RENEWAL of the CONCEPTUAL FOUNDATION for STS Design (STSD)

OUR HERITAGE of 'Whole/Integral System' Organization Design

A. THE DEVELOPMENT OF OUR "HERITAGE"

The origins occurred in the work of the Tavistock Institute of Human Relations (London, England), that came into existence in 1946 in response to critical problems in society after major upheavals of the industrial age and two world wars. Scientists from various disciplines-- psychology, anthropology, sociology, economics, education and mathematics--were held together through common research tasks in an action frame of reference called "action research" (Gustavsen, 2008).

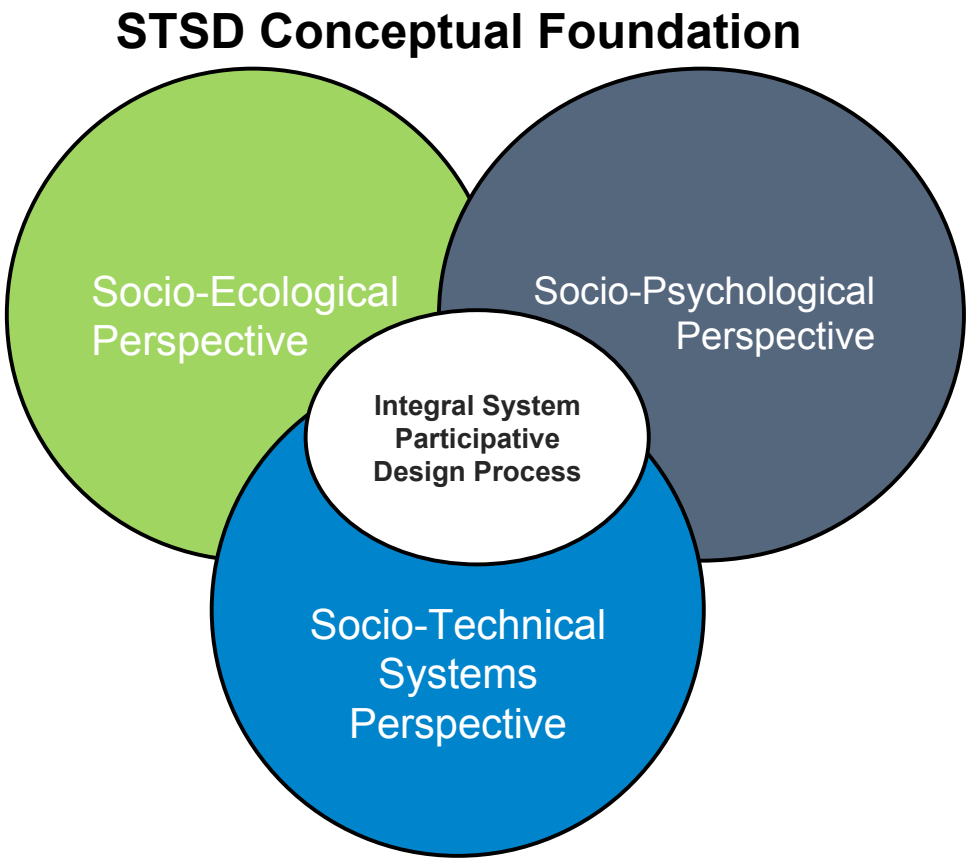
During what has been described as a "pioneering" phase of action research (1949-1959), Tavistock scientists worked in settings such as British coal mines and Indian textile mills. Then, in a "classical" period (1959-1971), they led experiments in Norwegian paper, metal, and chemical industries. What emerged was a "**basic shift in organizational paradigm**" that was contrary to previous paradigms (Scientific Management: Taylor, 1911; Human Relations: Mayo, 1933) that had emphasized *either* the technical *or* the social aspects of an organization--in the Tavistock approach, *both* factors were "integrated as…components of one single socio-technical entity" (van Eijanatten, 1993).

Post 1971, when this new organizational paradigm was applied in expanded socio-economic contexts, "modern" Socio-Technical Systems Design (STSD) evolved with "amendments". Different development trajectories emerged (in Australia, the Netherlands, Scandinavia, and North America). Languages and concepts differ in these various "schools" of STS Design. Yet, all of these approaches are still "rooted in the Tavistock tradition" (de Sitter, 1994), with a focus on achieving organizational excellence in both technical performance and the quality of people's lives (van Amelsvoort, 2013).

