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"Leadership as an Emergent Phenomenon: A Framework for Complexity and Adaptability"

Cognitive and Social Issues
Assessment Tools and Metrics

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A Framework for Complexity and Adaptability”

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The recognition by some military leaders about the need for a different paradigm of leadership that responds to requirements for adaptability in complex environments has not necessarily translated into action. Existing organizational structures and processes which explicitly and tacitly support current ways of thinking and patterns of behavior often present obstacles to transformation. Nevertheless, changing the framework, structure, and processes in and by which a new generation of leaders are developed is a critical component of the current military cultural transformation.

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Introduction

Many strategic military and civilian leaders recognize that the challenges of maintaining US National Security are qualitatively different today than they were twenty five years ago. As they respond to present challenges and prepare for future ones, they are articulating new requirements for sustaining the nation's competitive advantage. For example, the Chairman of the Joint Chiefs of Staff General Myers in the National Military Strategy of the US in 2004 emphasized the intellectual and cultural adjustments required for transformation and the necessity for collaboration among our joint forces, agencies at all levels of government and multinational partners. This leader and others recognize that advances in information technology allow individuals with relatively few resources to acquire and diffuse information and knowledge to influence populations from whom they are separated in space. Technology has helped unleash the forces of globalization to create a world where ideas, human and financial capital, and goods travel almost without regard for national borders. These dynamics have both positive and negative effects. We frequently refer to the reality of asymmetric conflict in which non-state actors with few resources can threaten technologically sophisticated and powerful nations. The interdependencies of global societies and accelerated change have exponentially increased the complexity and uncertainty of our environment and emphasized the lack of predictability about the outcome of our actions. This paper argues that accelerated change, uncertainty, and complexity in our national security environment demand a new perspective, even a different paradigm, of effective leadership and the development of capacity in this domain. This paper integrates three theoretical perspectives – complexity theory (sometimes referred to as an emergent perspective of phenomena), constructive development theory, and organizational learning to propose a new paradigm of effective leadership and leadership development in the DoD compatible with the tenets of network enabled operations. We include a description of specific capabilities, mind-sets, and behaviors responsive to 21st century challenges and a proposed pilot research project incorporating this perspective.

The common conceptualization of leadership is that in which the authority to lead is primarily vested in an individual whom we assume has the ability to predict, plan and control outcomes. The desirable attributes of the leader associated with this model are based on assumptions of a linear relationship between organizational design, strategy, human behavior, and the desirable outcome of organizational effectiveness; however, these expectations do not conform to non-linear world in which we live. This conventional perspective views one of the major functions of a leader as designing the organization, planning the strategy, and hiring the 'right' people to effect specific performance outcomes, without regard to the possible effects of the interaction and mutual influence among many agents within the organization and throughout the larger system of systems in which the organization operates, frustrating expectations of simple cause-effect relationships. In effect, leaders are viewed as either heroes, in the case of organizational effectiveness, or scapegoats when the outcome is failure, without consideration of the emergent properties of the complexity. (Plowman & Duchon, 2007)

In the dynamics of non-linear systems the strength of an influence or the force of a motion on a system is not necessarily proportional to its impact. A relatively small cause could potentially have a very large effect. Many other characteristics of complex social systems enhance or defy our conventional and mechanistic assumptions about the dynamics of organizations and societies.

Complexity theory, emergent phenomena and their potential contributions to leadership art and practice in the DOD

An emergent perspective (a scientific paradigm and body of knowledge sometimes referred to as complexity science) offers insight and knowledge to ground a new perspective on leadership that is more consistent with what we presently understand about the dynamics of the natural and social world. This knowledge is particularly useful for developing capability for adaptability at individual, group, and organizational levels and, directly related to this capability, the ability to understand and encourage transformation within our institutions. A discussion of the emergent perspective is pertinent because some of the key concepts and processes grounding Network Centric Operations (NCO) theory draw from this body of knowledge. ADM Cebrowski in describing Network Centric Warfare (NCW) as the "capstone concept" for the U.S. Navy after Next in his keynote address to the Royal United Services Institution (RUSI) conference in 2000 made explicit references to ideas developed and coalesced in research and dialogue at the Santa Fe Institute,[1] e.g., describing "information-based" warfare as less deterministic and more emergent, more behavioral than physical, and focused on interactions (Moffat, 2003). These foundations of NCO theory in an emergent perspective are not well understood or even transparent to many advocating NCO and using this approach. Further, network-centric based systems permitted by advanced communication and imaging technology currently in use in operations have supported the practice of a less hierarchical distribution of decision-making.

The DoD already makes reference to this approach in documents, e.g., Joint Capstone Concepts of 2005 which refers to the DoD, adversaries, and the environment as complex adaptive systems; and the United States Army Commander's Appreciation and Campaign Design, TRADOC Pamphlet 525-5-500, version 1.0, January 2008, which incorporates the concept of complex adaptive systems, describes non-linearity, recommends approaching problems in a holistic way rather than using a reductive approach to understanding, emphasizes learning and adaptation, and even refers to distributed, non-centralized direction citing Holland (1995), one of the significant scholars in the development of emergent phenomena. Also, one could consider the operational concept of Commander's Intent, described in FM 6-0 Mission Command: Command and Control of Army Forces, as an example of leveraging network centric concepts in that once the intent of the mission is understood at all levels of hierarchy, it can be operationalized and even modified contingent on environment changes to accomplish the expressed mission. Many publications of the Command and Control

[1] In 1984, prominent physicists, including Murray Gell-Mann and David Pines, founded the Santa Fe Institute to generate and focus trans-disciplinary inquiry into complex adaptive systems and emergent phenomena in physical, biological, and social systems.

Research Project's (CCRP) reflect an understanding of complexity and chaos theory and further illustrate how these theories undergird many of the important concepts of network centric operations (NCO). However, even though there are examples of principles from an emergent perspective in DoD research, doctrine, and operations, there remains a need to better understand the relationship between NCO and complexity theory and well as more exploration into the social and cognitive domains of NCO in order to offer valuable insight and guidance to practitioners and a to create a firm foundation from which to innovate. In summary, there are critically important implications of an emergent perspective for leadership and leadership development, in general, and within the DOD. This paper intends to address this need by outlining an approach to explore theoretically and more concretely the implications of complex adaptive systems for effective leadership.

In this community of researchers and practitioners exploring military organizations, when we use the language of adaptation, non-linearity, self-organization, learning, innovation, resilience, and organizations operating at the 'edge of chaos,' we participate in the translation of knowledge originating in the natural science for application relating to social systems and, more specifically, to military organizations. When James Gleick's book, *Chaos: Making a new Science* appeared in 1987, the scientific perspective of complexity was already known among practitioners in the physical sciences where the emergent perspective was originally explored. Upon the publication of this book, written for consumption outside the scientific world, social scientists recognized that this perspective of reality could offer opportunities for deeper understanding of social systems. The importance of learning and the origins of innovation were subjects that interested both organizational scholars and managers alike. Questions revolving around how to structure and design organizations that could support agility and adaptability were of strategic significance. Evidence that interactions and the dynamics of complexity are origins of new knowledge, diversity, and innovation was an exciting advancement for organizations struggling to survive and compete in a fast-paced and highly interrelated global environment.

