationalization of conflict* (Emery 1966) to reinforce the above and maximize task orientation and community building. SC managers must understand the theory.

For the highest probability of successful implementation, we recommend that there is a PDW at the end, modified for design rather than redesign, so that you avoid the risk of lapsing back into DP1 during implementation. Setting up committees and other forms of DP1 organization guarantees drops in energy, motivation and action.

The *outcomes* of the SC are:

1. an adaptive system principle
2. people who:

- want to make the changes they have planned,
- understand how to monitor the environment and deal with its changes and
- can adjust their strategic goals, priorities and action plans as necessary, and
- have the excitement, energy and knowledge to involve others to spread the process

There are variations on the SC such as a series of SCs with an 'integration event' and a multisearch.

If your organization already has a set of strategic goals appropriate for active adaptation and your people already know how, and are committed, to monitor external change and change to maintain adaptation, you do not need a SC. Go straight into internal redesign of the system.

The Participative Design Workshop. The PDW is a workshop with the single purpose of changing the genotypical organizational structure from the first design principle (DP1) to the second (DP2), designing back in the human dimension of work which is summarised by the six psychological requirements of productive activity. These criteria are the *intrinsic motivators* (Emery & Thorsrud 1969).

The *six criteria* are:

1. Elbow Room, autonomy in decision making
2. Continual Learning for which there must be
      a. ability to set goals
      b. accurate and timely feedback
3. Variety
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4. Mutual Support and Respect
5. Meaningfulness which consists of
      a. doing something with social value
      b. seeing the whole product or service
6. A Desirable Future

The first three criteria must be optimal for each individual. The second three exist within the climate of the organization itself. They are things you can never have too much of. The criteria are measured in the first stage of the PDW to analyze the effects of the current structure on its people. A DP2 design maximizes them.

Structural redesign is not about 'doing teams'. We are talking about a series of workshops which will give you an elegant *system* with a very flat *non dominant hierarchy of functions* with people at every level being responsible (and accountable) for a comprehensive set of measurable goals. We are talking about changing the *formal legal structure* so that this replaces the master-servant act which is the default option for our organizations.

The comprehensive set of goals includes social, environmental and other goals as relevant, as well as production goals. 'Measurable' means they all have numbers on them, eg. x cans of peas per unit time with y quality specifications. These are all negotiated and agreed so that collectively, they move the system towards its strategic goals.

Total systemic redesign usually takes place in two (2) stages. In stage 1, people from a natural section of the existing structure, at least the bottom two levels, work together to redesign their section of the structure. When all of these stage 1 redesigns have been done, there is a workshop to redesign the top 2 or 3 levels and also integrate the bottom up designs into a coherent structure. There may, however, be better overall organizational configurations and in these cases, we recommend a stage 2. Once DP2 is working in the current design, people from all over the structure come together and redesign the macro structure. Because people already understand DP2 working and will want to be involved, this 2 stage process while longer in time, avoids the disruption associated with other options.

As with the SC, there is preparation, planning and design work to be done prior to initiating the workshops.

The *basic design of the PDW for **redesign*** is as follows:

Phase 1. Analysis

> *Briefing 1 - Design Principle 1*
> Groups complete matrix for 6 psychological requirements of productive activity.
> Groups complete matrix of skills available.
> Reports and diagnostics.

Phase 2. Change

> *Briefing 2 - Design Principle 2*
> Groups draw up work flow.
> Groups draw up organizational structure and redesign it.
> Reports.

Phase 3. Practicalities

> *Briefing 3 - What Is Required to Make the Redesign Work*
> Groups spell out :

- a comprehensive set of measurable goals.
- training requirements (from skills matrix).
- other requirements, eg. mechanisms for coordination, changes in
- technology, etc.
- the basis for designing career paths.
- how the redesign improves scores on the 6 criteria.

The first phase is an analysis of what currently exists, phase two makes the change and phase three covers all of the practical matters which accompany the systematic change and ensure its effectiveness in practice.

In phase 1, the PDW manager does a briefing on the 6 criteria, DP1 and its consequences. The participants then analyze the effects of the existing structure in terms of human motivation and current distribution of skills. (DP1 structures deskill over time.)

