Adaptive Capacity in Project Teams
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Introduction

Organizational resilience has become critical in today's environment. According to Engelhardt and Simmons (2002),

> The need for organizational flexibility to accommodate a changing world is well understood. Today's high-velocity and competitive markets apply added pressure to adapt rapidly and perform at high levels. Technology is opening up new ways to compete while making old ways obsolete. These trends are recognized in strategic management theories that focus on constant change and speed. (p. 113)

This paper explores interconnections between attachment and hierarchy theories as contributory factors in the development of adaptive capacity in project teams and subsequent resilience in organizational systems.

Attachment theory is recognized in the field of human development and family systems. Only recently has there been renewed interest in application of attachment theory in the workplace (Harms, 2011). Even though attachment theory is considered foundational in personality research, it has not been widely adopted as a perspective to view workplace phenomena and organizational systems. Instead, there has been an overreliance on the Five Factor Model (Extraversion, Neuroticism, Agreeableness, Conscientiousness, and Intellect) (Harms, 2011). Similarly, beyond Maslow's (1943) theory of human motivation (hierarchy of needs) which contributed to Herzberg's Two-Factor Theory (Herzberg, Mausner, & Snyderman, 1959), hierarchy theory has been primarily applied to the biological, socio-ecological and socio-economic systems sciences. It has not been widely applied to workplace performance, leadership, and adaptation (Edson, 2011). Independently, these theories offer many possibilities for research that could be integrated into organizational behavior models. Together, these theories present potential insights into organizational systems. While Harms (2011) focused on the former, this paper advances the latter.

Purpose

This paper presents a theoretical proposition for understanding adaptive capacity in project teams using a three-faceted model. The model's three facets are based upon theoretically pluralistic approach (Midgley, 2000) including group development (Tuckman & Jensen, 1977) as understood through complex adaptive social systems (CASS) (Byrne, 1996; Miller & Page, 2007), attachment theory (Bowlby, 1969, 1973, 1988; Ainsworth, 1967, 1969, 1970; Main & Solomon, 1986), and hierarchy theory (Ahl & Allen, 1996). Further, it is based upon the results and emergent findings of dissertation research discussed in *A Systems Perspective of Resilience in a Project Team* (Edson, 2011), summarized in *Systems Research and Behavioral Science*, A Complex Adaptive Systems Perspective of Resilience in a Project Team (Edson, 2012).

Background
As a project manager for several project teams, I (Edson) observed some project teams were adept at overcoming adversity, while others were not. The project teams that adapted to environmental constraints were able to modify their behaviors to meet goals without losing their function, while others were not. These observations led to the investigation of the nature of project team resilience in the face of adversity. Based on my project management experience and research results, my sense is that project teams present an untapped resource for understanding adaptation and a leverage point for transformational change in organizations. In reviewing the literature, plenty of research focused on understanding group development under standard operating conditions, yet little attention had been devoted to team adaptation under adverse conditions.

This gap in understanding group development, specifically project team adaptation, prompted me to explore different adaptive models. Gunderson and Holling (2002) had developed a model of ecological adaptation in their investigation of panarchy, which was compelling in its explanation of resilience in biological, ecological, and complex adaptive systems. Years earlier, experts in the field of organizational behavior, particularly group development theory, such as McGrath, Arrow, and Berdahl (2000) had called for research using complex adaptive systems theory (CAS) as a perspective to view group dynamics. The potential convergence of these three theoretical streams (group development, panarchy, and complex adaptive systems) became the focus of my research about resilience in project teams. That research prompted further investigation and explanation on of adaptive capacity in teams.

Attachment, Hierarchy, and Adaptive Capacity
In this discussion, an interrelationship between attachment and hierarchy theories will be demonstrated. Theoretically, one or both may help to explain team resilience. Functionally, both attachment and hierarchy could affect the ability of teams to adapt to adverse conditions. This interrelationship can be observed (manifest) in the extent (degree) to which teams seek to minimize uncertainty and reduce risk, in order to create a shared sense of security through establishment of explicit and implicit organizational behaviors (norms) and structures (artifacts). Through analysis of research and review of the literature, a proposed approach to understanding the attachment dimensions of adaptive capacity in teams is offered.

- Attachment behavior established in early human development is a compelling frame of reference for a definition of adaptive capacity in individuals' lifecycles, because it relates to how individuals learn to cope with uncertainty and fulfill needs necessary for survival (Bowlby, 1969, 1973, 1988; Gunderson & Holling, 2002).
- Attachment behavior has been shown to impact adult behavior in close relationships and family systems (Ainsworth, 1967, 1969, 1970; Bowen, 1966, 1978; Main, 1990; Main & Cassidy, 1988; Main & Solomon, 1986, 1988).
- Individuals seek attachment in varying degrees in their adult relationships in other contexts, such as organizations, beyond intimate bonds (Hazan & Shaver, 1990).
- Because most adults spend significant time invested in those contexts, especially in organizations that relate to their ability to survive and thrive in society, early learned strategies of attachment are perpetuated (Harms, 2011; Hazan & Shaver, 1990; Schirmer, & Lopez, 2001).

- Attachment behavior in organizations is evidenced by the establishment of shared meaning of security, or secure base (as defined by Bowlby, 1988), through explicit (documented) and implicit (generally accepted behaviors) norms and organizational structures which are manifestations of hierarchy (Weick, 1995; Ahl & Allen, 1996; Commons, 1991, 1998).
- Cohesive groups and teams serve as figures of attachment and secure base (Mikulincer & Shaver, 2007; Smith, Murphy, & Coates, 1999).
- Leaders are perceived as figures of attachment and secure base (Popper, Mayseless, & Castelnovo; 2000; Popper & Mayseless, 2003; Davidovitz, Mikulincer, Izsak, Shaver, & Popper, 2007; Mayseless & Popper, 2007; Van Sloten, 2011).
- Early established attachment behavior may be modulated during the course of human development into adulthood; however, under stress, individuals may revert to original attachment behaviors and strategies for establishing a secure base (Harms, 1990).

This progression leads to several questions. The focus of this inquiry is, "If attachment behaviors scale from infancy to adulthood; individuals to groups, teams, and organizations; then what are their roles in defining adaptive capacity in project teams and resilience in organizations?" Further, "If we apply a three-faceted understanding of attachment theory, hierarchy theory, and group development to the definition of adaptive capacity, what are the implications for selection (assessment) and development (learning) of team members and leaders in teams and organizations?" This leads to more questions such as, "In the definition of adaptive capacity in teams what aspects are intrinsic capabilities and what are competencies that can be inculcated," "Can they be measured," and "What aspects of attachment of malleable (can be mediated and/or mitigated) and what aspects are set relative to training, leadership, and organization development?" Finally, "Can organizations be assessed for adaptive capacity based upon the extent to which norms (interpersonal, explicit, and implicit behaviors) and hierarchical artifacts are used to create secure base," and "Will organizational assessment of adaptive capacity aid in initiatives to shift toward more resilient teams and organizations?" The scope of this paper does not allow of all these questions to be explored, so the focus will be on the interrelationship of attachment and hierarchy theories as they relate to defining adaptive capacity in teams and organizations. Providing this definition will serve as a foundation for answering the subsequent questions.

Rationale for Defining Adaptive Capacity in Project Teams
Previous research (Edson, 2011, 2012) compelled further investigation into adaptive capacity in project teams. Given that CAS theory is a relatively new approach to understanding group development; my research design used a theoretically pluralistic framework (Midgley, 2000). The study used qualitative methods to investigate the question of whether Gunderson and Holling's (2002) model of ecological adaptation and panarchy could inform our understanding of group development and project team adaptation, thus addressing the gap in understand group development under adverse conditions. A qualitative method was chosen as an initial investigation of this question because so little was known about the subject. Because using positivistic and quantitative methods for testing hypotheses would have been premature, an inductive study design allowed for emergent discoveries.