As well as tacitly embedding direct participation as a key feature of the Socio-Technical Systems Design (STSD) paradigm, Tavistock's action research evolved and was strongly influenced through three distinct "**perspectives**" or ways of knowing and "engaging" with the world. These perspectives are all linked and related to comprehensive organization design (Trist, Emery & Murray, 1990-1997)).

Initially, concepts were formulated through the lens of a psycho-analytical orientation based on the work of Klein, Bion, and Lewin, much of it related to group dynamics and field theory. Soon thereafter, Fred Emery and others at Tavistock were inspired by systems thinking, particularly von Bertalanffy's work on open-systems in physics and biology. Eventually, the Tavistock researchers needed to extend their systems framework drawing on the work of Chein, Sommerhoff, Angyal to create a third perspective—the socio-ecological--focused on systems *and* their environments.

These three perspectives—**socio-psychological perspective, socio-technical systems perspective, and socio-ecological perspective**—were elaborated continuously during the latter period of the 20th century, until today they constitute the conceptual foundation of the Socio-Technical Systems Design (STSD) paradigm--linking the individual to the group, the group to the organization, and the organization to its environment—with an integrating participative design process that combines innovative design principles with most valuable local experience and knowledge.



B. PARTICIPATIVE DESIGN

Direct participation in design was tacitly present in the action research process itself during the 'pioneering' phase of Tavistock's development of the Socio-Technical Systems Design (STSD) paradigm. It became more explicit in the 'classical' phase (especially in the 'Industrial Democracy' project led by Fred Emery and Einar Thorsrud in Norway, 1962-69). Very soon thereafter following his return to Australia in 1969, Emery and his wife Merrelyn developed the first comprehensive participative approach that became known as the "two-stage model" of design, beginning with a Search Conference (SC) building a directive correlation between the system and its environment, and then, a Participative Design Workshop (PDW) building a directive correlation between people and the work.

Later in the 'modern' period of Socio-Technical Systems Design (STSD), there emerged other large group participative design processes such as the program of "Democratic Dialogue" developed in Norway and Sweden (Gustavsen, 1991; 2008) for intra-organizational and inter-organizational learning and co-creation between management and workers at all levels and areas of an enterprise, and beyond. Similarly, in North America, Dick and Emily Axelrod developed a "conference model" (1998), seeking to "move beyond the few who design for the many and engage significant portions of the organization" in system-wide design. (Other North American large group processes of "whole-scale"

design were developed in the 1980's and 1990's (Dannemiller; Lytle; Mohrman & Mohrman) to address needs for more effective diffusion of innovation and accelerated implementation of change.)

The link between a participative process and the content of Socio-Technical Systems Design (STSD) was further strengthened by the work of Albert Cherns (1976), who distilled the writings of Tavistock researchers (Trist, Emery, Herbst, et al.) in a set of nine "Principles of Socio-Technical Design". The first principle is "Compatibility", the requirement that for construction of a participative organization, a necessary condition is that "people be given the opportunity to participate in the design of jobs they are to perform". Cherns also proposed principles of 'Incompletion' and 'Minimal Critical Specification', advocating that design identify what is absolutely essential (and no more) so that options remain open to address the needs of future job-holders and future contingencies.

Even though Modern Sociotechnical Theory (MST) as developed in The Netherlands has its own distinct set of "design rules", Ulbo de Sitter (1994) advocated for a view similar to Cherns' principle of "compatibility", as expressed by de Sitter's fellow countryman, Hans van Beinum (1993) that "organization design can only be authentic and effective under the condition that the very process of design shows the same features as the desired final state, i.e. participation, self-regulation, and local autonomy". Indeed, all variants of 'modern' STSD practice some form of *participative design*, which involves data gathering by stakeholders, their reflection on the data, their generating evidence from the data, and making claims to knowledge based on conclusions drawn from validated evidence.

