Sociotechnical Systems Design

For

Adaptive Enterprises

Prepared For:
Journal of Organizational Development

Authors:
Doug Austrom, Don de Guerre, Helen Maupin, Craig McGee,
Bernard Mohr, Joe Norton, Carolyn Ordowich
STS Roundtable Adaptive Enterprise Team

Sociotechnical Systems Design for Adaptive Enterprises

In 2005, members of the STS Roundtable (STS-RT) began an action research process to reinvent STS. As a participative process, the STS community creates innovation while continuing to preserve the core values and principles of STS. The intent is to find new ways to assist 21st century organization's innovation and adaption in a volatile business environment.

Fundamental changes have occurred in our society. As the co-evolution of political, social, technological, economic and ecological change accelerates, a new way of organizing is emerging identified by the authors as *Adaptive Enterprise Systems.* Socio-technical systems theory and practice is also evolving, and, we believe, becoming a foundation for these Adaptive Enterprise Systems whose emerging characteristics are outlined below.

1. Self-organizing
- Shapes system evolution
- through an emergence and feedback process
- with limited (or no) hierarchy of command and control
- and limited (or no) planning and management

2. Transformational
- Includes single-loop learning (incremental improvements) – Behavior change
- Includes double-loop learning (reframing assumptions) – Belief change
- Includes triple-loop learning (innovation and integration) – Being/identity change

3. Simplicity
- Includes only those critical processes that integrate creating/innovating with conserving/sustaining
- Measured as good enough (excellence is built in with additional iterations)
- Minimally complex and not complicated

In the design and development of an Adaptive Enterprise, simplicity of processes and structures is key for ensuring its rapid response ability. Boundaries are temporary and fluid to encourage continual morphing based on emerging needs, and excellence is measured as 'good enough' to meet immediate needs because those needs could and likely will change next month or next year.

4. Nested Systems
- Simultaneous intervention in all systems (individual, core work system, organization, ecosystem)
- Inclusion from across the nested systems builds agility, resilience and innovation through diversity, requisite variety and interdependence

5. Rapid Prototyping
• Embraces uncertainty and unpredictability
• Integrates familiar STS principles and methodologies such as variance control, incompletion, boundary location, multi-functionality and minimal critical specifications

In traditional organizational design and development, the belief held is "once the experts perfect it, we can implement." Because perfection takes too long and is unrealistic because the world around us is changing at an increasing speed, a new belief of 'good enough' is required. The practice of creating ever-improving iterations (think Apple products) through rapid prototyping of a product/service-offering by a diverse collaborative team marries innovation and optimization, which allows organizations to simultaneously exploit and explore opportunities.

6. Simultaneous exploration and exploitation
• Aligns optimization and innovation processes
• Integrates infinite feedback loops
• Coordinates along three co-occurring horizons
    1st horizon (operational optimization of core businesses)
    2nd horizon (development of new products or businesses with resources attached but not yet matured/optimized)
    3rd horizon (researching seeds of ideas for new businesses)

World markets' increasing speed of change and complexity require 21st century enterprises to strategize on two fronts — surviving and thriving. Survival in the business world implies the removal of rework and errors in all core business systems and processes. The resulting efficiency and effectiveness creates a stable foundation from which the enterprise optimizes its benefits and profit margin. These accrued resources feed and seed developing and new markets enabling the organization's longevity and thrive-ability.

Emergent Themes

The remainder of this paper is organized around the following five themes emerging out of the STS Discovery work:

1. the evolution of the New Normal environment
2. the new STS design context of emergence and engagement at multiple system levels—firm, network, eco-system
3. STS ideals, principles and values relevant to new forms of organizing
4. innovative STS design processes, tools and methods for working with enterprises at each level (firm, network, eco-system)
5. collaborative leadership and governance systems emerging to address the complexity of organizing across all three systems.

1. The New Normal: a Hyper-Turbulent, Global Environment

When Tavistock action researchers developed their view that work system characteristics were socio-technical (Trist & Bamforth, 1951; Emery, 1959), they used von Bertalanffy's (1950) General Systems Theory (GST). While GST described open systems in a constant two-way exchange with the environment, the environment was simply presented as random deviations to which adaptation could easily occur. Envisioning a world where increasing complexity would make adaptation more challenging, Emery & Trist (1965) set out to develop a more complete Open Systems Theory. While socio-technical systems analysis and design helped optimize existing production systems, organizations needed better ways to understand and cope with change.

Emery and Trist defined the environment as a social field consisting of human systems with changing values, expectations and ideals (Emery, 1977). They described organizational environments as causally textured identifying four different types:

- Type 1, "placid random", described a limiting theoretical case that probably never existed with placid referring to stable value systems.
- Type II, "clustered, placid", as the longest-lasting and most adaptive environment (lasting from our early beginnings to about 1790) was characterized by cooperation in and between groups as the dominant way of working together.
- Type III, "disturbed reactive", ushered in by the industrial revolution was characterized by competition between large, virtually identical organizations. Also known as Taylorism (Kanigel, 1997; 2005), it became the dominant form of organizing resulting in widespread mal-adaptations, which continue to undermine our organizations today.
- Type IV, "turbulent environment", in which most people alive today were born and raised. In parallel, another term was coined to describe this turbulent environment – *i*VUCA – which stands for the following:

interconnected	-- the "three degrees of separation" between all people facilitated by technological communication and global social networks
Volatile	-- the nature and dynamics of change and the nature and speed of change forces and change catalysts
Uncertain	-- the lack of predictability, the prospects for surprise and the sense of awareness and understanding of issues and events
Complex	-- the multiplex of forces, the confounding of issues and the chaos and confusion surrounding an organization
Ambiguous	-- the haziness of reality, the potential for misreads and the mixed meanings of conditions; cause and effect confusion

When surprises are the new normal, resilience is the new skill.
Rosabeth Moss Kanter

The STS–RT Discovery Stream's view of this dynamic global environment, in which not only the amount of change but the rate of change continue to increase, is the *New Normal.* We adopted this term to define a range of diverse environmental conditions. The New Normal was initially coined by a thought leadership team at the Pacific Investment Management Company, in reaction to the American economic recession. Since then it has taken on a much broader set of characteristics than its originators intended including –

- "a restructuring of the economic order" from its current fog of uncertainty McKinsey Quarterly (2009)
- a "society without digital limits" (Peter Hinssen, *The New Normal,* 2010)
- a race neutral society
- an environment of climate extremes

and within the context of enterprise design –

- flexible work systems with continuous and rapid adaptation
- "member" alienation, isolation and lack of engagement
- coordination complexities within and across enterprises
- intentional socio-technical networks to achieve shared value creation
- contingent workforce; "free agency" and contract/flexible work
- multiple generations and cultures in the workplace
- greater connectivity and opportunity for direct participation, dialogue & deliberation on the big issues
- manufacturing shift to developing countries
- mistrust of traditional leadership and institutions
- fulfillment of individual potential--passion and purpose as meaningful aims

These changes in the design context require us to think about design very differently.