The intent of the research design was examination of group development and dynamics of a project team experiencing adversity to understand whether a relationship between group

development and ecological adaptation could be established. The qualitative approach allowed the use of inductive research methods, specifically appreciative inquiry (Cooperrider & Whitney, 2005), case study (Yin, 2003) and grounded theory Charmaz, 2006; Glaser & Strauss, 1965, 1967, 1968; Strauss & Corbin, 1990, 1998) to develop an accurate depiction the project team dynamics through its experience of adversity.

The study was conducted with a project team (CUSD2009) at Cornell University, which was competing in the United States Department of Energy's (DOE) Solar Decathlon in 2009 (see http://www.solardecathlon.gov). The Solar Decathlon is an international competition among 20 academic teams sponsored by the DOE to build and exhibit solar homes so as to educate American homeowners and consumers about energy efficiency and sustainability. CUSD2009 was formed in late 2007 from a project team that had just competed in the previous Solar Decathlon in October 2007. Between October 2007 and October 2009, CUSD2009 faced different academic and economic realities than its predecessor. About halfway through the project, the team encountered a $60,000 funding shortfall that threatened the completion of the Silo House, thus imperiling the team's ability to compete in the Solar Decathlon. Ultimately, the team prevailed and competed in the Solar Decathlon in October 2009, taking seventh place.
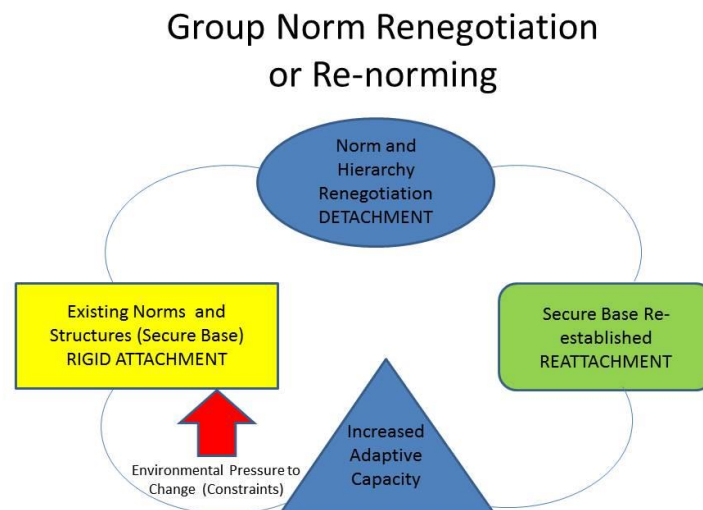
The results of the study showed a relationship between ecological resilience as CAS (Goldstein, 1999; Holland, 1992, 1999; Kauffman, 1993, 1996) and project team resilience as complex adaptive social systems (CASS) (Byrne, 1996; Miller & Page, 2007). The relationship was established using theoretical pluralism (Midgley, 2000). The framework of theoretical pluralism was applied in this research by comparing and contrasting two theoretical models and relating them through underlying principles embodied in each model. Further, methodological pluralism was used in the multi-level analysis. In the study, Tuckman and Jenson's (1977) Group Development Model was compared with Gunderson and Holling's (2002) Ecological Adaptation Model (panarchy) using CAS Theory. Specifically, the research study showed how ecological adaptation (time and space bound) relates to team adaptation (time, space, and agency/meaning bound) through four principles of CAS – self-organization, hierarchy, emergence, and learning. Indeed, project teams can legitimately be understood as CASS. While many findings emerged, it was evident that a clearer understanding of adaptive capacity in CASS, like project teams, would be useful for future research.

One of the most compelling findings of the research related to the dynamics of agency, hierarchy, and adaptation. During the storming phase, CUSD 2009's norming process rejected a formal hierarchical structure led by one project manager in favor of emergent, democratic leadership. In order to overcome the $60K deficit, a barrier to CUSD 2009's participation in the Solar Decathlon competition, the team chose to abandon one set of behavioral and hierarchical norms and artifacts (processes, policies, and procedures) to adopt another set that supported the team's goals and objectives. This is a process of re-norming, which may be understood as a shift in conceptualizing CUSD 2009's collective secure base. As a result of the team's ability to detach from hierarchical structures that inhibited their success, to renegotiate their norms, and then re-attach to new hierarchical structures that enabled the team to progress, they were successful in achieving their aims (see Figure 1). Depending on the degree of change required to re-establish stability (homeostasis), this shift in norms may be modeled as norm renegotiation at the inflection point between norming and performing (Tuckman & Jensen, 1977), at the point of *punctuated equilibrium* (Mayer, Eldredge & Gould, 1972; Gersick, 1988), or as creative destruction (nested) between conservation and release (Gunderson & Holling, 2003).

It is important to note that development of a collective secure base in groups or teams is not to be confused with groupthink (Janis, 1971). Groupthink is a plateau in which the group or team has reached a level of comfort internally with the establishment group norms and externally with the resources available (Janis, 1971). It is an inclination for highly cohesive groups to value consensus over decision quality (Janis, 1982). Groupthink is "blind conformity" to group norms. While groupthink and secure base are aspects of group cohesion, they are different in their outcomes. Groupthink leads to poor quality decision making. Hierarchy and norms influence how groups make decisions and the quality of those decisions, indicative of group cohesion and its propensity for groupthink (Postmes, Spears, & Cihangir, 2001). Group norms serve as feedback and moderators of thresholds for group cohesion through the process of how decisions are agreed upon, whether critical or consensus (Postmes et al., 2001).

In contrast, when a group or team has established a secure base it is an environment in which members sense it is safe to express ideas and opinions that may be different than others without fear of rejection or retaliation. Team members share feedback that is considered valid in the process of improving the function of the organization. Establishment of a collective secure base may create a conducive environment for improved feedback and decision making (Weick & Sutcliffe, 2007).

Figure 1. Norm Renegotiation (Re-norming)

Group Norm Renegotiation
or Re-norming

Norm and Hierarchy Renegotiation DETACHMENT

Existing Norms and Structures (Secure Base) RIGID ATTACHMENT

Secure Base Re-established REATTACHMENT

Environmental Pressure to Change (Constraints)

Increased Adaptive Capacity

Note: Based on *A Systems View of Resilience in a Project Team* (Edson, 2011)

At an organizational level, the norm renegotiation model shown in Figure 1 parallels Lewin's (1947a, b) three-stage model of organizational change. During the first, unfreeze stage, organizational inertia is mastered and the existing "mind set" is questioned, then, it is disassembled. This is done as a matter of organizational survival. Defense mechanisms must be neutralized. During the second stage, change occurs, which entails a period of confusion, uncertainty, and transition. While there is collective awareness that old methods are being challenged, the group does not have clear vision about the methods that will replace them. During the final stage, "freezing," a new frame of mind is crystallizing. The organization's

comfort level is returning to previous levels. Lewin's model has drawn criticism because in today's organizational environment of constant change, there is little time to "freeze" after a change. This is one of the reasons adaptive capacity is integral in developing organizational resilience. While core stability is critical for organizational performance, the more adept teams and organizations are at release of non-critical hierarchical attachments (preserving only those critical for coherent functioning), the better positioned they are to meet environmental challenges.