Complexity theory is the study of both natural and social complex systems in which order and coherence emerge as a outcome of the interaction of multiple entities (whether they be proteins, cells, individuals, organizations, or societies) . Whereas stable systems (i.e., those in which which a small change in initial conditions cause correspondingly small effects) do not embody the uncertainty of less stable ones, they are not sufficiently dynamic to produce the diversity required for resilience and innovation in the system. Belgian physicist, chemist, and Nobel Laureate Prigogine (1997) describes non-equilibrium systems in chemistry "which may evolve spontaneously to states of *increased complexity*" (p 64). The capacity to acquire new properties and adopt new structures distinguishes 'far-from-equilibrium' systems from near-equilibrium systems. As the ability to adapt to the environment and maintain resiliency in the face of perturbations, as well as the capacity for innovation, are recognized to be important for survival and advantage in social systems, this capacity to acquire new properties becomes strategic. Many believe the 'far-from-equilibrium' states are the source of diversity and innovation in both natural and social systems.

Biebracher, Nicolis, and Schuster (1995) assert the superiority of self-organizing systems with examples from biology where it is the mechanism by which complex products are formed characterized by “unsurpassed accuracy, efficiency, and speed.” Unlike central management, “[S]elf-organizing systems allows adaptation to the prevailing environment, i.e., they react to changes in the environment with a thermodynamic response which makes the systems extraordinarily flexible and robust against perturbations from outside conditions.”

As we consider the borderline and differences between stable and unstable systems or between near-equilibrium and ‘far-from-equilibrium’ systems, the distance from equilibrium emerges as an important variable. A system is stable until it reaches a critical threshold on a path between near-equilibrium and far-from-equilibrium called the point of bifurcation when the system crosses the boundary to a landscape of different attractors available to the system. Attractors are trajectories acting like gravitational pulls to attract systems to their orbit. A class of attractors, strange attractors, especially interest those studying complex adaptive systems because they represent systems whose behavior is non-linear and never repeated itself. Prigogine calls this class of systems ‘dissipative’ when it reaches the bifurcation point. It is an unstable system until it ‘chooses’ to fluctuate to one of the alternative attractors to regain its stability. See Figure 1. In moving to a different trajectory from instability, the system self-organizes to realize some degree of learning, innovation, and even transformation. Strange attractors have a capacity to change in that they can grow or diminish to a larger or smaller range of behaviors or they can change its appearance. Through this process new levels of order spontaneously emerge in non-equilibrium systems resulting in greater system capacity.

While those holding conventional views of social systems view this instability and these fluctuations as undesirable, leaders understanding that these ‘far from equilibrium’ states can generate learning and new order for the system productively support emergence in this process. Equilibrium-biased systems and their ‘chosen’ leadership attractors tend to limit the system’s consumption of energy (information). When external stimuli enter the stable system, the system applies controlling mechanisms (negative feedback) to diminish the impact of the stimuli in order to encourage the system to return to stability. Moving from a paradigm of leaders who predict and control for specific outcomes to those that appreciate the generative potential of instability, the question is how does leadership support the potential for learning and the realization of transformation. Continuing with the complexity metaphor, we consider attractors in complex social systems as a metaphor for social phenomenon (Marion, 1995) and, more specifically, as a metaphor for a leadership prototype, the prevailing DNA or mind-set that dominates an organization. The leadership attractor, as every other strange attractor in a social system, is an ensemble of attitudes, values, symbols, norms, and action tendencies which are interlinked. The balance between positive and negative feedback either enhances or constrains the existing attractor or might encourage movement toward another attractor or a modified structure of the existing attractor. Each attractor, however, represents a complex pattern of interlinking thought, affect,

and action. Groupthink is an example of the loss of balance between positive and negative feedback in groups.

Although a conventional view of organizations and other social systems attempt to avoid the instability and fluctuations of 'far-from-equilibrium' systems, stable systems cannot be effectively adaptable because they do not allow 'choices' in order for the system to sufficiently adapt to the environment, rather they are 'guided' to move back and forth much like a pendulum between the mean of a limited number of alternative behaviors. However, systems close to chaos are those that appear to have the greatest capacity to coordinate complex activities and to evolve in both the natural and social worlds. Leadership mind-sets or action-logics, as described by the LDP, at later stage of development understand this generative capacity of 'far-from-equilibrium' social systems.

Developing concepts of NCW

It is not the purpose of this paper to exhaustively describe the concepts of NCO, but rather to discuss some significant foundational NCO concepts that are representative of leveraged opportunities for exploration in terms of their origin and relationship to complexity theory to explore significant implications for C2 in complex environments. The objective in the short discussion that follows is to lay the groundwork for reflection to discuss the Leadership Development Framework (LDF) that follows.

Self-synchronization

Self-synchronization is a critical component of defense transformation and network-centric operations. Self-synchronization is a model of interaction between two or more networked entities operating outside the constraints of traditional hierarchical structure in which they share information and develop shared awareness and understanding of a situation through mutual sense-making to add value and effectiveness to decision-making and action. This model allows continual assessment of an order to assure it conforms to a situation as it unfolds, using feedback to improve decision and actions. The assumption built into this model is that, by providing information and decision authority to the individuals operating in the tactical level of the organization, it is possible to shift from the linear steps characterized by planned synchronization to a smooth curve of executions defined by many smaller, semi-independent operations. Unlike other organizational process language, the term self-synchronization is exclusively used in the NCW and NCO literature.

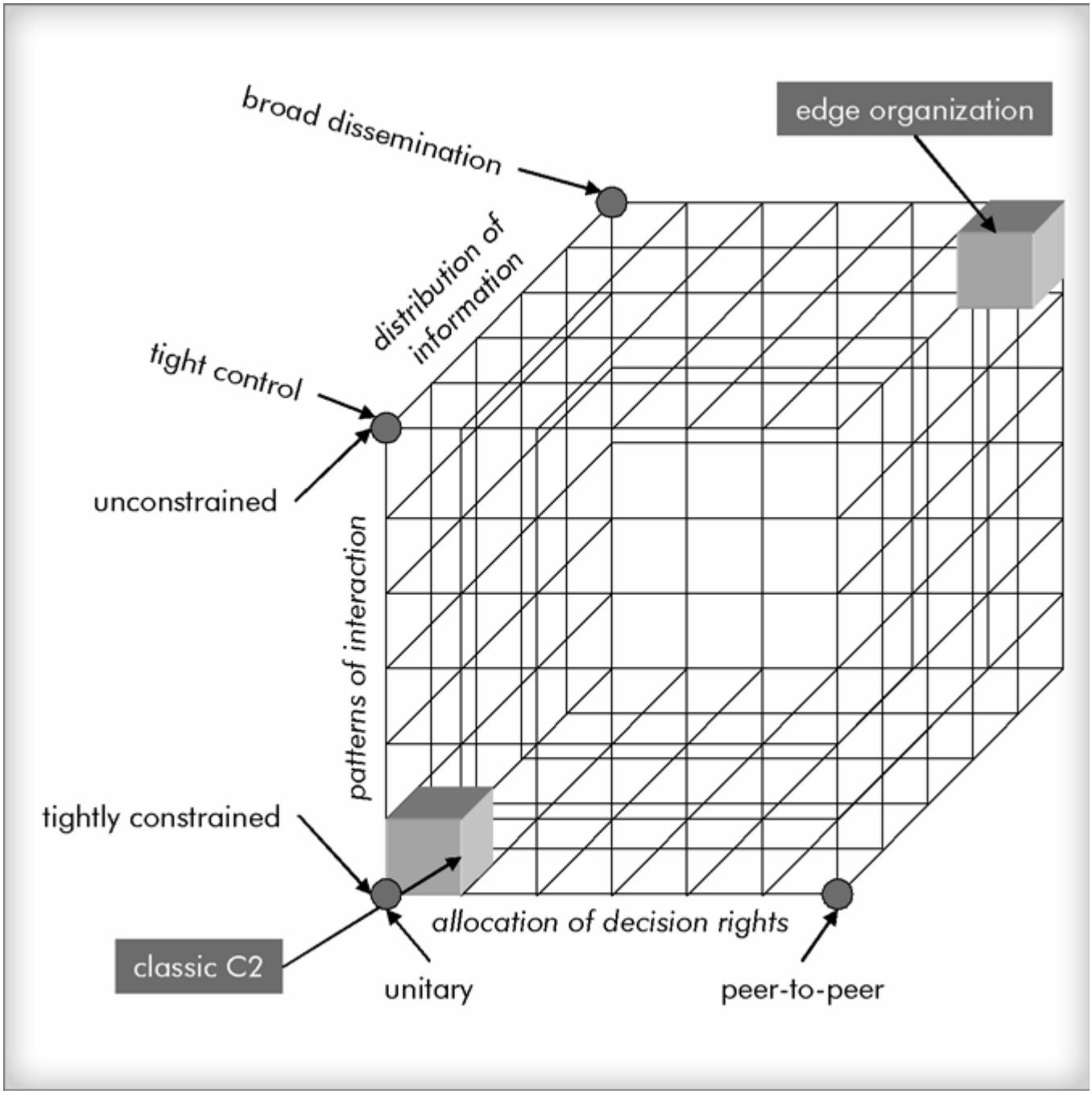
Self-organization is an attribute of complex adaptive system in a 'far-from-equilibrium' state; it is a property of complex adaptive systems (cas) that allows it to respond adaptively to perturbations in the environment. The interactions between entities are the vehicle for exchanging information and making sense of it. The networked properties of the system permit the flexibility and robust character that develop from that intake of energy. In these situations of complexity, centralized control is artificial, ineffective, and dysfunction to achieving timely action and adaptation. Self-