Organization Design:

1. is no longer about creating effective processes, structures and systems, but about *leading effective designing* (everyone is a designer).
2. is *emergent,* no longer planned, occurring in a rapid adaptive cycle
3. is *ambidextrous* requiring constant managing of the tension between innovation (growth and reorganize) and optimization (optimize and release).
4. occurs *simultaneously across three levels of systems (firms, networks, ecosystems)*.

Emergent Design:

For organization designers, the most important change in assumption arising from this hyper-turbulent, global environment is "emergent order, in which the patterns that form are not controlled by a directing intelligence; they are self-organizing." (Kurtz and Snowden, 2003). This awareness of emergent order and its impact on mainstream

management theory and practice is still in its infancy.

An organization design may simultaneously exhibit directed and emergent order with the intertwine and interaction between each creating the New Normal environment. Kostof (1991) described this well as regards cities – "two primary versions of urban arrangement, the planned and the 'organic' often exist side by side...Most historic towns, and virtually all those of metropolitan size, are puzzles of premeditated and spontaneous segments, variously interlocked or juxtaposed." According to Bolman and Deal (1997), the same thing occurs in organizations where a formal command structure lives side by side with informal trust networks, while simultaneously competing with each other.

This new *context of design* with its dynamic and constantly changing environment requires a new mindset for design. To realize an effective organization in the ordered design context , we achieved renewal of the system by jointly optimizing the social and technical parts through analysis and structured design processes.

For emergent order, the whole is multi-level and can never be the sum of the parts because any act at any system level changes the nature of the whole system. Thus in a turbulent environment, we engage in constant designing of *patterns of emergent order* to stabilize desirable patterns and seed their emergence as well as destabilize undesirable patterns. Designing in this environment is essentially prototyping to make the pattern or potential patterns more visible before action is taken.

2. STS Design at Multiple Levels of System Complexity

A 'society without digital limits' and with a recent explosion of social media has empowered the awareness of large-scale societal issues. People know and can respond immediately to global events half a world away. This interconnectedness brings multiple levels of enterprise – firm, network and ecosystem – into view simultaneously, and requires analysis and understanding for all stakeholders beyond the traditional focus of only the level of system within which they live. "Moving between the three levels is as important as thinking about the context we are 'in' because a move across boundaries requires shifting to a different model of understanding and interpretation including leadership style "(Kurtz and Snowden, 2003).

Articulating and understanding the three levels of systems enables designers to sort out the complex dynamics in the turbulent environment at each level and make effective design decisions.

The three levels of systems and the corresponding patterns we see emerging are:

- the *firm* level of analysis and design as manifested by what we call either a *Vertically-Integrated Centralized Organization* (VICO) or a *Vertically-Integrated Decentralized Organization* (VIDO).
- the *network* level of analysis and design as manifested by what we call a *Value Realization Network* (VRN).

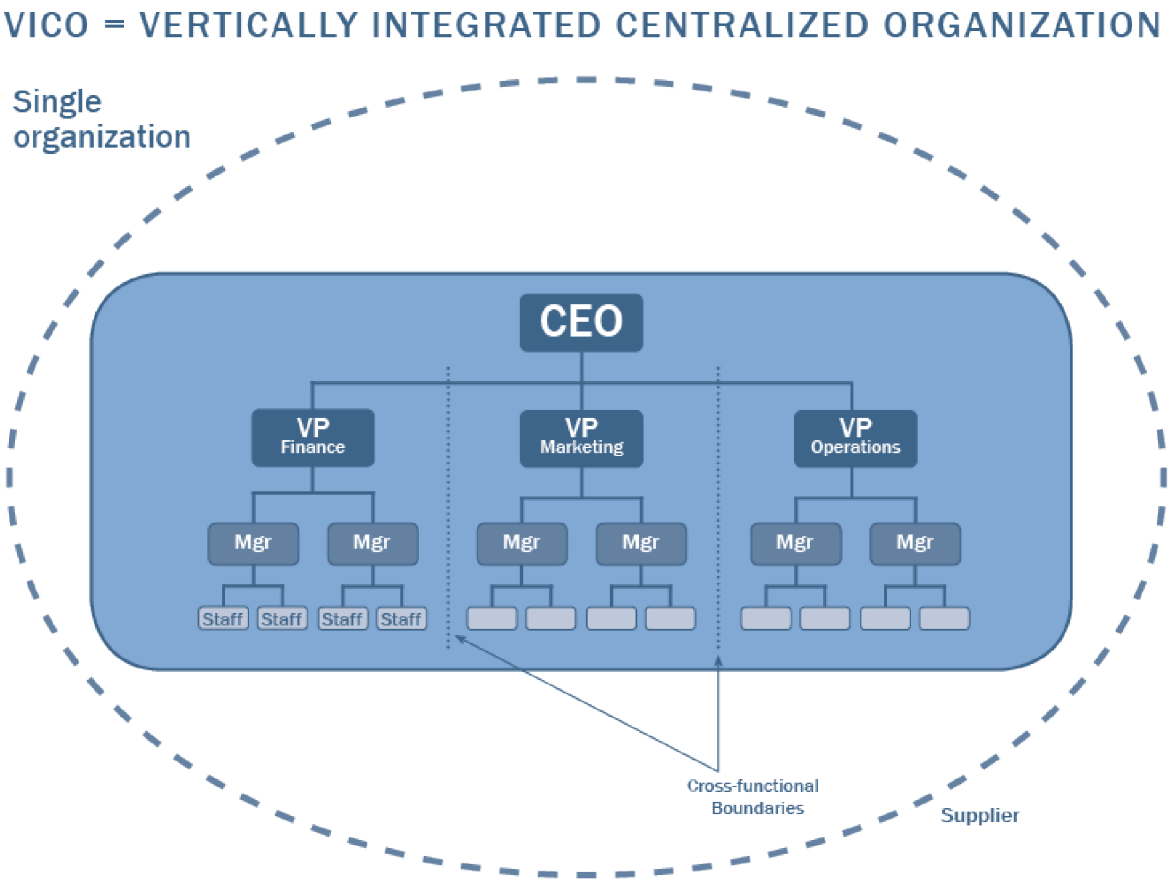
- the *societal (ecosystem)* level of analysis and design as manifested by what we call the *Issue-based Eco-System* (IBES).