In phase 2, the manager covers DP2 and its consequences and the DP2 structures appropriate for specialist as well as potentially multiskilled self managing organizations. Participants briefly draw up the workflow through their section of the organization to ensure that everyone knows what happens in the section as a whole and where critical decisions about control and coordination are made. They then draw up the formal legal structure of their section and redesign that structure. When they have the best possible DP2 structure, they move on to phase 3.

In phase 3 they do a first draft of the goals which will control the work of that section or the groups within it, work out their detailed training requirements and anything else required to

make the new structure work in practice. They also do a first draft of a new career path based on skills as it would apply to them in their work. These drafts are later negotiated and agreed with whatever designated organizational authorities. A final career path based on payment for skills will be designed by a professional career path designer.

The final system design will be individual to your people and your organizational strategic goals. It will be a variation on some basic sorts of models from multiskilled throughout to various mixtures of multiskilled to the specialist and project models shown above.

The *application* of the PDW is very flexible. The basic rule is that there must be **no imposition** of a design. Everybody in the organization fills in the matrices for the 6 criteria and skills, and is involved in the final design.

Apart from this rule, PDWs can be done in parts separated over time, workshops can be composed of single sections, deep slice teams from a section, multiple teams designing different sections or multiple teams designing the same section with integration. There is also the option of using a workshop using mirror groups which adds to organizational learning. These choices will depend on the nature of each individual workplace.

There is also a modified version of the PDW for the *design* of organizational structures from scratch (emery M, 1999). This is useful for the design of greenfield sites, project teams, communities following Searches, etc.

Specific changes from STS

There are many differences (Emery M 1993) but the major changes are:

- substitution of organizational design principles for old STS concepts and language (eg. sociotechnical, joint optimization)
- addition of conscious conceptual knowledge of design principles, 6 criteria and how to redesign on the run - this is essential for systemic active adaptation to both internal and external change (Emery M, 1999).
- no analysis of variance - people know how the place works
- collective participation replaces experts and design team

Diffusion

Diffusion is powered by the affect system, particularly the affects of excitement and joy as explicated by Tomkins, 1963 (Emery M 1986). Affects, ideals, structures, learning and motivation are systematically related. The basic prerequisites of a purposeful (DP2) organizational system and appropriate task, reliably elicit ideals and positive affects and consequently, produce the motivation to diffuse. The only other component required for effective diffusion is conscious conceptual knowledge of that which people are motivated to diffuse. The 2 stage model provides this knowledge.

Open systems thinkers now have available to them a vast array of conceptual and practical tools. With these they can design an infinite variety of methods which encompass DP2 and active adaptation more generally.

Elaborating the Model to Cultural Change

The model can be extended infinitely to address adaptation at the cultural level over much longer time spans. Culture is defined as a system of behaviours in context. Cultural change is produced by an integrated sequence of activities in which there is an individual goal for each, and at the same time an ultimate goal to the whole sequence. Sommerhoff's integration theorem states: "If G_A is the goal event of a directive correlation A and if the occurrence of G_A is a necessary condition for the occurrence of the goal, event G_B of a directive correlation B, then G_B is also a goal-event of A." (Sommerhoff 1969: 187-8). As L_{22} and L_{11}