Participative Design is vital for people to achieve a holistic, whole system view of the work done in each of the perspectives and levels of designing the organization. The process integrates the work of the perspectives — harmonizing the three perspectives with each other as each leverages the other — reinforcing whole system design of micro, macro, and meta levels. People work primarily at one level and are not purview to the other levels and how they function, so participative design is vital for them to see all three levels as a whole and thereby make their own choices coherent with the whole.

Finally, participative design helps participants transition from perspective to perspective so they can process what they have become aware of in each lens and prepare for the <u>whole transformation experience</u> in the most optimized manner. The process is dynamic and able to shift as participants decide how to transform and adapt to a continuously changing environment. The goal is not to design only one worthwhile intervention in one perspective, but to design a <u>flow</u> of worthwhile interventions woven into a meaningful and uplifting transformational journey — a sum that is greater than its parts.

C. THREE INTER-RELATED PERSPECTIVES

The three perspectives in simple terms are outside-in (socio-ecological), inside-out (socio-psychological), and structural (socio-technical) lenses that were widely adopted in the last fifty years as methodologies by many disciplines. However, they were rarely integrated in a holistic participative organization design process.

The three perspectives are interdependent, yet each has its own focus or lens. What follows is a brief description of the essence and source of each perspective, based on their original form as developed during the 'pioneering', 'classical' and 'modern' phases of STS Design development.

A. Socio-Psychological Perspective

The Socio-Psychological Perspective is about what individuals need for agency to thrive as a group, with culture as the 'bridge' in the dynamic relations between the individual and the social entity.

The source concepts which gave rise to the socio-psychological perspective are psychoanalytic object relations theory, Lewinian field theory, the personality-culture approach and the theory of open systems. These concepts were developed during war-time and immediate post WWII projects in Social Psychiatry and Leadership Selection processes; Group Process in primary groups; Family Studies; Transitional Communities, and dynamics of Organizational Change.

One of the fundamental sources was the work of Bion (psychoanalytic object relations theory) in his study of the Experience of Groups and what he termed the "group mentality"--that will grip a group into patterns of behavior in opposition to the work/task activity—Bion named these patterns "basic assumptions" (of dependence, of fight/flight, and of pairing).

Lewin's seminal work in 'field theory' was on group decision making and the dynamics of social change. Lewin and Bion played central roles in the foundation of the "Group Relations" program that became part of the "Tavistock tradition" in which insight into the conscious and unconscious dynamics of groups was seen as a prerequisite for development of viable institutions (M. Sher, 2013).

One of the most important concepts to emerge from the Tavistock coal mining studies was the work of Trist, indicating how "psychological forces, unconscious and conscious, at the level of the group, interacted with structural forces to bring into existence a "field" with dynamic patterns of behavior specific for a given social situation". In the paper, "Culture as a Psycho-Social Process", Trist (1950) recognized that the relation of an individual to the social group is "a type of part-whole relation…that depends on the recapitulation of the structure of the whole in the part". Culture is the bridge. *"Culture represents the means, however imperfect, at the disposal of the individual for handling his relationships. On it he depends for making his way among, and with, other members and groups belonging to his society."* (Wilson, Trist et al., 1952)

In the era of full employment after WW II, Trist (1951) studied the formation of an "absence culture" in British coal mines, where "temporary withdrawal" by individuals from work was a function of stress in the person/work relationship *and* the tolerance of a firm based on its need to maintain an enduring employment relationship. By comparison, Trist showed that in a select few mines where restructuring of jobs enhanced the quality of individuals' work experience, absentee rates were so significantly lower that an "absence culture" was virtually non-existent.

The Netherlands Modern STS shares a similar view to Trist's work as stated by Jac Christis that "culture of an organization refers to the subset of fact and value premises that are taken for granted—these 'rules of the game' structure what we feel, think, and do". Furthermore, Niklas Luhmann, one of the most important German sociologists and social theorists of the twentieth century who developed a highly original form of systems theory, refers to these premises as "behavior expectations". Later, Edgar Schein in the USA developed extensive theory on the dynamic relationship between "Organizational Culture and Leadership" (1985)—highlighting the role of leaders in culture creation.