CUSD 2009's adaptive capacity may be attributed in part to youth, emergent project leadership, and an environment that, while highly competitive, is within an institution in which learning from failure is not only tolerated but encouraged to promote creativity and innovation. However, it was evident that adaptive capacity in project teams is comprised of deeper dynamics and motivations (Hsueh, 2002). The results of the research showed interrelationship between Gunderson & Holling's (2002) model of adaptation in ecological systems with Tuckman & Jensen's (1977) model of group development as expressed through the four principles of CAS, self-organization, hierarchy, emergence, and learning, as shown in Figure 2.Figure 2. Complex Adaptive Cycle in Project Teams

Complex Adaptive Cycle in Project Teams
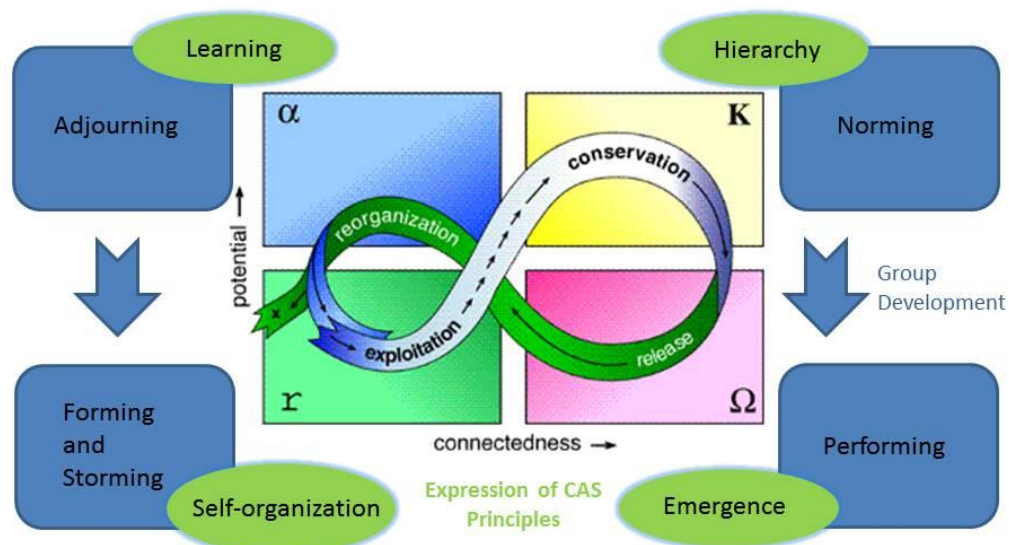
Note: Adapted from Gunderson & Holling (2002), Panarchy: Understanding Transformations in Human and Natural Systems; Tuckman & Jensen (1977), Stages of Small Group Development Revisited; and Edson (2011), A Systems Perspective of Resilience in a Project Team.

Theoretical Approach

This paper establishes adaptive capacity as a fundamental concept relating systems theory as applied to organizational teams. It presents a theoretical proposition for understanding adaptive capacity in project teams using a three-faceted model. The definition of adaptive capacity has three theoretical facets which are: 1.) adaptive group development based upon panarchy and CASS principles, 2.) attachment theory, and 3.) hierarchy theory. The results of previous dissertation research (Edson, 2011) demonstrated the relationship between uncertainty and change as mediated by team agency/meaning making, leadership, and adaptability. Further, the

research made it clear that adaptation in project teams occurs through changes in hierarchical structures (artifacts of organization) and behavioral norms of the group.

Group Development.
Starting with Group Development Theory, Tuckman and Jenson (1977) explained in their phasic model (forming, storming, norming, performing, and adjourning) that a group's activity around the adoption of ideas and norms is an important inflection point in the establishment of group cohesion. The critical juncture occurs between storming and norming, while the group tests ideas and behaviors to determine its threshold or tolerance level for conflict and competition. It is this inflection point that the group's team members establish the ways they will work together. "How we work together" encompasses acceptable behaviors as norms, as well as operating processes and frameworks as hierarchical structures to get the group's goals accomplished. It also establishes the foundation for the group's sub-culture within the organization.

Some teams get stuck in the storming phase by focusing on minutiae of conflict and never coalesce. Others find mutually acceptable ways to work together and develop a plan to work toward the group's goals. At this bifurcation point, some individuals commit to the team's goals and objectives while others do not. Frequently, those who do not commit either stay and are unproductive or seek reassignment to another project. This inflection point is marked by a psychological and behavioral shift by team members from championing ideas and goals held by individuals to advocating for the group's vision, goals, and objectives. An analogy can be inferred from Piaget's (1964) early research with children as they move from egocentrism to sociocentrism via "spontaneous conviction" (Hsueh, 2004). Team members conform to the established norms. Norms become codified.

The term, "SOP," or Standard Operating Procedure, takes on a dual meaning – explicit and implicit. Explicitly, SOPs are documents, policies, procedures, and processes an organization or group follows to accomplish goals efficiently. They offer hierarchical organization and structure to the groups operation. Implicitly, SOPs are the unspoken behavioral rules, which are sometimes inferred. In casual reference, SOPs can include covert behaviors or refer to effective ways to operate in the cultural and political environment in which the group exists. When team members operate within the established norms, they have reasonable expectancy or certainty of being accepted as a contributing member of a successful team. When they do not, storming tension persists. Less stress occurs when one operates within norms, so there is an affinity for members to adapt to the prevailing norms and to avoid tension.

Hierarchy Theory.
Hierarchy Theory is the second facet of the theoretical model as the focus on a group's norms serves as the central basis for the theoretical rationale presented. It is proposed that the more tightly bound a group or team is to its hierarchical structure and norms, the less adaptive capacity it has. In other words, the more attached teams are to their norms the less flexible and adaptable they are to change. For example, a team's threshold for acceptable behavior depends on tolerance of confrontation and conflict. Those who conform operate successfully within the team. Those who test the threshold beyond its tolerance are rejected, sometimes through scapegoating, isolation, or dismissal. The team coalesces and establishes a functional cohesion based upon its norms. It is also the way the group's "pecking order," power dynamic, and hierarchical structure is established. This process governs the way roles and responsibilities are assigned and accountability is managed within teams and organizations. Such dynamics closely align with

Hierarchy Theory (Ahl & Allen, 1996), specifically in terms of team organizational and behavioral (panarchical) nesting.

Further, the nature of norming speaks to development of acceptable standards of behavior that are non-threatening to the existence of the group and its members as in positional and interrelational power. Norming maintains a team's viability because norms are calibrated based on behavioral tolerances and thresholds of the group. It assures team members that rules bound their roles and responsibilities engendering a sense of security and safety that, when team members behave within its established norms and parameters of operating, they will be accepted and acknowledged as productive contributors. When they do not and behavioral tolerances are threatened or thresholds exceeded, the team self-corrects through behavioral strategies such as reinforcement, extinction, and punishment (Skinner, 1938).

Individuals negotiate this behavioral modification at personal and group levels. The storming phase of Tuckman and Jensen's (1977) model of group development refer to particularly turbulent periods of norming as storming, as acceptable behavior levels are calibrated and established. This added degree of understanding is attributed to human sense and meaning-making (Weick, 1995). In short, team members are just trying to figure out where they can operate optimally within the group structure. Team members make choices about commitment to collective goals over individual preferences. Vroom's (1964) theory of expectancy and Bandura's (1977) theory of self-efficacy factor into motivation for conforming to group norms as in beliefs and expectations about individual and group capabilities to achieve goals.

Attachment Theory.
Finally, the attribution that conforming to norms serves as assurance of safety, security, acceptance, and acknowledgement speaks directly to early human development theories, such as Bowlby's Attachment Theory (1988). Bowlby thought human attachment aids survival and has an evolutionary component. "The propensity to make strong emotional bonds to particular individuals [is] a basic component of human nature" (Bowlby, p. 3). Bowlby characterized attachment as:

- Proximity Maintenance - A desire to be close to the people with whom we are attached.
- Safe Haven - Returning to the attachment figure for comfort and safety in the face of a fear or threat.
- Secure Base - The attachment figure acts as a base of security from which the child can explore the surrounding environment.
- Separation Distress - Anxiety occurs in the absence of the attachment figure.