are coimplicative, mutually determining through a process of coevolution, sequences of directive correlations will then look as in Figure 9. $L_{11}(L_{22})$ means the system as it is defined by reference to the environment in which it exists and vice versa for $L_{22}(L_{11})$ (Emery F 1993).
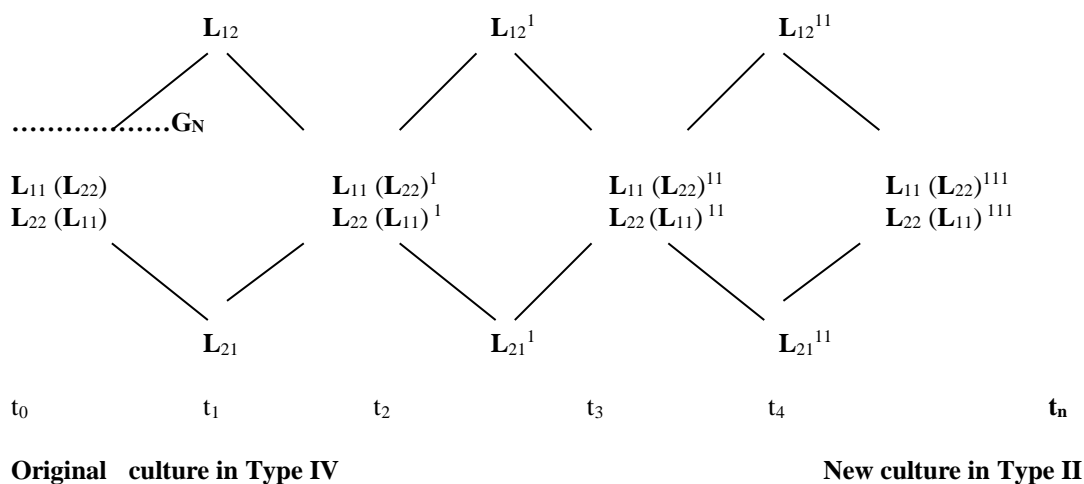
$$
\mathbf{L_{12}} \qquad\qquad \mathbf{L_{12}}^{1} \qquad\qquad \mathbf{L_{12}}^{11}
$$

………………$\mathbf{G_N}$

$\mathbf{L_{11}\,(L_{22})}$ $\mathbf{L_{11}\,(L_{22})}^{1}$ $\mathbf{L_{11}\,(L_{22})}^{11}$ $\mathbf{L_{11}\,(L_{22})}^{111}$

$\mathbf{L_{22}\,(L_{11})}$ $\mathbf{L_{22}\,(L_{11})}^{1}$ $\mathbf{L_{22}\,(L_{11})}^{11}$ $\mathbf{L_{22}\,(L_{11})}^{111}$

$$
\mathbf{L_{21}} \qquad\qquad \mathbf{L_{21}}^{1} \qquad\qquad \mathbf{L_{21}}^{11}
$$

t_0 t_1 t_2 t_3 t_4 $\mathbf{t_n}$

Original   culture in Type IV   **New culture in Type II**

Figure 9.   Codetermination of Cultural Change over Time

At each point in time, the environment is defined in terms of the changing systems which form it. Similarly the systems within it are defined by the nature of the environment they form. Any one system has only a limited effect on the field but as systems influence each other and coordinate their directions relative to the field, they can have a significant and visible effect. After both system ($L_{11}\,(L_{22})$) and environment and ($L_{22}\,(L_{11})$) have responded to the starting condition, they have changed each other at t_2. This continues to happen. If such a sequence is adaptive over time, it will result in a more coordinated movement of L_{22} and L_{11}. At t_n there is a distinctly different culture which when sufficiently widespread, becomes a new environment. The open systems model is inherently and continuously dynamic.

When we translate the Figure 9 into the 2 stage model, $L_{11}(L_{22})$ is an organisation or community which has Searched and created its set of strategic goals incorporating the ideals, G_N. As it implements its plan, the environment $L_{22}(L_{11})$ is itself changing. By the time $L_{11}(L_{22})$ arrives at G_A, the first level of subgoal in the nested temporal hierarchy of strategic goals (G_N includes G_B which includes G_A), the organisation must, as it assesses its progress, continue puzzle learning, re-evaluating changes in L_{22} and its position in relation to them. Where there have been discontinuities in the field or even moderate shifts in areas of relevance for the process of L_{11}, priorities will need to be revisited and probably reordered. Monitoring the L_{22} becomes a way of life.

If L_{11} has democratized itself (its first goal, G_A) for learning, it will be able to not only respond adaptively in terms of modifying its G_B, but the creativity of its people released by the change to DP2 will also have resulted in innovations which themselves require redefinition of G_B. As the strategic goals embody the ideals, then the process of mutual adaptation of L_{22} and L_{11} can continue towards G_N. Because G_N is ideal based, it can only be approximated over time. Therefore, adaptation is a continuing process in which the subgoals G_A onwards, become milestones and deliberate pauses for reassessment of both L_{22} and L_{11} and adjustment of further goals towards G_N. But of course, as more systems Search and follow the process approximating G_N so L_{22} itself evolves through Type IV towards a

new Type II. This is exactly the thinking behind some current forms of strategic alliance and other dedicated relationships.