These three patterns of organizing are not proposed as a developmental progression where evolving from one to the other is desirable. Rather, the IBES may contain VRN's and VRN's may contain VIDO's. Further, a firm or enterprise may manifest all three patterns. For example, a business unit of General Electric may be considered a VIDO. However, when we include its supply chain and other business partners, that system could be considered a VRN. And when we consider the business unit is involved with developing mini-nuclear reactors designed to address the energy needs of remote communities in developing countries, we see it as an IBES.

Nor are we prescribing these three patterns as ideal organization forms. They are the contexts within which people currently work and have the opportunity to design. In other words our three patterns of organizing (firm, network and ecosystem) may combine into multiple possibilities of "adaptive enterprise" rapidly responding to changing demands of the environment, that is, the tension between optimization (surviving) and adaptation (thriving). These patterns represent the three levels of system analysis within which we find ourselves designing and practicing.

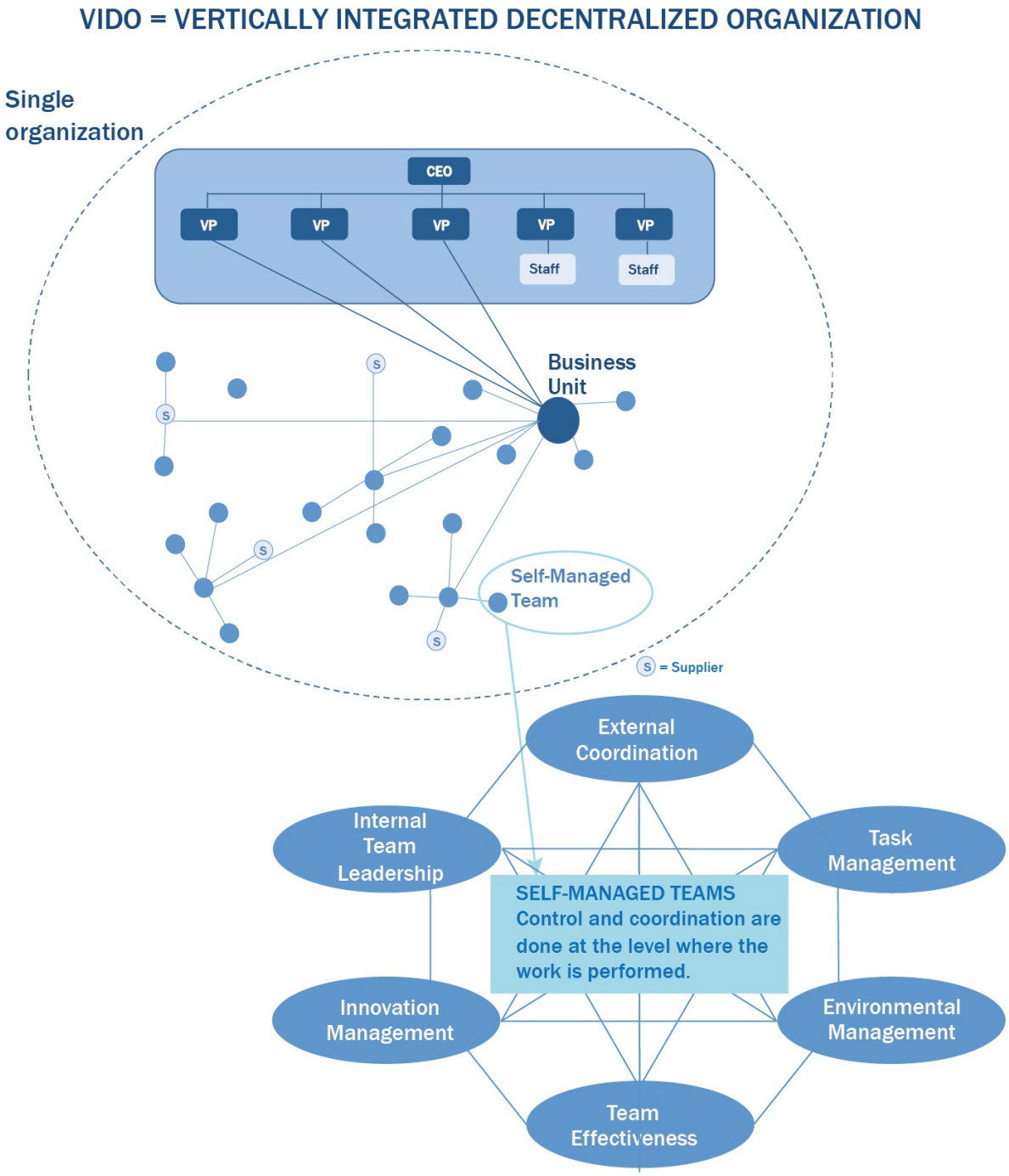
<u>*Firm* Level of Analysis and Design</u>

At the firm level (see images below), we are typically presented with a single enterprise having clearly defined organizational boundaries represented by a either a Vertically-Integrated Centralized Organization (VICO) or a Vertically-Integrated Decentralized Organization (VIDO).



Although more organizations are moving toward team-based and network designs where authority and decision making occur at the point of production and sales, we continue to see the traditional hierarchy of the VICO in many small, medium-sized and large enterprises. VICOs organize around their functions or divisions while maintaining coordination and control over strategy and operations at the very senior levels of the organization (CEO and VP). While standardized output and efficiency means cost savings through economies of scale, creativity and employee empowerment are discouraged. Examples of VICOs in our current marketplace are Revlon, Inc. and Wal-Mart, Inc.