synchronization is a combination of the self-organization of emergent phenomena and the sense-making (Weick, 1995) involved in developing shared awareness and, on a larger scale, cognitive frameworks which drive action. Understanding better the theoretical basis of self-synchronization in complexity science would help to develop better its application in enterprise management and operations in the field.

Leadership

Leadership and leadership development are some of the domains most significantly impacted by a complex, uncertain environment and a complexity perspective. Drawing knowledge from both theory and practice of command and control to advance to a more disciplined analysis of what is entailed in the functions of command and control, the three-dimension model elaborated by Alberts and Hayes is useful. This model places what have been identified as the three functions of command and control -- allocation of decision rights, patterns of interaction, and distribution of information -- on three different axis of a matrix to encompass the C2 approach space. This establishes an analytical model to guide inquiry and discussion into such important questions as the following: a) if we accept that organizational innovation and resilience are facilitated by the 'far-from-equilibrium' states represented in the far right-hand back corner, then how can we perform a risk assessment as military organizations move toward the 'edge of chaos' space? b) Can points of bifurcation be anticipated? c) if some units and divisions or departments are operating productively in different C2 command spaces, what range of variation in C2 is tolerated within an organization? d) how do C2 requirements for operations and enterprise differ and along what dimensions? e) how can knowledge about the dynamics of the C2 approach space support developing mechanisms to encourage co-evolution in transformation between operations and enterprise management?

Figure 3: C2 Approach Space



Source: Alberts, David S. and Richard E. Hayes. (2006). *Understanding command and control.* Washington, D.C.: CCRP, p. 75.

Before beginning a discussion of the implications of this relatively new knowledge for organizational processes, especially leadership, I revisit why the examination and

application of these concepts is critical for organizations in general, but most particularly for Department of Defense and other US and multi-national agencies with whom it collaborates. The advent of computerization technology supporting the Internet, and recent advances in nano- and bio-technology, among other areas, demonstrate the explosion of new knowledge and how the Internet, cell phones and other modes of communication support easier and often cheap access to knowledge. Indeed, globalization as a "process leading to greater interdependence and mutual awareness (reflexivity) among economic, political, and social units in the world and among actors in general" (Guillen, 2001) is an integral force of the expanding complexity of our world. An accelerated rate of change and high levels of uncertainty are introduced by the interaction of many agents in various scenarios as they play themselves out unpredictably for the most part. A single leader, organization, or society's ability to control the outcome of a series of events and predict the outcome is diminished exponentially. Most significantly for organizations, the importance of learning and innovation to achieve adaptability and competitive advantage is required for organizational effectiveness. Yet, the relationships among these factors, e.g., adaptability, resilience, innovation, are not deeply understood, even though they are frequently invoked in conversation and publications. Nor do organizations have in place organizational processes and a culture that support the development of these capabilities. In discussing the disposition of the DoD and other organizations contributing to national security, "learning, and developing the capacity to learn, is of strategic importance in sustaining our national competitive position globally" (Transformation Chair Network, in print).

Leadership capabilities for network-enabled organizations in an interconnected complex world

The requirements for sustaining national security, given the complexity of the present and future environment call for a new perspective, even a new paradigm about leadership and leadership development. Recently, the Transformation Chairs[2] co-authored a chapter addressing the future challenges for organizations charged with national security, the leadership capabilities required to support adaptability in this environment, and the role and challenges of DoD educational institutions in building capability. (Transformation Chair Network, in print). I contributed to Section II, Key Characteristics of National Security Organizations and the Leadership Capabilities Required for Organizational Adaptability, of this chapter including the descriptions of leadership capabilities, mind-sets, and behavior which support sustainable adaptive organizations. I quote below: :

[2]The network of Transformation Chairs currently includes twenty-three chairs across the U.S. DOD educational institutions, as well as representatives from among U.S. allies, specifically, the Australian Defense Staff, the UK Defense Academy, and Swedish National Defense College. The U.S. institutions represented in this network are the Air Command and Staff College, the Air Force Institute of Technology, and the Air War College of the Air University, the Army Command and General Staff College, the Joint Forces Staff College, the Marine Corps University, the National Defense University, the Naval Postgraduate School, the Naval War College, and the academies of the Air Force, Army, and Navy.

1. Sufficient cognitive agility to reconcile multiple and diverse mental frameworks.[3]
2. Sufficient cognitive complexity to respond and adapt to diverse and changing environmental and internal stimuli. From the perspective of complexity, individuals, teams, organizations, and societies must have enough variety in their cognitive frameworks to be able to adapt to a range of circumstances.

a. A subset of the previous capability is to have a high degree of self-awareness, including emotional awareness, enabling the entity (whether an individual, organization, or society) to be able to identify the assumptions being brought to particular settings and understand the limits of their application.[4]

3. A worldview consistent with complexity, e.g., embracing uncertainty and change as opportunity, learning from diverse points of view, and tolerating differences.

4. Enhanced capabilities for mutual feedback and power sharing.[5]

5. An ability to recognize emergent patterns in both social and physical systems.[6]

6. An ability to harness collective intelligence by working in an inclusive, collaborative way to grow communities of trust, including the ability to encourage conversations, enhance connections to share information, and support mutual sense-making.[7]

7. An understanding of sense-making and learning processes and how they contribute to an organization's capability for innovation and adaptation, and ultimately for timely action at the individual, team, organizational and societal level.[8]

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3 Kegan, R. In over our heads: The demands of modern life. Cambridge, MA: Harvard University Press, 1994. Also, Rooke, D. & Torbert, W. "Organizational transformation as a function of the CEO's developmental stages," Organizational Development Journal. Vol. 16:1, 1998.