As systems become adaptive, they establish protected sanctuaries of ideal based structures and processes which function as Type II environments. Over time, as more systems become adaptive, these pockets of Type II cohere into larger, more encompassing systems, finally evolving into a new, modern form of clustered, placid environment, the new Type II.

A CASE OF CONCEPTUAL AND METHODOLOGICAL MALADAPTION

Much USA social science appears to have ignored the concept of directive correlation as the particular and contextualism as the general. Emery & Trist (1965) is much cited but little used. Without understanding of the L_{22}, there can be little progress as it is perfectly possible to hypothesize and behave as if there were no consequences of the action of a single system. This neglect has caused some strangely distorted views of open systems, eg. they are based on a pregiven environment, independent of an observer which generates "a fundamental opposition or antagonism between organism and environment". There is a widespread view that "OST has essentially ignored, or failed to appreciate, the co-emergent nature of organization and environment" (Purser, 1993, p193).

It is a good question as to how and why the USA managed to ignore Sommerhoff in relation to open systems. In *Towards a Social Ecology* published in the USA in 1973, Emery & Trist devote a whole section to directive correlation (pp6-8). Specifically, Emery states "It is understood that these conditions may vary independently of each other and do not constitute a closed system wherein the initial state of one would determine the initial state of the other" (p7). Similarly, its Appendix includes an explication of the move from "closed to open systems" (p211) and discusses the tendency in the realm of social theory "to continue thinking in terms of a 'closed' system, that is, to regard the enterprise as sufficiently independent to allow most of its problems to be analyzed with reference to its internal structure and without reference to its external environment." (p212)

Much social science in the USA is mechanistic, fixated within the Type III environment and its model of organization. The word 'organization' is used to connote DP1 structures and 'corporation'. That is, there is no concept of an organization structured on DP2 or even of one which functions as if there were a Type IV environment. Purser found a view that "Within the OST framework, the goal of an organization is also to bring inside the boundaries all the good things (raw materials .... etc) while paying out as few goods as possible...The organization - environment boundary is reified and solidified (amounting) to a collective forgetting of the surrounding space or background in which the organization is embedded" (p192). This is a classic definition of the appropriate organization for a Type III environment, a bureaucracy, competitive to the death, totally ignoring the effects of its actions on the broader environment with the exception of pursuing a win-lose strategy in relation to relevant competitors.

A further clue is given by the conjunction of "OST/STS" (Purser, p186) where 'STS' is the corruption of original open social technical systems theory into the method practiced in USA today. Here we have another clear case of maladaption. STS as it is practiced today in the USA, despite its efforts to be participative and 'fast cycle' has not escaped from the method which was practiced by the pioneers of the experimental period (Emery, M, 1993, pp141-7). That methodology was explicitly adapted to the environment of the time which required rigorously produced and precise data to prove the existence of an alternative to DP1. There had to be high confidence in the scientific reliability and validity of the results. This involved detailed measurement and redesign of the technology as well as the social system in order to arrive at joint optimization. Once it was proven that there was a workable alternative to DP1,

it was time to move into the diffusion phase, Phase C (Emery F 1969). By this time also, the environment had evolved well into the Type IV. Both the needs of diffusion and the new environment demanded totally new methods.

Passmore et al (1982, p1180) call for more research, into a method rendered obsolete by a new world and the Participative Design Workshop which is designed specifically to meet the new set of needs. Today in the USA, there is still a heavy emphasis on the technological side of the system, the "technocratization of OST" (Purser, 1993, p217). Yet technological innovation is relatively infrequent (Passmore et al, 1982).