VIDOs or vertically-integrated decentralized organizations can be viewed as a singular enterprise bounded by its core capability with several functions performed by other suppliers. In a VIDO, outsourcing is for cutting costs and taking advantage of some network capabilities. While some form of team is typically the basic unit of organization, the control and coordination given to these teams varies from little to a high degree of self-management. In more effective VIDOs, there may be pockets of collaborative communities using social media to connect internal and external resources.



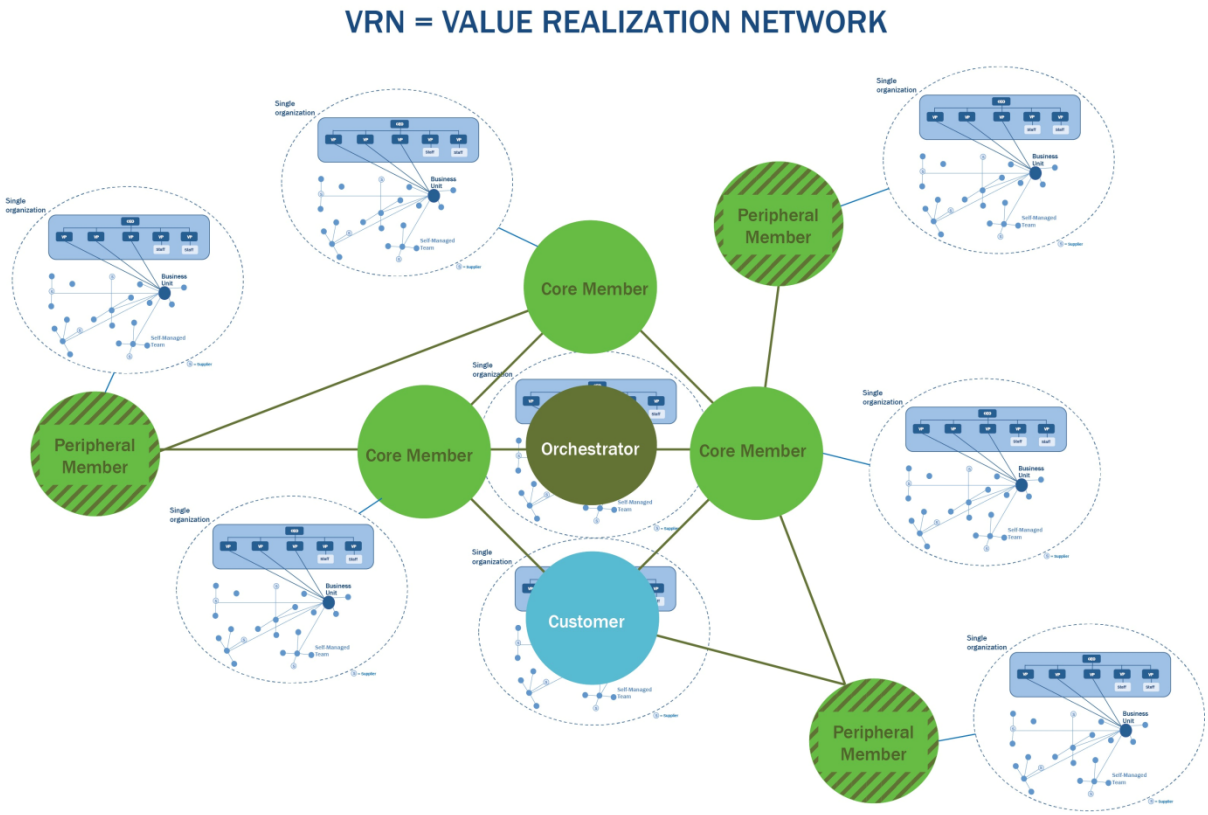
An example of a commercial enterprise emulating the VICO form was Apple (see image below) under Steve Jobs's leadership (Lashinsky 2012). Apple's command and control hierarchy with its infamous and dictatorial leadership relied on unilateral coordination. In other words, Apple set all the standards within which outside suppliers could then choose to participate. The verdict is still out, but if Apple's work groups, under Tim Cook's leadership, begin to reorganize into more autonomous work teams, we could see its emergence into a VIDO.

Source: http://fortunebrainstormtech.files.wordpress.com/2011/08/apple_org_chart_large11.jpg

Network level of Analysis and Design

At the network level, redesign work happens with multiple enterprises maintaining a variety of connections, which provide mutual benefit. We represent this set of relationships as a Value Realization Network (VRN). VRNs range from *linear value chains* to *industry-based* value creation constellations (Ramirez, R. 1999). Multiple entities, both private and public, work together to create value as defined by the customer. VRNs are bound together by a shared value proposition. Members' initial interaction is *divergent* due to different values and points of view, but they rapidly *converge* around clarifying the value proposition. Their convergence is guided by high-level processes, which we named converse, connect, collaborate, co-create, contribute, continue. As the VRN matures, interactions become increasingly nonlinear and dynamic with simultaneous co-creation taking full advantage of network properties. While many entities operate together in this system of partnerships and alliances, an "orchestrator"

takes on the primary coordination role. In more effective VRNs, control is vested in shared values and purpose not just in the role of the orchestrator. Value is created through the interaction of multi-functional roles and knowledge, which is complex to design and coordinate.