B. Socio-Technical Systems Perspective

The Socio-Technical Systems Perspective is about organizing for work/value creation through development of structures and processes that jointly optimize both the social and technical aspects in an integrated system

The socio-technical concept arose in conjunction with the first of several field projects undertaken by the Tavistock Institute in the coal-mining industry in Britain during postwar reconstruction of industry. What was discovered in the Haighmoor coal mine gave to a first glimpse of the "emergence of a new paradigm of work" where the technological imperative could be disobeyed, with positive economic as well as human results. Under the old paradigm, engineers prescribed whatever organization the new mechanization seemed to require. However, the detailed findings on performance outcomes in the Bamforth and Trist study (1951, 1963) of two very different ways of "organizing" work at similar longwall mining operations indicated there is "organizational choice" in how to structure the social arrangements with any given technology for positive economic and human results.

Based on these coal mining studies, a key tenet of Socio-Technical Systems design became the embedding of many coordination tasks within a multi-skilled primary work group that self-regulates a 'whole' task system—what Trist's Tavistock colleague, Emery referred to as Design Principle 2, with a redistribution of power from traditional roles in the hierarchical, bureaucratic Design Principle 1.

Later, David Herbst (1976), a Norwegian colleague who at one time held a staff position at Tavistock, introduced an even wider variety of organizational alternatives, many of them non-hierarchical, including semi-autonomous work groups, matrix, and network structures. Structural replacement of one narrowly skilled person doing one fractionated task--by the alternative of a multi-skilled work group--was also promoted in the Netherlands Modern STS by Ulbo De Sitter in his (1990) paper "Simple Organizations, Complex Jobs: the Dutch socio-technical approach**"**.

From its origins, the socio-technical concept developed in terms of systems and interdependencies. In terms of open system theory, socio-technical concepts are concerned also with the environment in which an organization does regular commerce in input-output exchanges of materials and products or services. It was significant that Von Bertalanffy's (1950) paper on "Open Systems in Physics and Biology" along with the emergence of cybernetics and the work of Ashby (1956) occurred at the same time that the socio-technical concept was being formulated.

In conjunction with the Norwegian Industrial Democracy project (led by Einar Thorsrud and Fred Emery, 1962-1969), Emery reformulated the interdependence ("goodness of fit") between the technological component and the work relationship structure as *the joint optimization of social and technical (sub)systems* that are *independent* of each other in that the former follows the laws of the physical sciences, while the latter follows the laws of the human sciences and is purposeful. Yet, they are *correlative* in that one requires the other for the *transformation* of an input into an output.

During the 'modern' period of Socio-Technical Systems Design, "amendments" were developed to many of these 'pioneering' and 'classical' concepts and methodologies. One of the most significant innovations was the way the Dutch version of "Modern Sociotechnical Theory" (MST) chose a different way to "see" integral design: "the original socio-technical ideal of integrating social and technical

aspects remains" (van Eijnatten, 1998), but with a different concept of organization "structure". Dutch MST defined work organization as an interacting network of people executing tasks and roles, using technological instrumentation, tools and machines. In the Dutch version of MST, people are therefore the primary "elements" of the system, with technology as "attributes" (in addition to materials and information used as means by the human actors to perform the required operations).

It is significant that the Dutch concept of "Integral Organizational Renewal" (IOR) was developed in the 1970's at a time when economic forces were calling for more flexible production and service delivery. Hence, IOR applied control theory and the work of Ashby to design "a new architecture of structure" for an organization to "improve its controllability under turbulent environmental conditions" (de Sitter, 1990). Design starts with sorting customers into customer/product families with different demands (de Sitter, 1986, 1994). Having streamlined the production structure, IOR then considers the control structure and particularly, the "control capacity" or the ability of people to exercise discretion to reduce "interference" (or variance) in work processes. Control capacity is linked to the human factor by the work of Karasek (1979) whose research has shown that autonomy (control capacity) and workload can be effective predictors of human stress and absenteeism.

Elaboration of this link between the character of work processes and psychological effects has been a key feature of the 'classical' and 'modern' periods of Socio-Technical Systems Design. In their Norwegian projects, Thorsrud and Emery (1969) first wrote of "a limited number of general psychological requirements" of work as principles for task redesign. More broadly, Thorsrud, Emery and colleagues in Norway wanted to build democracy (starting on the shop floor). Democratization of work was supported by "The Norwegian Confederation of Trade Unions" and "Confederation of Norwegian Enterprise" (the business organization) and a new work environment Act (1977).