Attachment theory has three main propositions. First, children raised with confidence that their primary caregiver will be available to them are less fearful than those raised without such confidence. Second, this confidence is established during a critical period of human development - during infancy, childhood, and adolescence. The expectations formed during that period tend to remain relatively fixed for the balance of an individual's life. Third, these expectations are tied directly to actual experience. As such, children develop expectations that their caregivers will be responsive to their needs based upon their experiences (i.e. their caregivers have been responsive in the past). Two of the characteristics and the three propositions of Bowlby's Attachment Theory (1988) in addition to other systems theory aspects (Metcalf, 2010) provide the third theoretical facet.

Attachment theory explains the dynamics of human relationships through their bonds to one another. Its central principle focuses on emotional and social development; specifically, an infant's need to establish a relationship with at least one primary caregiver for expected patterns of normal development to occur. Attachment theory explains the extent to which parents' connection and bonding with a child influences his/her emotional and social development. In response to the large number of orphaned children post World War II, the United Nations asked psychiatrist and psychoanalyst, John Bowlby, to conduct research. He wrote a pamphlet, entitled "maternal deprivation" or "failure to thrive." In *Maternal Care and Mental Health* (1951), Bowlby drew from evolutionary biology, ethology, cognitive science, developmental psychology, and cybernetics to further develop his attachment hypothesis.

Bowlby's (1951, 1958, 1960, 1961, 1973, 1982, 1988) attachment theory focuses early human development beginning when infants become attached to individuals who sensitively respond and interact with them and who remain consistent caregivers during a period from approximately six months to two years of age. This is known as sensitive responsiveness. When an infant begins to crawl and walk, they see attachment figures (caregivers) as a secure base from which to explore and return. Patterns of attachment are formed based on caregivers' responses. In turn, patterns of attachment lead to internal working models, which will guide perceptions, emotions, thoughts and expectations in future relationships. Separation anxiety, the grief following the loss of an attachment figure, is considered to be a normal and adaptive response for an attached infant. These behaviors may have evolved because they increase the probability of survival of the child. It is important to note that parental deficiencies in bonding are viewed as *vulnerabilities*, not direct causes of difficulties later.

Mary Ainsworth, Bowlby's colleague, fellow researcher and developmental psychologist, developed the concept of a "safe base" and corresponding attachment patterns: secure attachment, anxious-avoidant (insecure) attachment, and anxious-ambivalent-resistant (insecure) attachment. Later, Mary Main (1986, 1990), a colleague of Ainsworth developed a fourth type, disorganized attachment (Ainsworth, Bretherton & Munholland, 1999). Figure 2 summarizes the four attachment styles.

Hazen and Shaver (1994) extended attachment theory to adults. Other types of interactions may be interpreted as exhibiting elements of attachment behavior, such as peer relationships at any age, romantic relationships, sexual attraction, and care giver relationships beyond infancy to include the sick and elderly. It is expected that individuals who do not establish early secure attachment may develop sensitivity to rejection in later relationships. While attachment theory has been modified through empirical research, its concepts are generally accepted (Rutter, 1995). It serves as a framework for informing existing therapies, as well as development of new approaches and applications (Main, 1999).

It is important to note that Attachment Theory relates to the Systems Sciences through both Cybernetics and Hierarchy Theories. This connection is important because it relates to the scalability of relating concepts of individual security/insecurity and abilities to cope with uncertainty, ambiguity, and change to adaptive capacity at the group, team, and organizational levels. In other words, individual capacities for adaptation and resilience have implications for group, team, and organizational resilience. The proposition of this paper is that individual strategies of attachment developed during infancy not only impact family systems, but group, team, and organizational systems. To pull this thread, a valid argument needs to be constructed that ties scientific evidence that validates theories at each level.

Figure 2. Summary of the Four Attachment Styles

Attachment styles	% of sample (also generalized to represent U.S. population)	The child's general state of being	Mother's responsiveness to her child's signals and needs	Fulfillment of the child's needs (why the child acts the way it does)
Secure Attachment	65%	Secure, explorative, happy	Quick, sensitive, consistent	Believes and trusts that his/her needs will be met
Avoidant Attachment	20%	Not very explorative, emotionally distant	Distant, disengaged	Subconsciously believes that his/her needs probably won't be met
Ambivalent Attachment	10-15%	Anxious, insecure, angry	Inconsistent; sometimes sensitive, sometimes neglectful	Cannot rely on his/her needs being met
Disorganized Attachment	10-15%	Depressed, angry, completely passive, nonresponsive	Extreme, erratic: Frightened or frightening, passive or intrusive	Severely confused with no strategy to have his/her needs met

Note: By Coste, Birgitte (2014) at http://www.positive-parenting-ally.com/attachment-styles.html. Based upon Ainsworth, M., Blehar, M., Waters, E., & Wall, S. (1978). *Patterns of Attachment*. Hillsdale, NJ: Erlbaum; Main M, Solomon J (1986). "Discovery of an insecure disoriented attachment pattern: procedures, findings and implications for the classification of behavior". In Brazelton T, Youngman M. *Affective Development in Infancy*. Norwood, NJ: Ablex.

First, Bowlby was influenced by cybernetics, or control theory as he referred to it (Metcalf, 2010). He viewed an infant's need for proximity to an attachment figure as homeostatically balanced with the need for exploration (Bowlby, 1969, 1982, 1988). Bowlby compared this balance between proximity and exploration to physiological homeostasis (Bowlby, 1988; Main & Cassidy, 1988). His comparison links to his colleagues' work, specifically Piaget (1964) and Bertalanffy (1949), in developing General Systems Theory (Metcalf, 2010). That is, a child's needs for proximity and exploration changed, the actual distance the child maintained changed. For example, when a child felt threatened or was injured, closer proximity to the attachment figure was sought; however, when safety was perceived more distance was sought. The caregiver is not the goal of the child's behavior, but a secure state of being at desired distance from the caregiver given the situation. This is akin to the frequently referred to "comfort zone" the state of security in which one retreats with perceived threat and

one expands with perceived safety (Yerkes & Dodson, 1907; Bardwick, 1995; White, 2009; Taylor, 2012). This secure state is a concept that will be related to resilience at multiple levels later in this paper.

Second, Bowlby (1969) introduced the idea that there is a hierarchy of attachments. In infants, the primary caregiver, usually the mother is at the top of the hierarchy with secondary and tertiary attachments nested below. For example, in the African tribe, the Efe, village women share care by breast feeding one another's children. Even so, Efe infants form primary attachment with their biological mothers. Main (1999) states,

> Although there is general agreement that an infant or adult will have only a few attachment figures at most, many attachment theorists and researchers believe that infants form 'attachment hierarchies' in which some figures are primary, others secondary, and so on. This position can be presented in a stronger form, in which a particular figure is believed continually to take top place ("monotropy") ... questions surrounding monotropy and attachment hierarchies remain unsettled. (pp. 845–87)

Relationship to hierarchy theory can also be seen in the works of Piaget (1964), Ainsworth (1987) as well as Hazan and Shaver (1994) through their descriptions of not only hierarchical attachments, but hierarchies of behavior. Attachment speaks to sense-making (Piaget, 1977; Piaget & Inhelder, 1973; Dervin, 1992; Commons, 1991; Weick, 1995) as infants interpret signals from their environments to develop hierarchies of understanding and behavioral strategies to get their needs met. Hierarchy relates not only to organization and structure, but sense-making in open systems through organizational artifacts and processes (Weick, 1995).

Adaptive capacity in project teams depends upon group adaptation – its capability to renegotiate group norms in the face of adversity. It is critical that team members, individually and collectively, recognize when established hierarchical structures no longer serve the goals and objectives of the team and/or its current operating model no longer assures the team's survival, much less success. It requires capability within the team, however, to acknowledge that the current structure inhibits necessary functioning, and to move towards constructive action in seeking alternatives that will more likely create success.