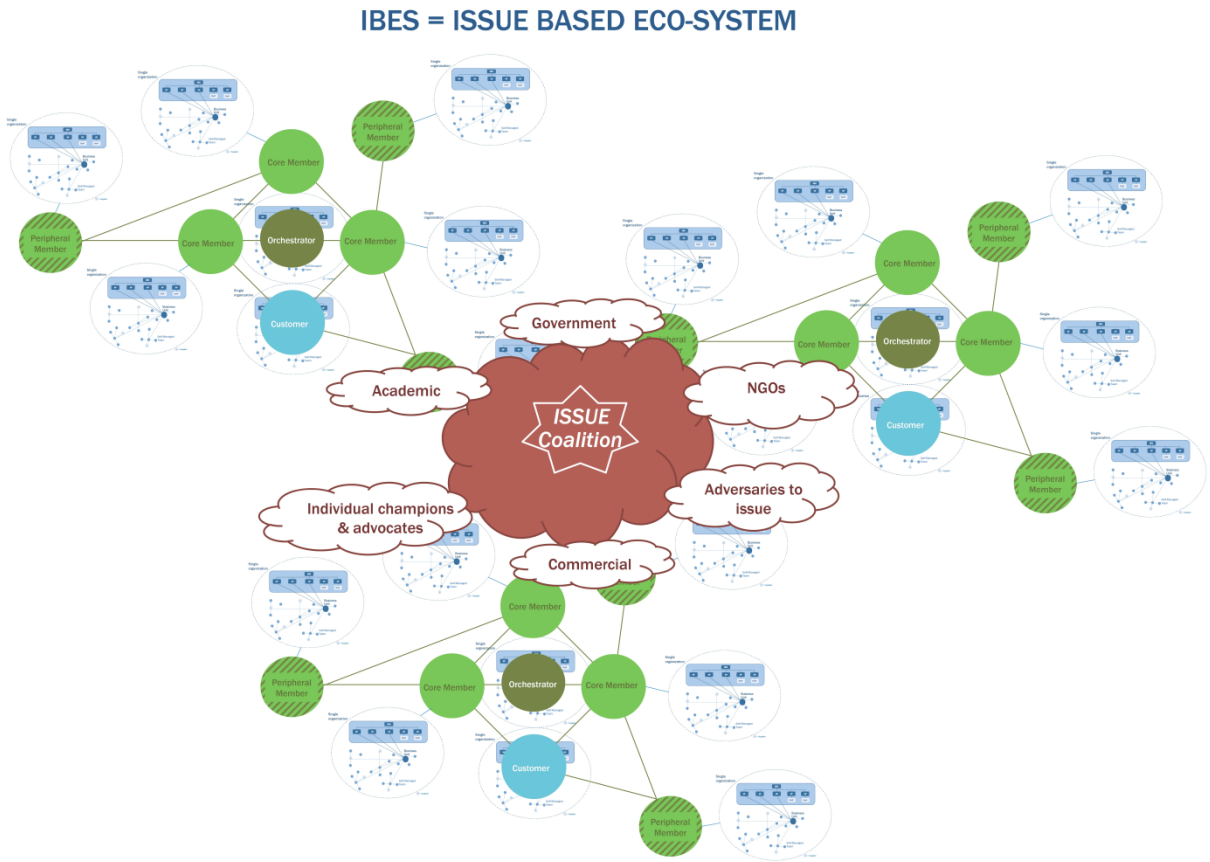


An example of an enterprise formed as a VRN is the Human Brain Project led by Henry Markram (Federal Polytechnic School in Lausanne, Switzerland). This consortium of more than a dozen European institutions received a billion-euro grant to create a full-blown simulation of the human brain. The optimistic outlook for project completion is before the end of this decade.

An example of an emerging VRN is Motorola's Project Ara, which is an open hardware platform for smartphones. Third-party developers create modular phone pieces allowing users to choose only the pieces they want and to customize their smartphones. Motorola serves as the orchestrator or catalyst in this networked approach to open innovation. Although seemingly similar 'value networks' formed around Apple's iPhones, iPad, iPods, iTunes and iBooks, their coordination does not rely on mutual adjustment nor are their outcomes mutually beneficial to all parties internal and external to Apple Inc.

Society or Eco-system level of Analysis and Design

Large societal problems (e.g., elimination of AIDS, providing sustainable energy and food sources to all) are areas of concern for IBES where design work considers the larger eco-system (Emery & Trist 1972, Trist 1976). These "wicked problems" affect every organization and/or person but no one sector (government, corporate, civil society, etc.) working independently can resolve them. An IBES attracts passion, creativity and initiative into self-organizing groups. It forms with the *convergence of shared will* but needs to move to and stay with *divergence* (local autonomy and customization) to arrive at transformational and inspiring solutions. The IBES must 'hold the space' for its divergence to generate exceptional solutions satisfying multiple stakeholder needs. This requires more complex social and technical capabilities, thereby making the IBES the most complex form of adaptive enterprise to design and coordinate. Issue resolution at this societal scale requires a temporary coordinating structure (e.g., an issue coalition). The IBES addresses issues and ideals rather than profit, but at some point these ideals need to be monetized through VRNs, VIDOs and/or individuals to become viable in the economic context.



An example of an emerging IBES is the partnership between the Ulbo de Sitter Institute and the Socio-technical Systems Roundtable (STS-RT). This global network of individual practitioners, academia and commercial enterprises share a common interest applying STS principles and practices in creating more humane and healthy organizations.

As of October 2013, a second example of an emerging IBES is The Equitable Food Initiative (EFI), which was initially formed as a VRN. In the EFI's efforts to bring together farm workers, growers and retailers, the bigger challenge of coordinating food safety, pesticide management and improved working conditions attracted the involvement and support of Oxfam International—a confederation of 17 organizations building a future free from the injustice of poverty; one of the world's largest social and ecological issues.

When considering these three levels of analysis, organization design work brings different aspects of value to each level. At the firm level, design or redesign helps organizations optimize technology and work processes. High participation team-based structures are common design elements, which enable organizations to control the most predictable variances in their bounded system. At the network level, design helps organizations develop broader, more effective networks of partners/collaborators. Having this broad network creates greater ability to respond to more dramatic shifts in markets and technologies. Lastly, at the society level, design helps create broad coalitions, which develop greater conversation competencies and create large communities with shared values and ideas. These broad-based communities have greater capacity to identify and mitigate large social and ecological issues.

3. STS Ideals, Values & Design Principles in the New Normal

> *In the period 1945–1953, a series of events undermined the two key assumptions that had governed the acceptance of hierarchical domination of the people by the state. The extraordinary levels of production achieved during World War II destroyed the assumption that government control was required to guarantee the equitable distribution of scarce resources. The dropping of the A bombs on Japan, followed by the development of thermonuclear weapons and the MAD (mutually assured destruction) strategy of the Cold War, was more than sufficient to convince the global population that the assumption that the state guaranteed their security was untrue.* **M. Emery 2000**

Once people no longer accepted these long-held assumptions about domination and security, their beliefs and values began to change. The traditional value systems that sprang from the acceptance of hierarchical domination were rejected and people sought self-actualization in new belief and value systems. As noted by Thomas Berry (1978), we were then and are now "between stories." Our contemporaries are still trying to work out a new set of values to be agreed upon, and it is this process that creates the 'relevant uncertainty' we now refer to as the New Normal.