At the same time, an American mechanical engineer and professor of management who had been a colleague of Emery & Thorsrud in Norway, Lou Davis returned to North America and founded a program at UCLA that over a decade educated thousands of managers, union leaders, academics, and consultants on the principles and techniques of sociotechnical systems design as a key "enabling condition for enhanced Quality of Working Life". As an engineer, Davis (along with his UCLA social psychologist colleague, Taylor; 1972, 1975) was uniquely qualified to address "technology effects on jobs" and effectively asserted that "psychosocial assumptions" are built into production technology. Thus, Davis (and Berniker) advocated for the concept of "technological choice", a requirement that "at least two alternate ways of doing something be provided by the technology designers". With automated process technology, technological choice, in Davis' view, became even more significant.

Automation and use of microelectronics in factory and office equipment were also key after the 1970's in transforming a growing percentage of the workforce into "knowledge workers". The largest growth in employment was in non-routine, unprogrammed tasks, particularly in professional and service work. New work systems were described as "nonlinear" involving multiple, concurrent, non-sequential processes for conversion of data/information inputs to information/knowledge outputs.

This expansion of knowledge work provoked a call for "renewal" of STS Design (Pava, 1986). In the words of Cal Pava, a graduate student of Eric Trist during his professorial tenure at The Wharton School in Pennsylvania, USA: "*The nature of nonlinear work systems impedes conventional STS design."*

C. Socio-Ecological Perspective

The Socio-Ecological Perspective is about understanding both the unity of the organization and its environment as well as their respective underlying dynamics, thereby enabling design of strategies, relationships, and processes for future opportunity.

This concept was announced publicly in a paper that Trist and Emery published in Human Relations (1965a/Vol.III), "The Causal Texture of Organizational Environments" that was born of a series of overlapping case studies *(of large organizations in serious efforts to define new viable missions in international markets)*. As a result of this case study work, Trist and Emery confronted a challenge to develop further their notions of open systems thinking. We were now dealing with cases where the broader environment and its entities -- customers, labor force, legislators etc.—were developing a "connectedness" and changing task environments and input/output exchanges of the organization.

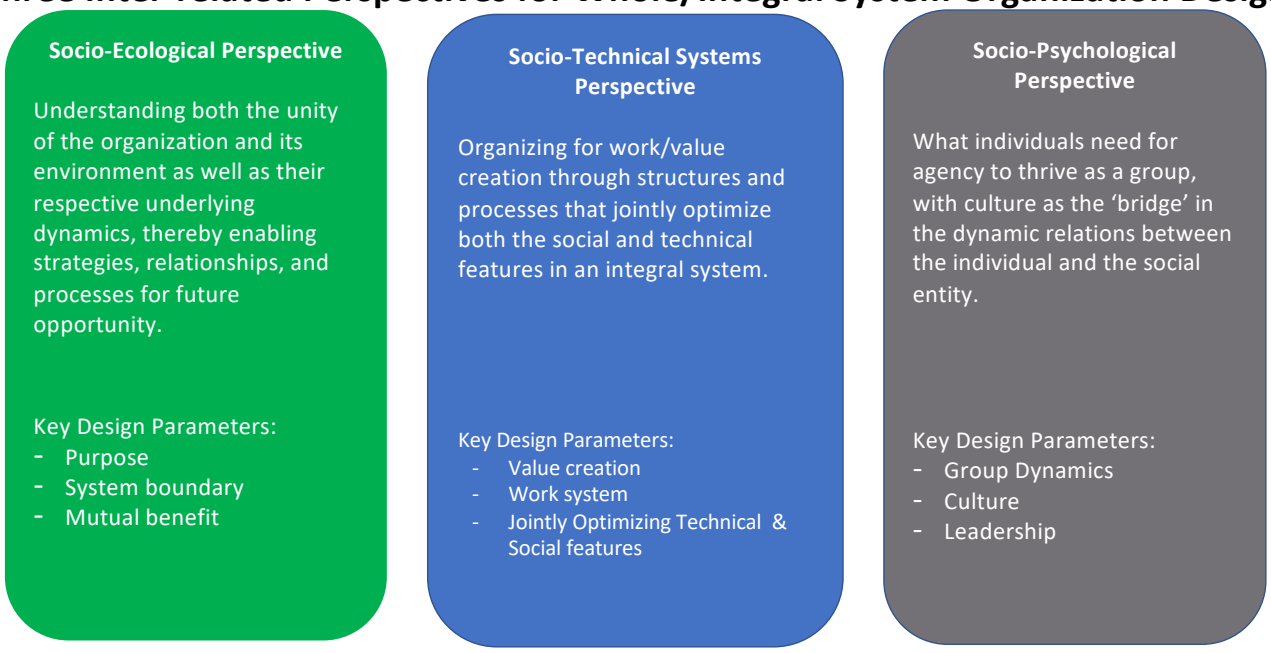
Trist and Emery postulated the existence of environments with four types of "causal texture". As the most complex type of environments, turbulent fields (Type IV) contain dynamic processes that arise from the field itself—the "ground" is in motion. Contributing to the emergence of this (Type IV) causal texture is the growth in size of organizations, so that collectively their actions are strong enough to induce processes in the overall environment. Trist and Emery identified the "deepening interdependence between the economic and other facets of society", with the conclusion that, for all organizations, "these trends mean a gross increase in their area of relevant uncertainty".