4 Argyris, C. and Schon, D., *Theory in practice: Increasing professional effectiveness.* San Francisco: Jossey-Bass, 1974. Scharmer, C. O., *Theory U: Leading from the future as it emerges.* Cambridge, MA: Society for Organizational Learning Press. 2007.

5 Argyris, C. *Knowledge for action.* San Francisco: Jossey-Bass. 1993, and Torbert, W. *Action inquiry: The secret of timely and transforming leadership.* 2004. San Francisco, CA: Barrett-Koehler Publishers.

6 Plowman, D. A., and Duchon, D., Emergent leadership: Getting beyond heroes and scapegoats, pp. 109-127. In Hazy, J. K., J. A. Goldstein, and B. B. Lichtenstein (Eds.), Complex systems leadership theory. Mansfield, MA: ISCE Publishing, 2007 and Scharmer, C. O. (2007) *op. cit.*

7 Plowman and Duchon *(2007), op cit.* Scharmer, C. O, Senge, P., Jaworski, J. and Flowers, B. S. *Presence: Human purpose and the field of the future*. Cambridge, MA: Society for Organizational Learning Press. 2004.

8 Weick (Weick, K. E., *Sense-making in organizations.* Thousand Oaks, CA: Sage Publications, 1995,

These capabilities and cognitive frameworks (action-logics) are compatible with an emergent perspective, representing movement toward a different paradigm or, if you will, toward an alternative leadership attractor. They will be difficult to develop; however, there is a growing body of literature that supports their effectiveness in 'leading' complex adaptive systems.

Description of constructive development leadership literature, organizational learning, and complexity

So far I have discussed the complexity metaphor as it relates to leadership and leadership development. In this section, I expand on constructive development theory, a body of work based on the idea that human beings naturally continue to develop through adulthood progressing through distinct stages. This view point is characterized by other tenets, including the following: 1) development is more than acquiring new information and represents qualitative changes in the way we know or how we make meaning of the world, 2) the demands placed on adults frequently surpass their developmental capacities, 3) development is stimulated through the continuing interaction between the individual and the environment, 4) individuals are active participants in their own growth, and 5) an individual's development, both the enhanced understanding and skills within one's present stage of development and movement from one stage to the next stage, benefits from support for this emergence, extension, and elaboration as a way of knowing and the skills associated with each stage. (Popp and Portnow, 2001).

Several theorists have identified specific stages of development characterized by distinct ways of organizing information (cognitive frameworks), the manner in which individuals construct their experience and knowledge to create meaning. The stages of individual development, called action-logics[9] in the Leadership Development Framework and described in more detail below, correspond closely to the stages of development identified by other development psychologists, including Kegan (Kegan, 1994; Torbert, 1991), Alexander (Alexander and Langer, 1990), Kohlberg (1984),

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and others have explored the importance of sense-making processes to decision-making and timely action. The systems-thinking group at MIT has shown the importance of learning for organizational sustainability and explored the leader's role as designer, steward, and teacher, e.g. Senge, P.M. *The fifth discipline: The art & practice of the learning organization.* New York: Currency Doubleday, 1990. From a technology perspective, see Christensen, C. M. *The Innovator's Dilemma.* Harper Business Essentials, 2000.

[9]The meaning of the term action-logic is somewhat related to the more commonly used term mind-set; however, this term, coined and defined by William Torbert and David Rooke in their development of the Leadership Development Framework and Profile, more specifically refers to schemas and strategies used by entities (individuals, teams, organizations, and societies) for reflecting on and representing their experience. The term action-logic emphasizes the relationship between this logic or organization of reality and the action of the entity. See the following references: Torbert and Associates, Action inquiry: The secret of timely and transformation leadership; Rooke and Torbert, Seven transformations of leadership from the Harvard Business Review, and Martin's chapter, The Schema, from Complexity: Metaphors, models, and reality, published proceedings from the Santa Fe Institute Studies in the Sciences of Complexity.

Loevinger (Loevinger and Wessler, 1970), and Ken Wilber (2000). The LDP emerged from Cook-Greuter's theoretical and empirical work to enhance Loevinger's work (Cook-Greuter, 1990 and 1991; Torbert, 2004). Examining the overall distribution of developmental action-logic scores from the results of several studies of professional adults in the US using the Leadership Development Profile and others highlights the degree to which different developmental theories and the measures associated them are similar. Specifically, the distribution of developmental scores using the LDP and Kegan's Subject-Object interview are practically identical, finding that 55% of the subjects scored at Expert level or below and 30% scored at Action-logic Achiever, with 15% scoring at later action-logics.

Torbert calls developmental stages action-logics to highlight to close relationship between one's cognitive framework or way of making sense of the world and the action it engenders. The Leadership Development framework and the Leadership Development Profile are used in the proposed pilot project I describe in the final section of this paper. To examine the theory and the empirical basis for distinguishing among the personal action-logic, see Torbert and Associates (2004). Figure 4 (Rooke and Torbert, 2005) presents a brief description of the seven action-logics. To describe in some depth these action-logics, I discuss briefly – the Expert, the Achiever, the Individualist and the Strategist. I would hypothesize that the DoD is populated by primarily Experts and Achievers, a distribution that would conform to the findings among other samples of managers. This brings focus to individuals, groups and organizations transforming from the action-logic of Expert and Achiever to a less conventional Individualist stage and then to the later stage of Strategist. Individuals in Action Logic III or Expert approach timely action as an exercise in efficiency; those acting from the Achiever framework focus on effective action. The Individualist is working to balance personal and organizational tensions and action-logics. It is only at the Strategist level where individuals, groups, and organizations learn to re-conceptualize situations in a collaborative ways to contribute to organizational transformation. In a study of ten CEO's trying to realize transformation within their organizations, Rooke and Torbert (1998) found a statistically significant relationship between the Action-logic of Strategist and the CEO's ability to lead successful organizational transformation. In spite of the small sample size, the correlation accounted for a large percentage of the variance at 42%. Further, in a succeeding analysis when both the action-logics of the lead consultants, as well as the 10 CEOS were considered together and compared along the dimension of success or lack thereof in organizational transformation initiatives, the leadership action-logic accounted for 59% of the total variance at a .01 level of significance (Torbert and Associates2004).

Figure 4: Action Logics: The Seven Transformations of Leadership

Action Logic	Characteristics	Strengths	% of Research Sample Profiling at this Action Logic
Opportunist	*Wins any way possible.* Self-oriented; manipulative; "might makes right."	Good in emergencies and in sales opportunities	5%
Diplomat	*Avoids overt conflict.* Wants to belong; obeys group norms; rarely rocks the boat.	Good as supportive glue within an office; helps bring people together.	12%
Expert	*Rules by logic and expertise.* Seeks rational efficiency.	Good as an individual contributor	38%
Achiever	*Meets strategic goals.* Effectively achieves goals through teams; juggles managerial duties and market demands.	Well suited to managerial roles; action and goal oriented.	30%
Individualist	*Interweaves competing personal and company action logics.* Creates unique structures to resolve gaps between strategy and performance.	Effective in venture and consulting roles	10%
Strategist	*Generates organizational and personal transformations.* Exercises the power of mutual inquiry, vigilance, and vulnerability for both the short and long term.	Effective as a transformational leader.	4%
Alchemist	*Generates social transformations.* Integrates material, spiritual, and societal transformation.	Good at leading society-wide transformations.	1%

Source: Torbert, William R. and David Rooke. (April 2005). Seven transformation of leadership. *Harvard Business Review.* pp. 67-76.