Nonetheless, Daniel Pink's popular statement below suggests STS ideals and principles for work design are becoming mainstream:

> *Stop treating people like horses and start treating them like human beings. Instead of trying to bribe folks with sweeter carrots or threaten them with sharper sticks, how about giving them greater freedom at work, allowing them to get better at something they love, and infusing the workplace with a sense of purpose? If we tap that third drive more fully, we can rejuvenate our businesses and remake our world.* Pink 2010

As Porter and Kramer (2011) noted, "The opportunity to create economic value through creating societal value will be one of the most powerful forces driving growth in the global economy." STS practitioners typically accomplished this through the collaborative process of action research.

Action research has been the foundation of Socio-technical Systems (STS) theory and practice since the 1950s work of Trist and Emery in British coalmines. As a co-learning or "learning-by-doing" process, those involved act to:

> *... contribute both to the practical concerns of people in an immediate problematic situation and to further the goals of social science simultaneously. . . . [This] dual commitment . . . to study a system and concurrently to collaborate with members of the system in changing it . . . requires the active collaboration of researcher and client, and thus it stresses the importance of co-learning as a primary aspect of the research process".* Gilmore, Krantz & Ramirez 1986

Inherent in the action research of STS analysis and design is the recognition that all members of the system have a stake in its goals and purposes. Thus effective 'organizational' design considers the quality of work life, enterprise objectives and environmental realities. To balance these multiple needs, STS analysis and design traditionally employed a common set of design principles and values, which improved quality of work life, productivity and sustainability.

However, as the *i*VUCA world came to be the New Normal, changing realities within our global environment triggered a ripple effect of reflection and reinvention relative to design contexts, principles and values.

Subsequent reviews of the extensive literature resulted in what we believe to be the key principles and values relevant to our current practice. We are in agreement with Emery (1976) that ideals are more enduring than values, which are currently shifting. In our design work and action research interventions, the following set of ideals, values and design principles are common across settings and applicable at all three levels of system complexity (firm, network, society/ecosystem):

STS Ideals: Emery (1976)

- Humanity (dignity/spirituality)
- Community (dialogue/relationship)
- Meaning (purpose/nurturance)
- Beauty (collective creativity/participative democracy)

STS Values:

- *human* dignity, meaning and community
- co-creation of our future
- a healthy and beautiful planet
- a healthy and just economy

STS Principles:

- Compatibility of designing, transitioning and end-state
- Joint-optimization of all systems—social, technical, environmental
- Timely information flowing first to the primary task/user
- Ongoing prototyping and redesign
- People doing the work design the enterprise
- Build on individual and collective strengths
- Conscious choice among multiple options
- Collaborative decision making (no design is imposed)
- Shared understanding and purpose

4. STS Innovative Design Processes, Tools and Methods

As mentioned previously, the New Normal generated three new "design contexts" at the firm, network and societal/ecosystem levels. Each of these levels (design contexts) presents new challenges and opportunities. We further suggest each level has different value propositions, high leverage design elements, processes and methods including specific analysis and design tools. While grounded in open socio-technical systems theory, we also integrated design thinking, appreciative inquiry and other perspectives to develop new design processes, tools and methods.

VIDO Design Context

At the firm or VIDO level, 'what gets designed' include the core work processes, management and compliance systems, and information flows. Alongside traditional STS tools such as variance analysis and key variance control, one also finds business process mapping, statistical tools and rapid prototyping as the methodologies for analysis and design.

VRN Design Context

At the network level, designers work with multiple enterprises (private and public) to create value as defined by the customer. This binds the VRN together through a commonly held value proposition. The focus of 'what gets designed' shifts toward defining shared value proposition, clarifying governance processes, developing network member capabilities, developing information capital, improving working relationships, and creating the right leadership paradigm. Our rich heritage of STS Design Principles and Deliberation Design methodology are complemented at this level by approaches such as Appreciative Inquiry (Watkins, Mohr, et. al. 2011), Two-stage Search Conference

(Emery 1999), Human Centered Design (Brown 2009), and Value Network and Social Network Analysis (Allee 2008).

IBES Design Context

At the broadest level of analysis, the IBES, large societal problems (e.g., global coordination of responses to pandemics) are the areas of concern. Because these "wicked problems" affect everyone, but no one sector working independently can resolve them, what gets designed focuses on processes for -- 1) creating productive dialogue across time and space and 2) building community. The broadly divergent stakeholder groups with widely differing values, competencies, and interests must each be given voice and productively engaged. The approaches utilized to bring this disparate set of constituencies together include Search Conferencing, Scenario Planning, Open Space Technology, Innovation Summits, Innovation Studios and Appreciative Inquiry (Holman, P., Devane, T., and Cady, S. 2007).

As a theory in the 1960s for understanding organization design, *open socio-technical systems* (Emery 2000) was ahead of its time. Trist (1979b) discussed early examples of emerging organizations and inter-organizational domains (networks/eco-systems) for the 21st Century. He foresaw democratized organizations with a high quality of working life and international controls. At the eco-system level, he envisioned the emerging appreciation of meta-societal issues, interdependent objectives and collaborating interests.

Following in Trist's footsteps, Cal Pava (1983) developed an STS methodology (Deliberation Design) for the nonlinear work that was then emerging in the environment. Our more recent discovery echoes Pava's work -- the key unit of analysis shared in common by all three system levels (firm, network, society/ecosystem) is *deliberation* (reflective and communicative behaviors concerning a particular topic).

5. The Missing Design Variable: Collaborative Leadership Systems

One of the most important challenges confronting adaptive enterprises is designing the coordination processes and roles for leadership to operate effectively in the New Normal.

Historically, leadership received relatively little, if any, attention in the field of socio-technical systems design because it was typically linked with the bureaucratic-technocratic paradigm of "command and control" (Perlmutter and Trist, 1986; Austrom and Lad, 1989). This hierarchical and unilateral approach to coordination was anathema to the STS principles and practices of self-management and self-organization.