Therefore, what becomes precarious under Type IV conditions (turbulence) is organizational stability. In these environments, individual organizations, however large, cannot expect to adapt successfully simply through their own direct actions. However, Emery (1977) identified "indications of a solution" to this challenge—"the emergence of ideals that have overriding significance for all members of the field". Any problem needs to be situated within a larger 'socio-ecology' to understand socio-political and socio-economic dynamics that influence organizations, and then, to develop active adaptation for organizations functioning harmoniously within their ecological systems (M. Emery, 1997, 2000).

Before the close of the 'modern' period of STSD, other conceptual developments presented different visions about a next phase of the socio-ecological perspective in STS Design. Oguz Baburoglu, professor of management and Turkish graduate from The Wharton School conceptualized a Type V "Vortical" environment characterized by stalemate, polarization, and dogmatism (Baburoglu, 1988). By contrast to this rather pessimistic vision of a world out-of-control, Trist (1983) conceived of ecological frameworks ("inter-organizational domains") in which a range of organizations sharing interests in particular societal problems could work together to match the scale and complexity of issues.

Indeed, at the close of the 'modern' period, others were calling for a total "revival" of STS Design. DeSitter (1990) pointed to the need for better integration of the "information aspect". Another Dutchman, Hans Van Beinum (1990) predicted a shift from socio-technical to socio-ecological design. In the USA, Pasmore (1982, 1995) advocated building on Pava's thinking about non-routine work. And, Enid Mumford, British computer scientist and professor of organizational behavior saw "opportunities for a socio-technical revival" in the new millennium when "commercial success in tomorrow's world [will] require motivated work forces (2000). Mumford viewed the most important contribution of STS Design to be its "value system", "the socio-technical principles of quality of life and personal control".

Our Heritage of
Three Inter-related Perspectives for Whole/Integral System Organization Design



Document Version: 18 Date: January 7, 2020.

ACKNOWLEDGEMENTS

This document has been developed in the spirit of the STS Roundtable, a network of business leaders, researchers, trade unionists, academics, managers, consultants, and students—who share the values, theory and practice of sociotechnical systems (STS) design. The STS Roundtable's central purpose is to be an open learning community advancing knowledge and practices that create healthy and powerful organizations and communities. Our 'big idea' is to collaborate on and discover the next generation of organization design technology that can match the speed and dimension of our complex digitized, VUCA world. As long-time members of the STS Roundtable, Carolyn Ordowich and Bert Painter have contributed primary authorship of this document. However, the writing has also been the product of the 'collective intelligence' of colleagues within and outside of the STS Roundtable and in our Global Network for SmarT Organization Design, who have offered insightful comments and substantial improvements for what is still a 'work-in-progress'.

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