Attachment and Hierarchy

In their discussion of "ordering levels," Ahl and Allen (1996) explicate nestedness across biological, ecological, and social systems, specifically making distinctions about context, constraint, and behavioral frequency. A link between Ahl and Allen's explanation of hierarchical constraint and context with attachment theory can be construed through Ainsworth's Attachment classifications. Ahl and Allen (1996) state,

> By being unresponsive, higher levels constrain and thereby impose general limits on the behavior of small-scale entities. Constraint this therefore achieved not by upper levels actively doing anything but rather by them doing nothing. For example, parents constrain a child's temper tantrum not by shouting back but rather by not reacting, and ignoring all the child's high-frequency thrashing and screaming. It may seem counterintuitive that imposing limits through constraint is passive, absence of behavior, rather than active manipulation. In the parlance of statistics, the upper level is a

parameter for the variable behavior of lower levels. Parents are parameters for children's high-frequency developmental changes (p. 103)

This parental strategy is also known as extinction of behavior because attention-seeking behavior no longer occurs (Skinner, 1979). While attention-seeking provides infants a way to express their needs through limited communication means, such behaviors may become pathological if reinforced. These behaviors are subsequently viewed as "neediness." Conversely, in the Strange Situation Procedure, Ainsworth (1987) defined "anxious avoidant insecure attachment" by demonstrating how inappropriate and excessive parental use of extinction (ignoring signals for attention so needs go unfulfilled) can be detrimental to children. When the caregiver of a child with anxious-avoidant insecure attachment style departs then returns, the child avoids, ignores, and displays little emotional response. Ainsworth's records indicate that infants avoided the caregiver when a history of rejection of attachment behavior occurred. When a child's needs go unmet often, the child learns that his/her expression of needs has little or no influence on his/her caregiver. In the Strange Situational Procedure, Ainsworth's protégé, Mary Main (1990), theorized that anxious-avoidant behavior should be thought of as a conditional strategy. This behavior allows proximity whenever possible under conditions of maternal rejection by diminishing attachment needs. Main suggested that avoidance has two functions for a child whose caregiver is consistently unresponsive to his/her needs. First, avoidant behavior permits a child to maintain a conditional proximity with his/her caregiver in terms of being sufficiently close for protection, but sufficiently distant to avoid rejection. Second, the cognitive processes forming avoidant behavior may direct attention away from the unfulfilled need for bonding with the caregiver; thus, the child avoids feelings of overwhelm and loss of control (disorganized) so as to achieve some level of conditional proximity.

Scientific research (using rodents) by Amano, Unal and Paré (2010) revealed that extinction is correlated with synaptic inhibition in the fear output neurons of the central amygdala. These neurons project to the gray matter controlling the freezing response (feigning death to avert predator attack). Further, inhibition originates in the ventromedial prefrontal cortex. Their results suggest potential cellular targets for new anxiety treatments. This research supports Ainsworth and Bell's (1970) theory that the unperturbed behavior exhibited by avoidant infants is actually concealment of distress, a hypothesis later evidenced through studies of the heart-rate of avoidant infants (Spangler & Grossmann, 1993; Sroufe & Waters, 1977).

With verification of relationship between attachment and hierarchy in the biological sciences, the question arises, "How scalable is this phenomenon?" Further, "What are the implications to the development of resilience in individuals working in teams and their organizations?" In other words, "Now that we know these two theories are related, what is next?"

How Does It All Fit Together?

Previous research by Edson (2011) established a correlation between group development and CAS. This paper extends that work down into the psychodynamic realms of individuals and groups, and beyond the level of teams into the organization and larger environments.

Humans continue to need a sense of security throughout their lives. Bowlby's (1988) Attachment Theory provides an explanation for the foundation with which individuals begin. We project our beliefs about security onto many different images throughout our lives, however, as we develop and mature. That projection begins with surrogate caregivers and schoolteachers, and moves on to more extended social and cultural representations. In developed economies, that includes employers, work supervisors, co-workers, as well as governmental institutions, financial systems, and so on.

Project teams have become an established part of many organizational structures. Individuals are expected to work effectively in them, often with little preparation for the relationships involved. Tuckman and Jensen's (1977) model of team development is simply a description of the usual dynamics through which such groups learn to work together. This process of adaptation is not essentially different from what we expect of individuals in many other roles in society – and in fact, are so common, that we consider them a part of "socialization." Young children are expected to adapt to group settings and generalized expectations of behavior when they enter schools. They learn to show respect for unfamiliar authority figures, and to behave as instructed. Adults take those learned skills into the workplace, both in terms of how they behave as employees, and how they manage others.

We have come to depend upon organizational structures as proxies for security. Small organizations are much easier to find and join (e.g. working in a restaurant or fast-food establishment.) Large corporations provide many more levels of potential advancement, and typically a much wider range of benefits (e.g. healthcare, retirement, etc.) Government institutions tend to pay somewhat lower wages, but provide a greater sense of secure employment over time.

In terms both of adaptation and of hierarchy, all of this happens dynamically, over time. Organizations are created, almost always with the hope that they will grow. They are structured internally to produce specific products or services, or in line with particular market demands. They must remain viable, but they must also be "habitable" for the people who work in them. Both internal and external forces work continuously in shaping organizational structures, which are ultimately only manifestations of human communication and relationships.

As teams form and disappear within the ecologies in which they exist (the organizations and larger societal structures), there is a constant tension between stability and change. What structures and functions must be released, at what levels, in order to conserve at other levels? From a human standpoint, what roles and relationships must be lost or changed for progress to occur? And within that human context, which relationships at what levels represent security, or even meaning?

In this paper, the relationship between hierarchy and attachment is made with respect to the human inclination to establish strategies for security and certainty through sense-making (Piaget, 1977; Weick, 1995). While the panarchy model (exploitation, conservation, release, and reorganization) speaks of conservation strategies, of which hierarchy building is one approach, conservation has a broader meaning (e.g. efficiencies to reduce energy use). Self-organization could also be interpreted to be an attachment strategy in that humans tend to seek relationships

with what is "known." Both hierarchy and self-organization were part of the CAS theory used to relate Tuckman & Jensen's (1977) model to panarchy (Gunderson & Holling, 2002).
So, the panarchy model, as well as Weick's (1995) "mean-making" factor into the discussion of adaptive capacity at two levels - individual and organizational. This paper is focused on defining "adaptive capacity" in teams, so the intent is to drill down into exactly what that means in human terms - fundamental drives such as establishing a "secure base." In this paper, we are not drawing a compare/contrast analysis between Tuckman & Jensen's model (1977) and Bowlby's attachment theory (1977), but focusing on why individuals, hence teams, need a secure base (either through hierarchy or having confidence based in past experience) for adaptation.

Several questions arise out of this supposition. For example, can humans adapt, that is, create a secure base as individuals and then collectively in teams that relies less on attachment to behaviors and artifacts of hierarchy using low context strategies (e.g. documentation of policies, procedures, rules, laws, and contracts) and more on interpersonal relationships and networks (e.g. trust, confidence, and comfort with uncertainty) or high context strategies of cooperation and collaboration?

In other words, can teams be more flexible, thus agile, rather than inflexible and rigid, thus fragile (Taleb, 2012). This supposition speaks to the works of Hall (1976), Schein (2004), Hofstede and Hofstede (2005), and Tainter (1988) with a central focus on how humans use behavior and artifacts to develop trust, establish secure base, become freed to explore, and take risks. In essence, adaptive capacity entails capabilities to maintain flexible attachments and competencies to maintain flexible hierarchies within organizations. Bennett & Bennett (2004), highlight the differences between bureaucracies and world-class organizations, as shown in Table 1.