Since we define the core purpose of leadership as *building the collective capacity to produce outcomes that matter – people, purpose, prosperity and the planet* (adapted from Anderson, 2002) leadership does not need to be solely a function of hierarchical position, title, or formal organizational authority. Nor does leadership need to be the purview of

the few. Arguably, the adaptive capacity of an enterprise would be enhanced if leadership was collaborative, co-creative and widely distributed. Contrary to the notion to promote and design leader-less organizations (Brafman and Beckstrom 2005), the authors believe the New Normal requires the design of leader-**ful** organizations embodying a culture of shared or distributed leadership (Ancona 2005, Gronn 2002, Senge 1996). By shared leadership, we mean organizations comprised of many people throughout the enterprise who are willing and able to –

- build collective capacity by
- working collaboratively across functions internally and across boundaries externally (organizational, sectoral, geographic, and cultural) to
- continuously adapt within the New Normal environment.

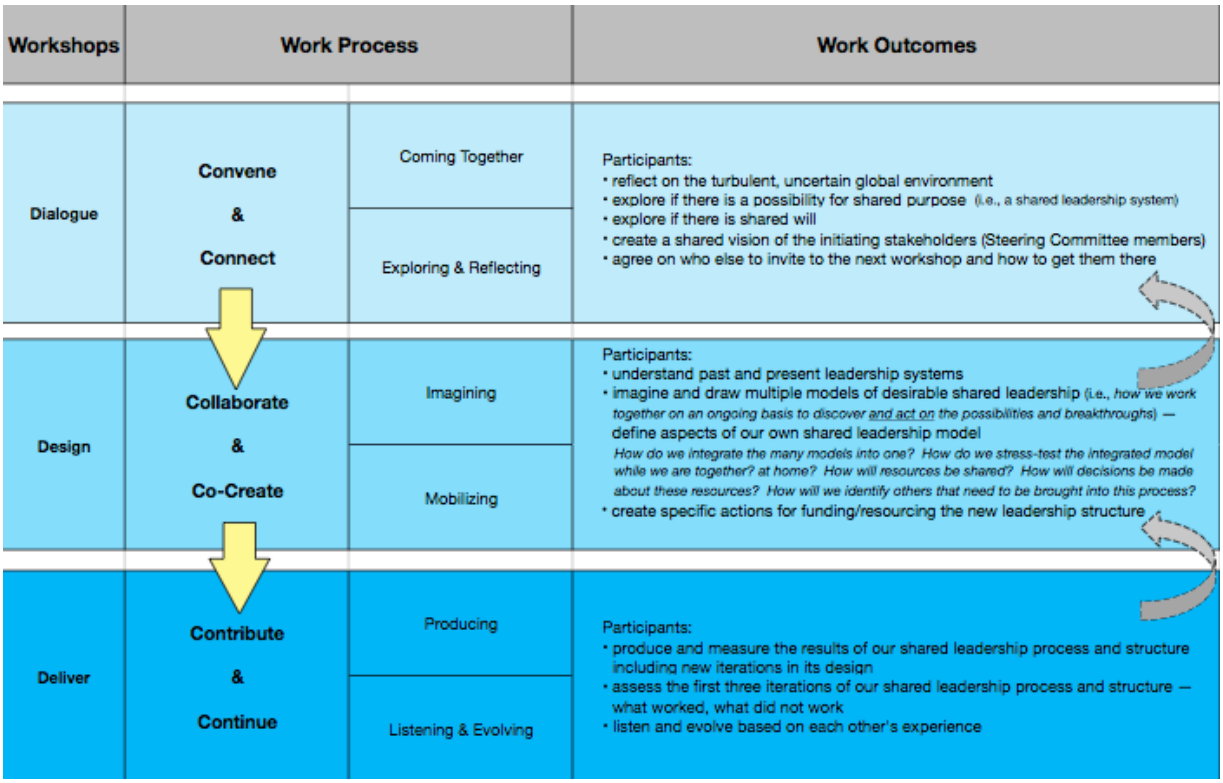
The following design challenges need addressing:

- Designing the appropriate co-creation and coordination processes and roles—the leadership system for a self-managed, self-organized and self-designed enterprise.
- Discerning the co-creation competencies individuals will need to be effective at all three levels of complexity—firm, network, and society/ecosystem.
- Developing and implementing a co-creation strategy for building the deep talent pool necessitated by a co-creative, collaborative model.

To address these design challenges, we outline below our *emergent collaborative leadership system,* which we believe builds the adaptive capacity of an enterprise at all levels of system complexity.

Important to note here is the STS assumption that leadership/co-creation is (and needs to be) distributed throughout the organization and is already occurring on a daily basis at all levels, albeit based in some very traditional views.

<u>6 Cs Process for Designing Co-creative Collaborative Leadership Systems:</u>



In Conclusion

By igniting the dialogue and forging new partnerships to increase understanding of this New Normal in which we find ourselves living and working, we are constructing the bridge between practice and theory. By building on a long history of open socio-technical systems design, we are collaboratively evolving both the practice of designing happy, healthy, humane workplaces and the theory of STS.

Through these means, we are coalescing into a community of practice and co-creating the futures our forbearers in Tavistock, Oslo, Melbourne and Los Angeles knew were possible. These interesting and complex times are a blessing as are the passions uniting us on this "discovery journey." Focusing on these passions is where our collaborations merge capabilities.

References:

Allee, Verna. 2008. Value Network Analysis and value conversion of tangible and intangible assets. *Journal of Intellectual Capital Volume 9, No. 1, pp. 5-24*.

Ancona, D. 2005. Leadership in an Age of Uncertainty: Research Brief, Cambridge, MA: MIT Leadership Center.

Anderson, Robert. 2002. Personal communication.

Austrom , D. and Lad, L. (1989). Issues management alliances: new responses, new values, and new logics, In J. Post (Ed.) *Research in Corporate Social Performance and Policy, 11,* Greenwich, CT: JAI Press.

Berry, T. 1978. *Comments on the Origin, Identification and Transmission of Values*. Anima Winter.

Bolman, L. and T. Deal. 1997. *Reframing Organizations,* Jossey-Bass.

Brafman, O. and Beckstrom, R. 2005. *The Starfish and the Spider: The Unstoppable Power of Leaderless Organizations*, New York: Portfolio.

Brown, Tim. 2009. *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation,* New York, Harper Collins.