Misconceptions of STS in the USA are legion. Part of the problem is that STS has come to mean no more than organizational change of some type, similar to the all encompassing use of the term QWL. The list of features in Passmore et al's review of STS studies is a dog's dinner. Many features such as 'teams' which remain under direct supervision, are directly opposed to the goals of the original sociotechnical systems work. Macy & Izumi (1993) have gone further and rewritten history. On pages 246 and 276 they define 'semi-autonomous' teams as work groups with a 'coach' but without first and/or second line supervisors, and 'autonomous' teams as those working without a 'coach' and without first and/or second line supervision. 'Semi-autonomous' was the original name applied to the basic units within a DP2 structure, as in the Norwegian Industrial Democracy Project. "Through the 1950s and 1960s it was common to refer to democratized work groups as 'semiautonomous groups' (Emery F, 1980). There was no concept of 'coach'. Most 'coaches' are supervisors with a name change, cosmetic rather than structural change. The term 'autonomous' is silly as every group is an interdependent part of a whole, governed by a precisely defined set of goals and a plethora of rules and regulations governing their use of resources. The modern and by far most accurate term is 'self managing' group (Emery F 1980). Self managing means simply that the group manages itself, its people and all of its tasks together to meet their comprehensive set of measurable goals, ie. it takes responsibility for its own coordination and control. The fact that the original intent was to change the design principle on which organizations were structured has gone missing entirely in the USA. In this sense, much North American social science is not only pre-Type IV, it is also ahistorical.

Examples of 'accelerated' STS (e.g. Lytle et al, 1994: Axelrod, 1994) are usually only variants on the old process. Lytle (1994) advocates a series of conferences. The first called a Futures Search Conference constructs a vision of the future organization without necessarily considering the L_{22}. There is, therefore, no concept of adaptation. The second which may be merged with the first, analyzes the business environment, often referred to as the 'external environment'. There is, therefore, no differentiation of L_{22} from task environment. The third and fourth perform the technical and social system analyses. These are followed by a 'design conference' in which participants work on the broad features of the new organization and consider issues. It appears not to include any mention of the organizational design principles. Then there is an 'implementation planning' conference in which participants "flush out the details of the design for their respective unit,...the boundaries and roles in a new team" (p22). They can't be genuinely self managing teams because in those, there are no set roles. It all remains dependent on DP1 with a heavy infrastructure of representatives, committees, consultants etc.
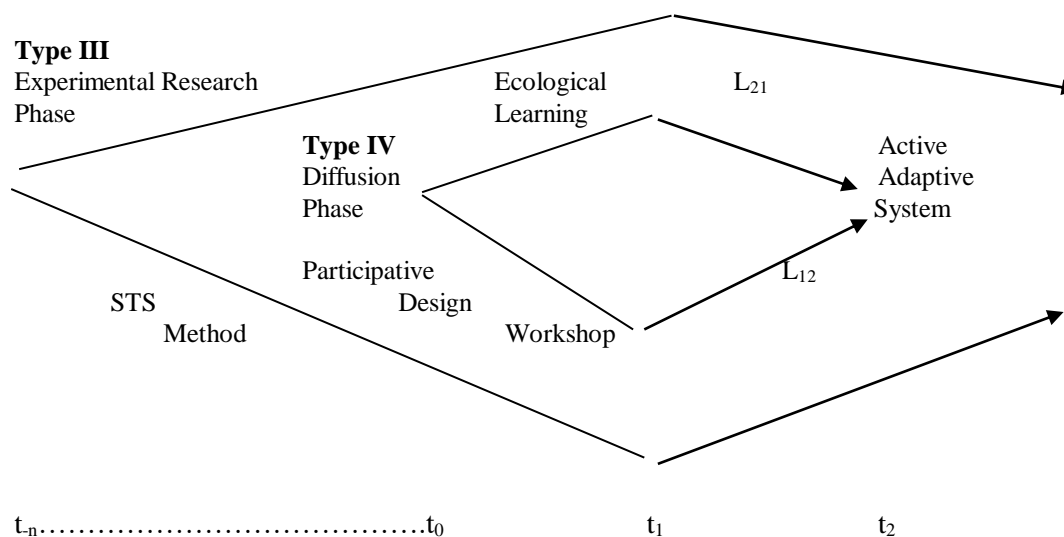
Figure 10. Conceptual and Methodological Maladaption in USA