Organizational Learning

Organizational learning has its theoretical basis in the influential work of Argyris & Schon (1978), whose elaboration of single- and double-loop drew from the earlier work of Gregory Bateson. In 1974 these authors described their work in the area of individual

learning, then after four more years of inquiry, they described their work on the nature and process of organizational learning from both the descriptive and normative stand-point. Single- and double-loop learning are different responses to the perceived gap between anticipated and actual outcomes at an individual, group, or organizational level, as an actor evaluates her actions. Single-loop learning accepts the existing assumptions, values, policies, assumptions, norms, and strategies of an organization; consequently, the response is an attempt to improve the performance or modify the actions within the parameters of the framework that supports the existing norms. Double-loop learning generates reflection about the values, policies, assumptions, norms, and strategies in a more systemic consideration of relationships surrounding the undesirable outcome. Double-loop learning changes to a greater or lesser degree the existing conceptual framework or mind-set of the organization. These authors emphasis on organizational learning brought focus to the processes involved in organizational adaptation to the environment. Although organizations are more than the collective of individuals, "organizations learns only through the experience and action of individuals" (Argyris & Schon, p. 9); Argyris and Schon explore in depth the connection between individual and organizational learning.

In Senge's (1995) influential book, "the Fifth Discipline" he also discusses the relationship between individual and organizational learning as he delineates the five disciplines of organizational learning: personal mastery, mental models, building shared vision, team learning and finally the discipline that integrates all of the preceding ones, systemic thinking. Significantly, Senge attempted to shift attention from the prevailing paradigm of the a single leader as the sole generator of success to shift to a more systemic view of leadership and change which acknowledged the power that individuals and groups of individuals other than the formal leader possess to bring about organizational change.

The Leadership Development Framework reflects a deep understanding of the theoretical and empirical lineage of both organizational learning and the learning organization. In summary, the complexity metaphor enhances the understanding of the learning process initiated by theorists and researchers from both these perspectives.

We have discussed above some important concepts from complexity theory and below we will illustrate how the instrument associated with the LDF is compatible with both complexity theory and by extension the tenets of NCO.

Compatibility of LDP with emergent perspective

As discussed earlier, the Leadership Development Framework (LDF) has a foundation in constructive development theory integrated with principles of organizational learning theory and is compatible with an emergent perspective (complexity theory). The Leadership Development Profile (LDP), the measurement associated with this framework, evolved from a twenty-year collaboration among Susanne Cook-Greuter, Dal Fisher, David Rooke, and Bill Torbert who modified Jane Loevinger's Washington University Sentence completion Test (WUSCT), one of the most widely used and most

frequenty validated psychometric instrument (Loevinger, 1985; Loevinger and Wessler, 1970). In recent years the LDP, a sentence completion instrument, has been refined further by David Rooke of Harthill Inc. and Bill Torbert to create a more organizational emphasis to better assess leaders working in the organizational context.

The LDF offers a new approach or paradigm for leadership and leadership development which captures requirements for effective leadership in this era of complexity and uncertainty and is compatible with an emergent perspective (complexity). The use of the LDP enables military leaders and the civilian leaders with whom they collaborate to reflect deeply on the patterns of meaning-making which drive their actions and decision making. The framework offers a specific language to describe significant development and the debriefing conversation, an integral part of the process, offers the participant an opportunity to begin a reflective conversation about their own aspirations and development. Administered in the organizational context, the LDP proposes processes for an exploration into the shared assumptions and beliefs that arise out of commonly shared meaning-making to 1) influence the probability of change at the group and institutional levels, and 2) to improve strategic leadership capabilities at the individual, team, and institutional levels. Further, Torbert and Fisher (1992) report that voluntary participation of individuals in cohorts of action inquiry for a two to four year period in which individuals together discussed their reflections and their own experience and were guided by a post-conventional action-logic practitioners significantly enhanced the probability of leadership development of these individuals to post-conventional action-logics (Strategist level and beyond).

LDP seems to be one of the few highly validated instruments that are compatible with the conceptual foundations of complexity theory. We discuss below specific ways in which this compatibility is exhibited:

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1. LDP is compatible with viewing leadership as an emergent phenomenon in complex social systems whereby “leadership can be enacted by any interaction in an organization” (Hazy, Goldstein, and Lichtenstein, 2007, p. 2), rather than being lodged within one person or role. This framework focuses on the interconnectivity and interaction of entities or agents within and across complex systems and the potential of conversation and other types of interaction to influence the behavior (learning) of agents. Specifically, this paradigm of leadership views every interaction or conversation as possessing the potential for influence and, by extension, leadership.

2. As earlier described, the social phenomenon of a strange attractor is an apt metaphor for a leadership prototype. Consistent with an emergent perspective, we would consider a leadership prototype as an ensemble of attitudes, norms, values, assumptions, symbols, and action tendencies which are mutually reinforcing. Individual leaders or groups of leaders are salient in that they participate in either maintaining or modifying the existing prototype or

alternatively to act as positive deviant models in contributing toward changing the trajectory to move in the direction of an alternative leadership attractor. This leadership behavior includes the recognition of latent strange attractors and acting to support the existing trajectories or encouraging movement toward constructive latent strange attractors.

3. The property or capacity for emergent self-organization reflected in complex adaptive systems is accounted for within the LDP. As leaders advance to higher levels within this framework they acquire higher levels of capacity to learn, adapt, and offer and accept feedback to more effectively to support emergence and transformation. Acting from a post-conventional action-logic, individuals and organizations are not fearful or perplexed by complexity, change or paradox, conditions characteristic of 'far-from-equilibrium' states, but rather recognize the generative capacity of these states and seek to use these challenges as opportunities for learning and development for themselves, their organizations and their societies. The LDP captures complexity in the mind-set or action-logic of the individual which in later stages of development includes an understanding that one's own framework or world-view is one among multiple frameworks that might be adopted to approach different challenges and environments. In fact, individuals possessing higher levels of cognitive complexity in this way can lead more effectively.

4. The LDF captures the critical importance of a capacity and appreciation for mutual feedback on the part of effective leaders. This capacity aligns with the complexity metaphor applied to organizations in that it is through the exchange of information and the sense-making process that organizations are 'fueled' to learn and new knowledge and patterns emerge. The leader's capacity to encourage conversations and mutual sense-making required for network enabled operations is emphasized. Feedback and response to feedback are some of the base line conditions for emergent self-organization in complex adaptive systems.

5. The Leadership Development Framework is fractal, that is, the structure and dynamics of levels of development as identified by the Leadership Development Profile are the same without regard to size or level, e.g., applicable to individual, team, organizational, or society.

6. The central role of the learning of an agent and of systems as a critical process for adaptation and innovation is reflected in this framework in several ways. Among them, for example, the framework itself incorporates deep understanding of learning at the individual, team, and more macro levels. Higher level action-

logics acquire greater capacity for learning using double- and triple-loop processes (Torbert & Associates, 2004).

7. The LDF focuses on the importance of maintaining awareness of past, present and future simultaneously. The Strategist, the first of the post-conventional action-logics, seeks to act in a timely way with a keen awareness of how the past is influencing the present, and how current actions might impact the future. From the standpoint of emergence, this relationship with time reflects an understanding that systems are dynamic and unpredictable requiring leaders to identify latent patterns and be responsive to new developments by maintaining perspective from multiple temporal realities.

8. The LDP captures the degree to which an individual (or a team or organization) productively leverages the tension and paradox of complexity well, negotiating multiple world views, to support learning, adaptation, and transformation.