Table 1. Differences between bureaucratic/rigid and world-class/agile organizations

Bureaucratic (Rigid) Mode	**World-Class (Agile) Mode**
Focuses on organizational stability through accuracy and repetition of internal processes	Focuses on flexibility and responsiveness to customer needs
Senior leadership uses autocratic decision-making with execution by unquestioning employees	Through engagement, leaders encourage ideas and capabilities of employees to improve decision-making and organizational effectiveness
Technology improves efficiency and employees are expected to adapt	Technology is leveraged to support and liberate employee engagement and effectiveness
Establishes fixed processes to ensure precision and stability with little concern for value	Takes action to reduce perfunctory processes and eliminate waste while increasing value
Avoids or eliminates requisite variety to increase stability	Leverages requisite variety for innovation

Management keeps strong control by limiting shared knowledge (power) and teams.	Teams achieve improved, balanced decision-making through shared knowledge and learning.
Metaphor: Knowledge is Power	Metaphor: Knowledge Shared is Power Squared

Note. Based on Organizational Survival in the New World: The Intelligent Complex Adaptive System (p. 9), by A. Bennett and D. Bennett, 2004, Burlington, MA: Elsevier - Butterworth Heinemann, and "Principles of the Self-Organizing System," by W.R. Ashby. In H. Von Foerster & G. W. Zopf, Jr. (Eds.), Principles of Self-Organization: Transactions of the University of Illinois Symposium (pp. 225-278), 1962, London, UK: Pergamon Press.

This comparison shows the constraints attachment to hierarchy puts on organizations. In terms of panarchy (Gunderson & Holling, 2003), the more rigid a socio-ecological hierarchy is, the more vulnerable it becomes collapse. Tainter (1988) and Diamond (2005) also observe this phenomenon in the societies they studied.

Discussion, Conclusions and Recommendations
This analysis of underlying theories related to meaning making, secure base, and adaptation leads to the question which is the focus of this inquiry, "If attachment behaviors scale from infancy to adulthood; individuals to groups, teams, and organizations; then what is its role in defining adaptive capacity in project teams and resilience in organizations?" Further, "If we apply a three-faceted understanding of attachment theory, hierarchy theory, and group development to the definition of adaptive capacity, what are the implications for selection (assessment) and development (learning) of team members and leaders in teams and organizations?"

This leads to more questions such as, "In the definition of adaptive capacity in teams what aspects are intrinsic capabilities and what are competencies that can be inculcated," "Can they be measured," and "What aspects of attachment of malleable (can be mediated and/or mitigated) and what aspects are set relative to training, leadership, and organization development?" Finally, "Can organizations be assessed for adaptive capacity based upon the extent to which norms (interpersonal, explicit, and implicit behaviors) and hierarchical artifacts are used to create perceptions of a secure base?" and "Will organizational assessment of adaptive capacity aid in initiatives to shift toward more resilient teams and organizations?" The scope of this paper does not allow of all these questions to be explored. The purpose of this paper was demonstrating the interrelationship of attachment and hierarchy theories as concomitant to the definition adaptive capacity in teams and organizations.

This discussion focuses on three areas of potential for further development of understanding the interrelationship between attachment and hierarchy, which include: a.) research, b.) assessment and c.) intervention.

Research. If we accept the notion that attachment manifests throughout the human lifecycle and that seeking hierarchy is a way to create a secure base through norming, how does this manifest in organizations? How do we know (evidence)? This question poses the classic causality dilemma of the "chicken and egg," "Which comes first?" Scientific (positivistic) approaches recommend a linear path of research, hypothesis creation, testing, validation, retesting, and results. Systems approaches suggest organic research design, in that both sides of the question

may be examined simultaneously, as with Action Research (Stringer, 2007). This may yield greater insight even though taking more time, which, given the nature of attachment in human relationships is merited. Because attachment is intimately tied to trust, the research done in this area requires care and discernment. In addition, evidence-based approaches may help build a path toward future research that will be valuable to organizational behaviorists and systems scientists. Thus the economic concept of the chicken – egg problem as a vicious circle becomes a virtuous circle because gathering evidence of the phenomena allows observation of tipping points in organizations, even if in retrospect.

Assessment. A significant body of research points to the need for greater insight into attachment in organizations including: a.) leadership, emergence, and effectiveness; b.) trust; c.) job attitudes, stress, health, coping, and work-life balance; and d.) job performance. As previously mentioned, the Five Factor Model has dominated psychodynamic assessment in organizations. Harms makes important distinctions in drawing relationships between attachment styles and personality traits (e.g. Five Factor Model),

> Despite several studies finding links between attachment and the Big Five, it has been noted that attachment styles typically show significant predictive power above and beyond the Big Five traits (e.g. Noftle & Shaver, 2006; Roisman, Fraley, & Belsky, 2007), particularly when relationship outcomes are the criteria of interest. Moreover, the relationships between the Big Five traits and attachment styles are generally small or insignificant. Indeed, Bowlby's writings make it clear that attachment styles were never meant to be considered a composite of general personality traits and efforts to define attachment in those terms are misguided (Fraley & Shaver, 2008). For example, attachment theory postulates that when individuals feel they have secure base of attachment that they can trust and rely on, they are more willing to engage in exploratory behaviors. In FFM terms, this would be akin to making the argument that individuals low in neuroticism become high in intellect/openness to experience. Not only does this violate the orthogonal nature of FFM phenotypic traits, but it implies that there is a causal relationship between the traits themselves. (2011, p. 287)

And yet a Five Factor Model assessment, the Hogan Personality Inventory (Hogan, 1988) is an exception because it includes an attachment subscale, which has been associated with counter-productive work behaviors and managerial potential (Harms, 2011). As Harms observes, most assessments are intended for research not organizational environments.

This gap between research and practice provides fertile ground for development of instruments to assess not only the extent attachment impacts team and organizational performance, but also the evaluation of adaptive capacity and organizational resilience through linking attachment styles to hierarchical norming. In particular, such assessments may be useful in revealing the sources of resistance to change through defense mechanisms such as denial or clinging to processes that are no longer relevant to organizational objectives. Moreover, assessment may be indicative of how attachment and hierarchical norms manifest during different levels of change, stress, and adversity. For example, "How do the attachment styles manifest with day-to-day changes versus organizational challenges and crises?" Would assessment reveal a bandwidth of response akin to a Resilience Scale? If so, then could

predictive tools be developed to assist organizations in selection, preparation, planning, and training for change? This last question leads to the third implication, intervention.

Intervention. If constructive change is to occur in organizations, it will likely come through resilient teams that have built adaptive capacity with experience and supportive leadership. Based upon the findings of prior research (Edson, 2011) and the literature review for this analysis, a relationship between attachment theory, hierarchy theory, and adaptive group development provides compelling foundation for defining adaptive capacity in project teams.

In sum, organizational resilience is the ability of the members to collectively respond to change without losing the integrity of the organizational function. Organizational resilience relies upon adaptive capacity. In terms of a conceptual model, adaptive capacity can range from low (rigid, tightly bound hierarchy with high attachment to norms and processes) to high (flexible, loosely bound hierarchy with low attachment to norms and processes). It would be easy to reduce this conceptualization to a two-by-two grid or two dimensional model, but doing so would not accurately portray the discernment that is required during assessment. Care must be used because the tendency to place ideas in buckets is yet another hierarchical construct that may not serve an organization well. It is also important to recognize that organizational culture is a mitigating factor is development of adaptive capacity. Strategies that influence development of adaptive capacity include:

- Assessment of attachment to and need for hierarchical structures
- Establishment of a collective secure base through organizational culture
- Intentional initiatives to create flexible hierarchies of norms and structures (e.g. policy, procedure, and process evaluation for relevance in the current operating environment)
- Ability to moderate and mitigate anxious, ambivalent, and avoidant behaviors by addressing organizational citizenship and counter-productive work behaviors
- Selection of leaders with adaptive *capacities* (inherent adaptability and secure attachment) enabling them to establish secure base for their teams and the organization (trustworthy, trusting, ethical,
- Training for *competencies* of resilience (evaluation of processes, collaboration, information sharing, strategic planning)

Implications

Some implications for further research and development include exploring the nature of adaptive capacity of individuals and organizations to address (volatility, uncertainty, complexity, and ambiguity) VUCA (Stiehm & Townsend, 2002; see Appendix A) in several areas: a.) sense-making through knowledge management; b.) readiness considerations for high reliability, crisis management, and disaster recovery teams; c.) process management, service systems, and systems engineering, d.) functional response and impact models, e.) forward practices and backcasting (The Natural Step, 2014).