Cherns A. B. 1976. *Principles of Socio-Technical Design*, Human Relations, 29, pp.783-92.

Emery, F. E. 1959. *Characteristics of Socio-Technical Systems: The Emergence of a New Paradigm of Work*, Canberra, ANU/CCE.

Emery, F. E. 1976. *In Pursuit of Ideals*. Canberra, ANU/CCE.

Emery, F. E. 1977. *Futures We Are In.* Leiden, Martinus Nijhoff.

Emery, M. 1999. *Searching: The theory and practice of making cultural change*. Philadelphia: John Benjamins**.**

Emery, M. 2000. *The Current Version of Emery's Open Systems Theory*, Systemic Practice and Action Research (13:5), pp.685-703.

Emery, F. E. and E. L. Trist. 1965. The Causal Texture of Organizational Environments. *Human Relations* **18**: 21-32.

Emery, F. E. and E. L. Trist. 1972. Towards a Social Ecology: Appreciation of the future in the present. New York, Plenum Press.

Gronn, P. 2002. Distributed leadership as a unit of analysis. *The Leadership Quarterly*, 13 (4), 423-451.

Hawken, Paul. 2007. *Blessed Unrest: How the Largest Movement in the World Came into Being and Why No One Saw It Coming* (New York: Viking). UFPPC (www.ufppc.org) Digging Deeper Xl @ Mandolin Café (Tacoma, WA) February 4, 2008, 7:00 p.m.

Holman, P., Devane T. and Cady, S. H. 2007. *The Change Handbook: The Definitive Resource on Today's Best Methods for Engaging Whole Systems 2nd Edition*. San Francisco, Berret-Koehler.

Kail, Eric G. Col. 2010. *Leading in a VUCA Environment: V is for Volatility,* HBR Blog Network, November 3. (http://blogs.hbr.org/frontline-leadership/2010/11/leading-in-a-vuca-environment.html)

Kanigel, R. 1997. *The One Best Way: Frederick Winslow Taylor and the Enigma of Efficiency*. New York, Hudson. Reprinted by MIT Press in 2005.

Kostof, S. 1991. *The City Shaped: Urban Patterns and Meanings through History.* Bulfinch.

Kurtz, C. F. and D. J. Snowden. 2003. The New Dynamics of Strategy – sense-making in a complex-complicated world. *IBM Systems Journal*, Fall 2003.

Ordowich, Carolyn; Painter, Bert; & Posey, Pam. 2007. *Using Action Research to Promote New STS Theory & Practice,* Paper Presentation for International Action Research Conference, Oslo, Norway, September (with Barry Bateman, Craig McGee, Betsy Merck and Stu Winby).
http://moderntimesworkplace.com/good_reading/UsingActionResearch.Oslo.07.v2.pdf

Painter, Bert. 2009. *STS Theory -- From the Industrial to the Knowledge Age,* May. (http://www.moderntimesworkplace.com/good_reading/GRWorkRed/STS_Theory_-_From_Industrial_To_Knowledge_Age.pdf)

Pava, C. 1983. *Managing New Office Technology: An Organizational Strategy.* New York: The Free Press.

Perlmutter, H. and Trist, E. 1986. Paradigms for societal transition, *Human Relations, 39.* 1-27.

Ramirez, Raphael. 1999. Value Co-production: Intellectual Origins and Implications for Practice and Research. Strategic Management. Journal, 20: 49–65.

Senge, P. 1996. Leading Learning Organizations: The Bold, the Powerful, and the Invisible. In F. Hesselbein, et al., *The Leader of the Future*. San Francisco: Jossey-Bass.

STS-RT Discovery Sub-Team (Doug Austrom, Don De Guerre, Bob Laliberte, Helen Maupin, Bernard Mohr and Carolyn Ordowich), 2011. Designing the Adaptive Enterprise. Presentation at the Annual Meeting of the Sociotechnical Systems Roundtable, New Orleans, September.

Trist, E. L. 1976. A concept of organizational ecology. Australian Journal of Management 2(2): 161-175.

Trist, E. 1979. New directions of hope: Recent innovations interconnecting organizational, industrial, community and personal development. *Regional Studies, 13,* 439-451.

Trist, Eric. 1979b. New directions of hope: Recent innovations interconnecting organizational, industrial, community and personal development, *Regional Studies*, 13: 5, 439-451.

Trist, E. 1981. *The Evolution of Socio-Technical Systems: A Conceptual Framework and an Action Research Program*, Ontario Quality of Working Life Center, Ontario Ministry of Labour.

Trist, E. 1983. Referent organizations and the development of inter-organizational domains. *Human Relations*, 36: 269-84.

Trist, E., and Bamforth, W., (1951) Some Social and Psychological Consequences of the Long Wall Method of Coal-Getting, *Human Relations*, 4, 3-38.

Trist, Eric; Higgin, Garth; Murray, Hugh; & Pollock, Alexander. 1963. *The Assumption of Ordinariness as a Denial Mechanism—Innovation and Conflict in a Coal Mine* (shortened rewrite of Chapters 19-22 in Trist et al. *Organizational Choice,* London, Tavistock Publications. (http://moderntimesworkplace.com/archives/archives.html)

von Bertalanffy, L. 1950. An Outline of General Systems Theory. *British Journal for the Philosophy of Science, 1950*. Accessed January 6, 2012 from psycnet.apa.org

Watkins, Jane Magruder, Mohr, Bernard J., and Kelly Ralph. 2011. *Appreciative Inquiry: Change at the Speed of Imagination*, 2nd Edition. New York, Pfeiffer.

The two presentation slides that accompany this article can be found on STS Roundtable (STS-RT) website or on the Organization Design Forum website where they are listed as concurrent sessions: 1) **Adaptive Enterprises at the Edge of Design – An Emerging Concept for Designing Presented by Helen Maupin** (Right to Joy) **& Carolyn Ordowich** (STS Associates, Inc) Maupin Ordowich 2012 Conference Presentation (pdf); 2) **Adaptive Enterprises at the Edge of Design – Tools, Methods, & Processes for Designing in the New Normal by Don de Guerre** (Concordia University) **& Bernard Mohr** (Innovation Partners Intl.) 2012 Conference deGuerre Mohr Presentation (pdf).