Proposed Study

At the time of writing this article, the author is in the final stages of planning a pilot project to refine questions and hypothesis and structure further inquiry about the relationships highlighted in the discussion among leadership, leadership development, and organizational transformation and effectiveness from an emergent perspective. The study is designed as action research (Reason and Hilary, 2001) an approach to scientific research which involves human subjects as full participants in the study; that is, participants would be not only fully informed of the methodology, objectives, and the results of the study, but their contributions and insight would influence the outcome and the direction of the study. The project has two types of equally important objectives: 1) the research objectives, and 2) the personal development of the individual participants. These two objectives are intertwined in that the knowledge acquired related to the research objectives and its validity are substantially enhanced by the involvement of the human subjects as full participants in the inquiry. Also, the individual and collective personal development of the participating individuals will contribute to the long-term strategic objectives to which this study potentially helps achieve which is that of developing leadership capacity within the DoD and its inter-agency partners to meet current and future national security challenges.

The study is fully integrated into the delivery of two electives for resident students at the US Army War College, one elective on the subject of Transformation and the other entitled Applying Senior Leader Thinking. The Leadership Development Profile will be the measure used to assess the leadership development of the participants in the study. The results of the measure and the debriefing sessions with the two groups (divided by course) and with individual participants, as well as participant observations made by the Principal Investigator during the course of the 10-week course will be the sources of data.

This is not a statistical study, but rather an exploratory, inductive study. The participants are not randomly chosen but rather a small group of self-selected students who, as evidenced by their choice of electives, are interested in transformation and leadership. Evidenced by their choice of elective, the leadership they have demonstrated in field operations and enterprise management within the DoD which was part of the criteria to choose them for participation in this annual program, and the nature of the strategic positions to which they are being assigned, this group of students could offer keen insight and thoughtful reflections about the focus area of this study, including the relationships among leadership, leadership development, and organizational effectiveness and transformation.

Some of the important questions that could begin to take shape in this study are the following:

a) Is the U.S. military leadership in a phase transition?
b) If so, what are some of the emerging characteristics of the emerging military leadership?
c) What are factors influencing this transformation?
d) If not, what are the perceptions about the necessity for change in the prevailing leadership model, if any?
e) What is the range of variability of leadership development among different levels of the military hierarchy, different services, and other component groups?
f) How does the military leadership model differ from other existing models?
g) What can we develop and support leaders to be effective in environments of uncertainty and complexity?
h) What have we learned from this study about how can future studies be designed to develop knowledge in all these areas?

The research objectives are to:

- Increase understanding of the relationships among leadership, leadership development, and organizational effectiveness and transformation in the context of multi-national, inter-agency and joint military projects and missions to design further research and better frame the critical questions delineated above for continued inquiry
- Gain knowledge about how to structure projects and programs of leadership development to support and accelerate effectiveness and transformation at our institutions
- Accelerate leadership development at an individual level by offering each participant an objective reflection from their Leadership Development Profile of: 1) their current leadership action-logic, 2) the next action-logic they can develop (with sufficient commitment and practice), and 3) specific steps they can take to bring about changes in their action-logics

- Encourage participants to experiment towards adopting the more systemic and strategic action-logics associated with greater capacity for dealing with complexity, uncertainty, and ambiguity
- Enable military leaders to appropriately engage their own 'conventional' capabilities, *as a choice,* in the service of a wider systemic awareness.

It is not the objective of this paper to describe the pilot study in detail, but rather to offer an example of how study of these relationships in the complexity perspective could take shape productively to innovate our methodologies and gain legitimacy among military constituents.

Conclusion

This article has integrated learning from three bodies of knowledge influencing organizational science – the emergent perspective (complexity), organizational learning, and constructive development theory. The objective has been to offer insight into the important relationships among leadership, leadership development, and organizational effectiveness and transformation in the context of 21st century challenges of US national security in the environment of uncertainty, accelerated change, and complexity.

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Leadership as an Emergent Phenomenon: A Framework for Complexity & Adaptability

Presented by Sandra M. Martinez, Ph.D.
Chair of Defense Transformation, US Army War College
13th International Command & Control Research & Technology Symposium, June 17-19, 2008, Bellevue, WA

Recognition of challenges in message from strategic military & select civilian leaders

- World reality is qualitatively different
  - Technology, 24/7 media, resultant globalization
- Institutional change required to support transformation/adaptation to this reality
- Necessity for a different way of looking at the world/paradigm shift
- Leadership capacity is critical to adaptation
- Less discussion of how specifically this will be accomplished

Approach: Research-based, including Action-research

- Integration of three theoretical frameworks compatible with complexity of environment and operations
  - An emergent perspective (complexity theory), constructive development theory, and learning theory
- Collaboration/co-creation of knowledge among practitioners and researchers

Adoption & Translation in DoD of complexity science (an emergent perspective)

- ADM Cebrowski's NCW concepts explicitly derived from physics of nonlinearity/complexity as developed by Santa Fe Institute (J. Moffat, 2003)
  - Relationship of complexity and information-based warfare was less deterministic, more emergent; less focus on discrete things, more on relationships
- Capstone Concepts for Joint Operations of August 2005
  - Views situations as involving 'complex adaptive systems'
- TRADOC Pamphlet 525-5-500 US Army Commander's Appreciation & Campaign Design
  - Describes non-linear concepts and CAS as conceptual basis for policy
- C2 literature, work of Alberts & Hayes among others
  - References to "the edge organization"
  - Complex adaptive systems

What is a complex adaptive system?

- “A Complex Adaptive System (CAS) is a dynamic network of many agents (which may represent cells, species, individuals, firms, nations) acting in parallel, constantly acting and reacting to what the other agents are doing. The control of a CAS tends to be highly dispersed and decentralized. If there is to be any coherent behavior in the system, it has to arise from competition and cooperation among the agents themselves. The overall behavior of the system is the result of a huge number of decisions made every moment by many individual agents.”

John H. Holland cited in *Complexity: The Emerging Science at the Edge of Order and Chaos* by M. Mitchell Waldrop