Figure 10 shows that 'STS' which consists of

1. theorizing in terms of DP1 organizations for a stable L_{22} (Type III) and
2. practicing a method, the usefulness of which finished with the completion of the Norwegian Industrial Democracy Project (Emery & Thorsrud, 1976)

is not adaptive and can't produce a desirable adaptive future. It is an instance of a function exceeding the back reference period where the back reference period is $t_1 - t_n$ rather than $t_1 - t_0$. In other words, it is designing for a world that no longer exists. Such a continuing response in terms of both old inappropriate theory and practice can only increase the distance between an active adaptive system in the Type IV environment and the state of systems produced by such responses. The USA has ignored the rest of the world and is living in the past. To be effective, STS2 must go back to basics and catch up with 30 years of progress before it can move on. This applies equally to 'integral organizational renewal'. Others such as 'democratic dialogue' are also maladaptive but for different reasons.

Clearly USA 'STS' has shifted into closed systems. In addition, 'autopoiesis' or organismic self regulation (Maturana & Varela, 1980) is commonly employed as a conceptual framework and this fits precisely with the above analysis. In his analysis of the theory of autopoiesis as one of a modern genre, Arnheim (1990) discusses this denial of objective reality and genuine commerce with it as a symptom of "the state of mind of the culture", a toxic blend of Hume & Nietzsche which "has had an irresistible influence on the mood of our time" and "darkened our philosophy like a cloud of poison gas". It is a negativistic world view in which people are purposeless and "static". This "pathology of our spirit" means of course that we cannot make change, that we are totally at the mercy of our unfolding 'self regulation' and the 'perturbations' caused by the environment which is only a mediated perceptual construct anyway. The analogy is that of a pilot flying by instruments alone in total darkness, able to change only the readings on the dials. Arnheim cannot tell "whether the ominous visions of a vanishing world are the forewarnings of a dying civilization or whether a coming generation will recover from the attack" (p278). If it is the former, then no change is possible. Under autopoiesis, active adaptation becomes not simply a maladaption but a nonsense. Dissociation becomes the only adaptive option. All other scenarios (Crombie, 1972, Emery F, 1977b) become maladaptive because they contain a component of purposefulness.

Autopoiesis as denial of reality may be attractive to a culture reeling under its accumulating maladaptions and uncertainty caused by the acceleration of the Type IV environment but in many ways it seems a ploy. Is it attractive because it provides a rationale for the 'haves' and elites to abandon the search for effective methods for change and urge acceptance by the disadvantaged and oppressed of their lot? Consultants are certainly among the elite. More recently Varela et al (1991) have argued that organism and environment are coimplicative but specifically reject Gibsonian direct perception on the grounds that it detracts from the 'autonomy' of the organism (p204). But an organism cannot be both totally autonomous and codetermined. And without direct perception, the system is still closed and the environment unknown, still unamenable to first hand directed purposefulness.

'STS' along with closed systems eclecticism, the production of papers which are words only, and aggressive competition for highly paid consultancies is a social science symptom of dissociation (Emery F 1977) with a consequent neophilia. Its observers agree that it springs from an imbalance of the individual over the common good, the common unity or simply, the community (Kemmis, 1990).

CHALLENGES

The first challenge is that while democratization is proceeding in organizations and communities, the education system must be democratized, particularly higher education involved in the production of elites. We cannot afford to continue producing even more managerial, academic and consulting dinosaurs for a world which no longer exists.

The second is that we need to start working more directly on changing the design principles at the governance level.

These two major challenges are interrelated in that they are necessary steps to reversing the current strong trends towards maladaption. There is a third which I put here in the form of two questions. Is there hope that social science may recover its sense of responsibility? And does it matter? Yes to the first and probably not to the second. People are finding the resources they need, or they are generating them. They will simply bypass mainstream channels if they are not delivering. Understanding of what is required is already diffused through the social field. Some US social scientists are already conscious of the malaise and their joint responsibilities. Why don't you come and join us?

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