Understanding adaptive capacity in project teams may support VUCA management and leadership initiatives. According to Wolf (2007), VUCA management depends upon enterprise value systems, specific assumptions, and natural goals. A "prepared and resolved" enterprise is engaged with a strategic agenda that is aware of and empowered by VUCA forces (Wolf, 2007, p. 115). Johansen (2007) emphasizes that the capacity of leadership to address VUCA in strategic and operating terms is contingent upon discernment of social, political, economic, and

technical realities of the work environments. Developing with sensibilities or "deep smarts" about the facets of VUCA may be essential for sustainability in a complex world (p. 68). In addition, psychometric measurement of fluid intelligence (Cattell, 1971), which includes inductive and deductive reasoning, is a general ability for forming concepts and solving problems through use of unfamiliar information or novel processes (Cattell Horn Carroll theory of cognitive abilities, 1941, 1965, 1993), may be predictive of cognitive performance in VUCA contexts.

Because preparation reduces the perception of uncertainty through meaning making hierarchies of processes and procedures, leaders may be able to develop competencies of resilience in their teams and organizations, in a way of being prepared for the unexpected or *in omnia paratus*, prepared for all things. While teams may not be able to anticipate every adversity, teams can develop resilience to adapt and change to new conditions through a cultivated willingness for reflection and evaluation using feedback. Examples of rapid incorporation of feedback include High Reliability Teams and Organizations (HRTs and HROs) (Burke, Wilson, & Salas, 2005; Weick & Sutcliffe, 1999, 2001, 2007). Adversity tests organizational flexibility (openness to feedback) and adaptability (versatility in making necessary changes). While adversity disrupts (pertubates) the system, and tests its thresholds, it also prompts renegotiation of those thresholds in human systems. Over a longer term, learning the process of renegotiation of thresholds helps build adaptive capacity that can be applied to future adversity at the team level. In sum, adversity can be a catalyst for change – positive, negative, and possibly transformative.

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Appendix A – Definitions

Complex adaptive systems are characterized by many components, which include flexible agents capable of learning, self-organization, and emergence (Holland, 2006). In addition, they are distinguished by adaptive capacity, which renders resilience under conditions when perturbations occur in systems – physical and ecological (Gunderson & Holling, 2003). These characteristics – agency, self-organization, learning, and emergence are articulation points between ecological and social systems to render adaptive capacity in both CAS and CASS. For clarification, several definitions used within this context need further distinction.

Adaptive Capacity

Adaptive capacity in CASS is the ability of the system to maintain its function and integrity under new constraints while operating at a new level of conscious awareness (agency) that transcends form no longer serving its purpose (Miller & Page, 2007). Adaptive capacity allows for a higher tolerance for change (Bennett & Bennett, 2004). Organizational resilience is sometimes considered as the degree of flexibility or rigidity of an organization's culture in response to change (Schein, 2004). In other words, organizational resilience is a collective adaptive capacity (versatility comprising abilities to use feedback for self-organization, hierarchy building, emergence of innovation, and learning) for change. In my research I (Edson) found that resilience is an ability of a human system or a CASS (team, organization) to adapt its structure while maintaining its function, which often entails emergence of new processes (behaviors, norms, and ways of organizing).

In broad terms, adaptive capacity is defined as the ability of a system to adapt in a changing environment. In human social systems, it is defined as organizational learning through accumulated experience and understanding, flexibility in decision making and problem resolution, and responsive organizational structures that consider the needs of all stakeholders. The Resilience Alliance (2014, http://www.resalliance.org/index.php/adaptive_capacity) describes adaptive capacity as follows:

> Adaptive capacity in ecological systems is related to genetic diversity, biological diversity, and the heterogeneity of landscape mosaics (Carpenter et al. 2001a, Peterson et al. 1998, Bengtsson, 2002).
> In social systems, the existence of institutions and networks that learn and store knowledge and experience, create flexibility in problem solving and balance power among interest groups play an important role in adaptive capacity (Scheffer et al. 2001, Berkes et al. 2002).
> Systems with high adaptive capacity are able to re-configure themselves without significant declines in crucial functions in relation to primary productivity, hydrological cycles, social relations and economic prosperity. A consequence of a loss of resilience, and therefore of adaptive capacity, is loss of opportunity, constrained options during periods of re-organisation and renewal, an inability of the system to do different things. And the effect of this is for the social-ecological system to emerge from such a period along an undesirable trajectory.

Further, the Resilience Alliance (2014) contends that resilience is essential in the enhancement of adaptive capacity, stating:

Addressing how people respond to periods of change, how society reorganizes following change, is the most neglected and the least understood aspect in conventional resource management and science (Gunderson and Holling 2002). Folke et al. (2002) identify and expand on four critical factors that interact across temporal and spatial scales and that seem to be required for dealing with natural resource dynamics during periods of change and reorganization:

- learning to live with change and uncertainty;
- nurturing diversity for resilience;
- combining different types of knowledge for learning; and
- creating opportunity for self-organization towards social-ecological sustainability.

In both ecological and social systems, adaptive capacity supports resilience under changing environmental conditions enabling reorganization with minimal functional loss. In ecological systems, resilience results in net primary productivity, maintenance of biodiversity and biomass, and stable hydrological cycles (water distribution, state, and condition). In human social systems, resilience results in stable social interactions, maintenance of value in social networks, and improving economic status (flourishing or thriving).

It is important to note a distinction between adaptive capacity in ecological systems, social systems, and human social systems in the role of agency in promoting adaptive capacity. Ecological systems are bound by time and space. While they may have the capacity to learn given genetic propensity to do so, social systems and human social systems are bound by time, space, and agency, which allows consciousness and decision making as factors in accumulation of knowledge and learning. Further, human social systems are distinguished by sense-making and meaning making (Wieck, 1995). Human social systems can develop competencies around learning to live with change and uncertainty, nurturing diversity, leveraging knowledge for optimal learning, and initiating organizational changes for survival, sustainability, and flourishing.

At high levels of organization in ecology and society, these definitions describe contributing factors of adaptive capacity, but they do not answer the question, "What is the essence or root of adaptive capacity in teams?"

The purpose of this discussion is to explore the role of adaptive capacity in teams as an essential aspect of understanding adaptation in social systems, and to clarify its role in group development under adverse conditions, specifically to ascertain social strategies of resilience. Because teams are comprised in individuals, it is important to investigate the development of psychological and behavioral strategies of adaptation (capacities) at other levels, namely individual and organizational. This approach ascertains how adaptive potential is established and fostered throughout a life cycle not only of individuals, but also team members, teams, and organizations.

1. In other words, we need to follow the progression of adaptation from infancy through adulthood to gain understanding about individual, group, and organizational capabilities for adaptation through individual and collective abilities to be comfortable with volatility, uncertainty, change, and ambiguity, or to borrow from the U.S. Army War College, VUCA, (Stiehm & Townsend, 2002, p. 6). VUCA impacts how individuals and teams,

view the context in which they make decisions. VUCA is recognized to influence organizational capacity to anticipate factors the impact conditions, understand consequences of actions taken in response to factors, appreciate the interdependence of multiple variables, anticipate challenges, prepare alternatives to the current reality, as well as comprehend and seize opportunities.