The emergent perspective

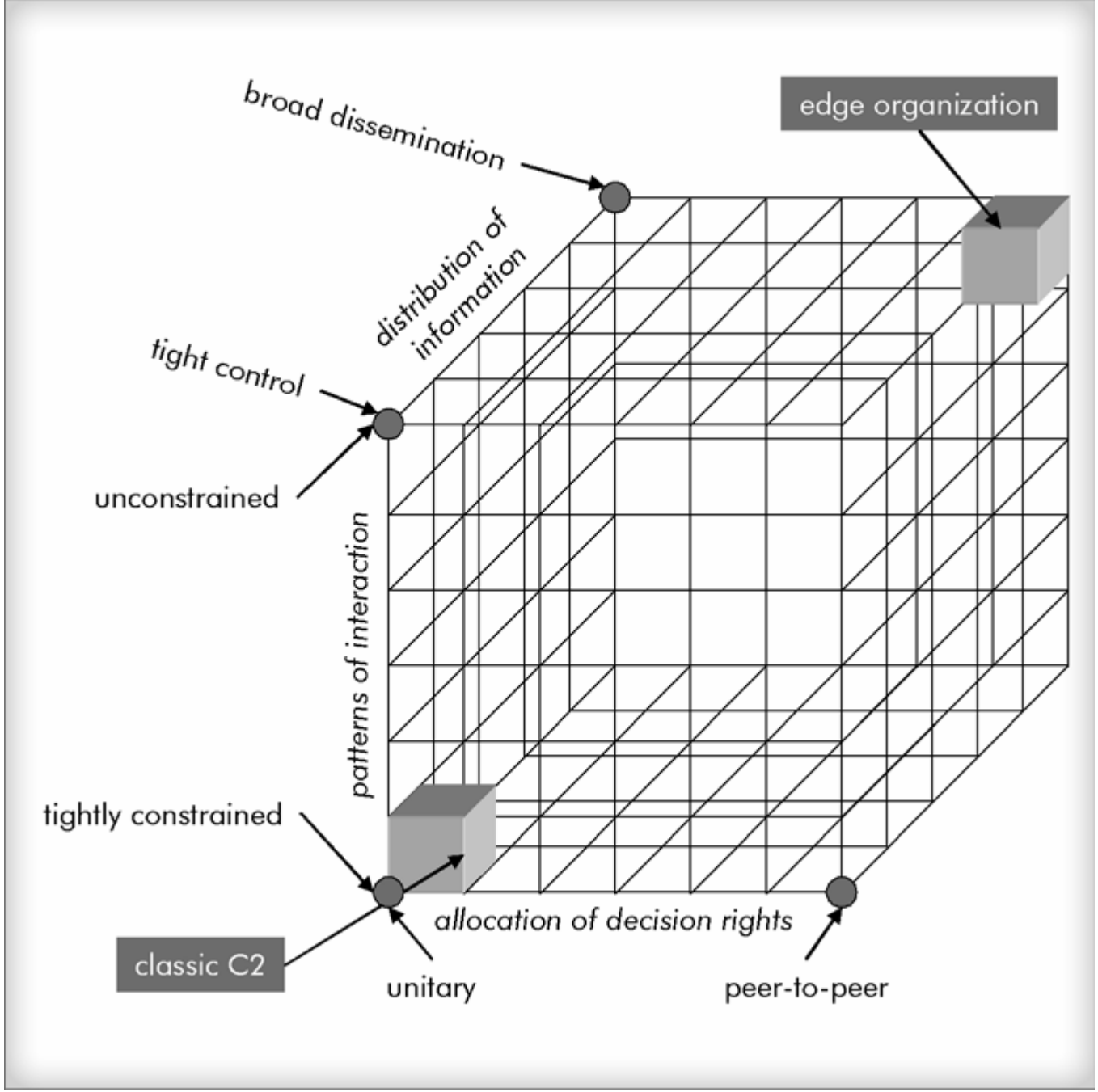
- Study of both natural and social complex adaptive systems in which order and coherence emerge as an outcome of the interaction of multiple entities
- Views systems holistically rather than reductively
- Non-linear is a dynamic where the strength of the cause is not proportional to its impact on the organization
- Emergent self-organization – the capacity of ‘far-from-equilibrium’ systems to acquire new properties and adopt new structures
- Leadership as strange attractor is ensemble of mutually reinforcing values, strategies, policies, norms.

Newtonian paradigm

- Historically military theorists have drawn from science to explain war
  - Physics in the form of Newtonian mechanics is source of many analogies
    - E.g., ‘friction and the center of gravity’
- Focus on decomposition and specialization
  - Leading to specialization – mastery in individual domains
- Emphasis on finding stability
- Focus on finding optimal solution
  - One best way
- Centralized planning to achieve optimal strategy and synchronization
- Mechanistic view/metaphor of machine
- Assumptions that leader can/does control and can predict

Concepts of complexity

- Emergence –
  - “Organized behavior emerges from localized rules; structure need not be coordinated to exist.” (Marion, p. 31)
  - Allows distributed agents to group together into a meaningful higher-order system
- Self-organization…
  - Order emerging from spontaneous, local interactions of networks
  - Each high level of organization has its own time-scale and new kinds of relationships and properties
  - The emergence of new entities or stable aggregate patterns of organization and behavior arising from the interaction of agents

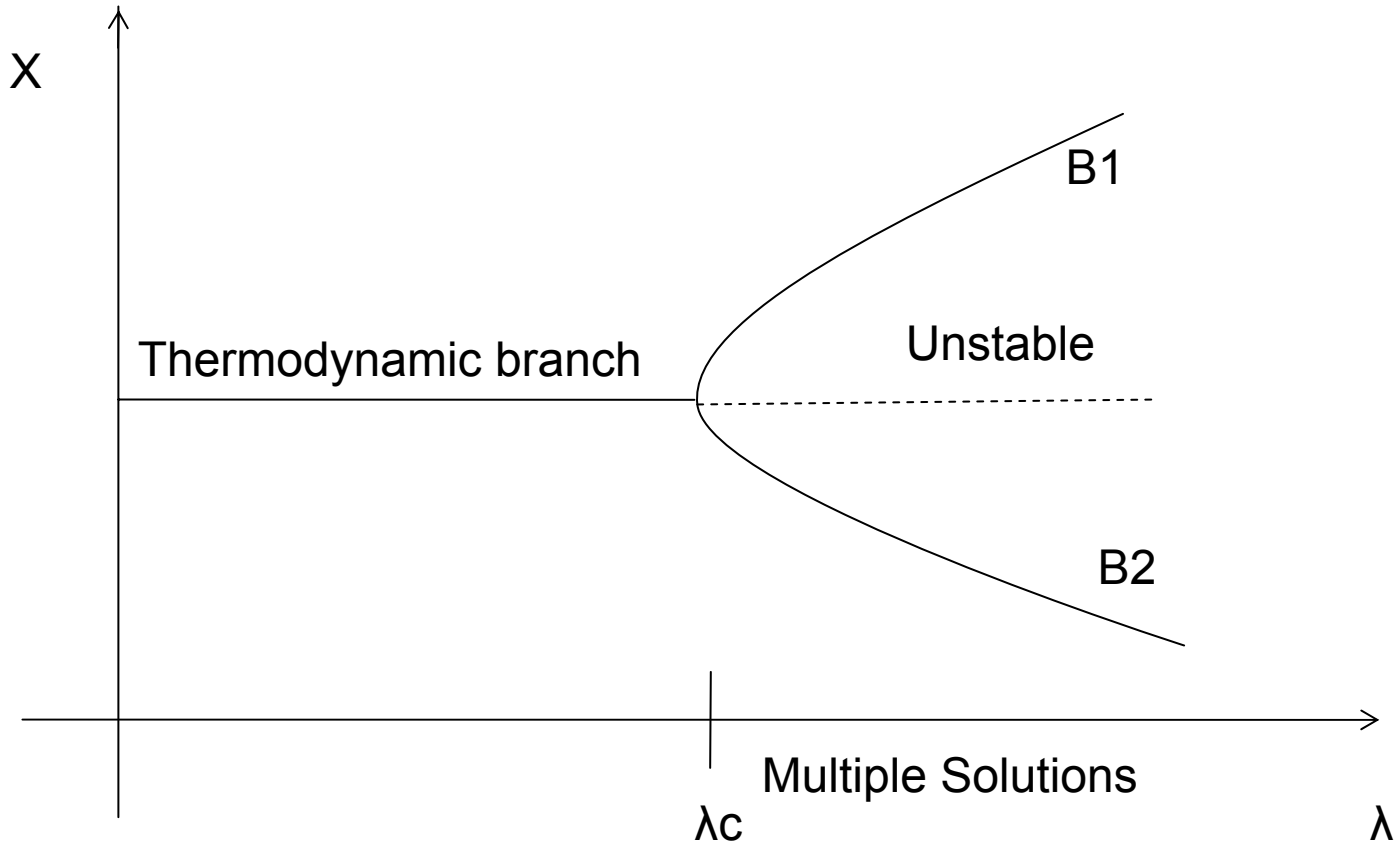


C2 Approach Space (Source: Alberts & Hayes. 2006 Understanding Command and Control. CCRP)

Why ‘far from equilibrium’?

- Unlike central management, “Self-organizing systems allows adaptation to the prevailing environment, i.e., they react to changes in the environment with a thermodynamic response which makes the systems extraordinarily flexible and robust against perturbations from outside conditions.” Biebracher, Nicolis, & Schuster
- ‘Far from equilibrium’ systems have the capacity to acquire new properties. Many believe that ‘far-from-equilibrium states are the source of diversity and innovation in natural & social systems.

Pitchfork Bifurcation



Concentration X is a function of the parameter λ, which measures the distance from equilibrium. At the bifurcation point, the thermodynamic branch becomes unstable, and the two new solutions b1 and b2 emerge. **(Source: Prigogine 1997 "The End of Certainty" The Free Press.)**

Concepts/Terms of Emergent Phenomena

- Attractors – A trajectory to which motion gravitates. It has a phase space portrait in a confined area.
- Strange attractors represent systems whose behavior never repeats itself; they are products of asynchronous nonlinearity and interactivity.
- Fluctuations
  - When fluctuations become as important as the mean, we use descriptions like chaos, complexity, non-predictability
- Bifurcations – when a system crosses over an invisible boundary (when the system becomes unstable) and the landscape of attractors alters dramatically
- Leadership patterns/prototypes as a strange attractor – an ensemble of values, assumptions, norms, action tendencies that are mutually reinforcing

Human CAS versus physical or biological CAS

- More levels of organization
- Multiple levels of nested CAS in which humans operate individually and collectively
- Every individual is a member of multiple organizations; not strictly nested
- Human organizations are socially constructed; they are not fixed laws of nature

Constructive Development Theory

- Development is more than acquiring new information, it represents changes in how we make meaning of the world
- Demands on adults often surpass their capacities
- Development is stimulated through continuous interaction between individual & environment
- Individuals are active participants in their development
- An individual's development benefits from support for the 'emergence, extension and elaboration' of their present stage of development or transition to the next stage of development

Popp & Portnow, 2001. Our developmental perspective on adulthood. Robert Kegan, Principal Investigator. Harvard University School of Education Research Monograph

Leadership capabilities for complexity & adaptability

- Sufficient cognitive agility to reconcile multiple and diverse mental frameworks
- Sufficient cognitive complexity to respond & adapt to respond and adapt to diverse and changes external and internal to entity
  - Includes self-awareness enabling entity to identify assumptions brought to situations and limits of application
- Worldview consistent with complexity, e.g., embracing uncertainty and change as opportunities, learning from diverse points of view, tolerating differences
- Enhanced capabilities for mutual feedback and power sharing
- An ability to recognize emergent patterns in both social and physical systems

Source: Transformation Chairs Network. "Challenge for National Security Leaders, Organizations and Leadership Development: Trends and Shocks in Complex Adaptive Organizations" Drawing from work of R. Kegan, C. Argyris, D. Schon, B. Torbert, Plowman and Duchon, C. O. Scharmer.

Leadership capabilities for complexity & adaptability

- An ability to harness collective intelligence by working in an inclusive, collaborative way to grow communities of trust, including the ability to encourage conversations, enhance connections to share information, and support mutual sense-making
- An understanding of the sense-making and learning process
- Ability to maintain perspective from multiple temporal realities concurrently, that is, being actively aware of how the past is influencing the present, and how current actions might impact the future

Source: Transformation Chairs Network. "Challenge for National Security Leaders, Organizations and Leadership Development: Trends and Shocks in Complex Adaptive Organizations"

Leadership Development Framework

- Integrates theoretical and empirical work from organizational learning and constructive development theory and is compatible with the emergent perspective
- Empirical evidence
  - Statistically significant different in managerial performance on in-basket tests in in an interview study between conventional and post-conventional action-logics (Merron, Fisher & Torbert, 1987)
  - Statistically significant different in success between conventional and post-conventional CEOs in achieving organizational transformation (Rooke & Torbert, 1998)

Leadership Development Profile

- Measures the way an individual maps the world, makes sense of their experience
- 36 sentence stems
- Augmentation of the Washington University Sentence Completion Test (WUSCT)
- Not deterministic, but developmental

Action-Logics: 7 Transformations of Leadership (Source: Torbert & Rooke, April 2005. Harvard Business Review)

Action Logic	Characteristics	Strengths	% Research Sample at Level
Opportunist	Wins any way possible. Self-oriented; manipulative	Good in emergencies & sales opportunities	5%
Diplomat	Avoids overt conflict. Obeys group norms	Helps bring people together	12%
Expert	Rules by logic & expertise. Seeks rational efficiency	Good as an individual contributor	38%
Achiever	Meets strategic goals. Effectively achieves goals through teams.	Well suited to managerial roles; action & goal oriented	30%
Individualist	Interweaves competing personal & company action logics.	Effective in venture & consulting roles	10%
Strategist	Generates organizational & personal transformations	Effective as transformational leaders	4%
Alchemist	Generates social transformations	Good at leading society-wide transformations	1%

Compatibilities of Emergent perspective & Leadership Development Framework (LDF)

- LDF focus on interaction and potential interdependencies of entities (agents) within and across systems
- Accounts for potential of conversation and other types of interaction to influence the behavior (learning) of agents
- Acknowledges potential for leadership in any interaction in an organization, rather than lodged in one person

Compatibilities continued

- Consistent with consideration of leadership as a ‘strange attractor,” that is, an ensemble of attitudes, norms, values, assumptions, symbols, and action tendencies which are mutually reinforcing
- The LDF captures capacity for temporal awareness, that is, acting the present with an awareness of the influence of the past and how current actions might impact the future

Compatibilities continued

- The LDF accounts for the properties of emergent self-organization in several ways, among them:
  - The LDF captures the complexity of the way the individual maps the world, i.e., understanding that one's own worldview is one among multiple frameworks and the ability to choose among frameworks depending upon circumstances
  - The LDF captures how productively an agent leverages the tension and paradox of complexity, negotiating multiple world views, to support learning, adaptation, and transformation
  - The LDF captures the critical importance of a capacity and appreciation for mutual feedback and learning among agents
  - At later stages of development leaders reflect higher capacity to support emergence and transformation

Significant Questions

- Is the U.S. military leadership in a phase transition or paradigm shift?
- If so, what are some of the emerging characteristics of military leadership?
- What are factors influencing this transformation?
- If not, what are the perceptions about the necessity for change in the prevailing leadership model, if any?

Significant Questions

- What is the range of variability of leadership development among different levels of the military hierarchy, different services, and other component groups?
- How does the military leadership model differ from other existing models?
- What can we do to develop and support leaders to be effective in environment of uncertainty and complexity?

Study Objectives – Research & Developmental

- Increase understanding of relationships among leadership, leadership development, and organizational effectiveness and transformation in the context of multi-national, inter-agency and joint projects and missions
- Accelerate leadership development at the individual level by offering each participant an objective reflection from their LDP
- Gain knowledge about how to structure projects & programs of leadership development to support and accelerate effectiveness & transformation at DoD educational institutions

Advocate

- Revisiting theory to identify and employ theoretical frameworks compatible with complex operations, information-sharing supported by technology, and the complexity and uncertainty of the real world
- Highly integrated exploration of theory and practice
  - High levels of interactive inquiry/communication between theorists and practitioners/research that leverages inquiry for leadership development of participants (action inquiry)
- New paradigm for leadership required
  - Looking at implications of Network Enabled Operations and complex adaptive systems/an emergent perspective for organizational processes, e.g., leadership, planning, and execution
- Cognitive Framework
  - This is the killer app

Questions