We contend that these capabilities develop in individuals' early in life and are carried not only into intimate social relationships, but also at work, in teams and organizations, with significant impact. Development of this systemic understanding will require a multi-level analysis (individual, team, and organizational).

In addition to developing a systemic understanding of the dimensions of adaptive capacity, anticipating implications of such a definition is also important because there is always a risk such definition will be exclusive rather than inclusive. While adaptive capacity encompasses certain competencies that can be taught, it also includes intrinsic capabilities (potential) which are acquired early in human development. The implication is that we can teach teams and they can learn to increase adaptive capacity in terms of competences; however, there may be limits given the individuals' capabilities. It will be important to distinguish the extent to which competencies can be inculcated and discern the capabilities for which leaders need to select during team formation.

Resilience

Resilience is "an ability to recover from or easily adjust from misfortune or change" ("Resilience," 2009). Senior editor at the Harvard Business Review, Coutu (2002) says, "More than education, more than experience, more than training, a person's level of resilience will determine who succeeds and who fails" (p. 6). In CASS, resilience comprises aspects of engineering, biological, and ecological resilience plus another layer of complexity through human agency (Miller & Page, 2007). Human cognition and sense making (Weick, 1995) add complexity to the four factors that are characteristic of complex adaptive systems – self-organization, hierarchy, emergence, and learning (Gunderson & Holling, 2002; Mintzberg & Westley, 1992; Mitchell, 2009).

Adaptive capacity in complex adaptive social systems is the ability of the system to maintain its function and integrity under new constraints while operating at a new level of conscious awareness (agency) that transcends form no longer serving its purpose (Miller & Page, 2007). This adaptive capacity allows for a higher tolerance for change (Bennett & Bennett, 2004). Organizational resilience is sometimes considered as the degree of flexibility or rigidity of organizational culture in response to change (Schein, 2004). In other words, organizational resilience is a collective adaptive capacity (versatility comprising abilities to use feedback for self-organization, hierarchy building, emergence of innovation, and learning) for change. In the context of this analysis, resilience is the ability of a human system or a CASS (team, organization) to adapt its structure while maintaining its function, which often entails emergence of new processes (behaviors, norms, and hierarchical structures).

Adversity

McMillen (1999) found that people can benefit from adversity. This finding may seem like the Nietzsche adage, "Whatever does not kill you makes you stronger." According to Seery, Holman, and Silver (2010), the adage is true for some types of individual resilience. As

attachment behaviors are antecedents to development of a secure base (Bowlby, 1982), responses to adversity are antecedents to resilience, in that resilience is one possible outcome of many (Earvolino-Ramirez, 2007). Adversity encompasses unanticipated, unforeseen, and unplanned events that impact a project team's ability to meet its goals and objectives. Adversity may occur as internal organizational perturbations - disruptions, competitive markets, or environmental factors that increase uncertainty or systemic instability. Adversity tests group cohesion and commitment (Bandura, 1989, 2000). Given the potential impact that adversity can have on the stability and sustainability of an organization, an understanding of how groups collectively rebound from adversity is essential to the ongoing success of the organization. So, it is important to understand the dynamic between adversity and resilience.

Adversity represents uncertainty and is frequently met with strategies to reduce uncertainty through increased control. Imposition of control mechanisms or hierarchical behaviors and structures can have an inverse effect. Engelhardt and Simmons (2002) observe,

> Organization is essentially a systemized whole consisting of interdependent and coordinated parts. Flexibility centers on modification or adaptation. The more systemized and interdependent a group of humans is, the more difficult the change process. Thus, flexible organizations have typically have been thought of as having less top down control and more team and individual empowerment. (p. 113)

Because of systemic interdependencies with embedded hierarchies, organizational change is difficult. Adversity stresses these interdependencies and increases reliance on hierarchy to establish stability. Bureaucracy is an example of this strategy demonstrating Bertalanffy's (1969) principle of "progressive mechanization," in which hierarchy in an organization creates specialization in the pursuit of efficiency (p. 213).

In time, an organization becomes increasingly inflexible because hierarchy assumes stability in the environment (p. 213). Rigidly following rules reduces learning. Adversity, if viewed as an opportunity, compels organizational learning. (Chan et al., 2003). As Farson (1996) puts it, "this presents us with the paralyzing absurdity that the situations we try hardest to avoid in our organizations would actually be the most beneficial for them" (p. 126). An inclination to address uncertainty (adversity) with more control is counterproductive.

It seems apparent that organizations have a lot to gain by understanding the dynamics of adversity and resilience in teams by learning to build adaptive capacity. Engelhardt and Simmons (2002) believe organizational resilience is an oxymoron; yet, the dynamic between adversity and resilience may behave as continuum rather than as an either/or state. Adversity tests organizational flexibility through openness to feedback and adaptability through versatility in making necessary changes. While adversity perturbates the system, and tests its thresholds, it also prompts renegotiation of those thresholds. Over a longer term, progressive learning (double-loop) the process of renegotiation of thresholds helps build adaptive capacity that can be applied to future adversity at the team level. In sum, adversity can be a catalyst for change – positive, negative, and possibly transformative.

Attachment
A formative bond between an infant and caregiver (Bowlby, 1951), which stimulates brain growth, effects personality development, and influences lifelong ability to form stable relationships. Neuroscientists have found that attachment is a primal need involving networks of

dedicated neurons in the brain and that forming lasting bonds is partially activated by oxytocin (Buchheim, Heinrichs, George, Pokorny, Koops, Henningsen, O'Connor & Gündel, 2009).

Hierarchy

In short, hierarchy is the way systems organize time and space to survive (Ahl & Allen, 1996, 2008). In human systems, meaning making is added a third dimension (Piaget, 1907, Weick, 1995). Culture, whether tribal, national, or organizational, encompasses hierarchical (organizational) strategies for societal survival through creating meaning through time and space (Hall, 1959, 1966, 1976, 1983) within a specific context. Hierarchy is a form of differentiation that can be symmetrical or complementary (Bateson, 1974, Mead, 1935). In this paper, hierarchy is neutral, a way of finding meaning through organization. It is not synonymous with bureaucracy, which is a rigid form of hierarchy. In the context of panarchy (Ahl & Allen, 1995; Gunderson & Holling, 2003; Tainter, 1988), rigid hierarchies (ecological and social) are vulnerable to collapse when environmental change occurs. As observed in Edson (2012), social systems (project teams) near collapse can consciously decide to release hierarchical norms (behaviors) and structures (artifacts) that no longer serve the survival of the system in favor of change, adaptation, and innovation. This process is also known as creative destruction (Schumpeter, 1942, 2009). Through creative destruction the system has learned to adapt and thrive under new environmental conditions. Through continued adaptation and organizational learning (Argyris, 1999), the system builds adaptive capacity, which enables it to be resilient during future environmental changes. The system has been transformed.

Norms and norming

The formation of organizational culture essentially occurs through establishing *norms*. According to Bettenhausen and Murninghan (1985), social norms are among the most powerful and least evident forms of social control over human action. Sherif (1936) defined *norms* as "customs, traditions, standards, rules, values, fashions, and all other criteria of conduct which are standardized as a consequence of the contact of individuals" (p. 3). Bettenhausen and Murninghan viewed norms as "regular behavior patterns that are relatively stable within a particular group" (p. 350).

The *norming* process is essential in group and organizational culture development because it reduces uncertainty and increases group cohesion (Schermerhorn, Hunt, & Osborn, 2000). Understanding the importance of group norming was borne out of the Hawthorne studies conducted during the 1920s and 1930s (Gautschi, 1989; Robbins & Judge, 2007). During norming process, members of the organization standardize behavior and establish structures or hierarchies of how actions are conducted and who takes responsibility for the attainment of goals and objectives (Schermerhorn et al., 2000).

Norming is recognized as one of several phases of group development (Bennis & Shepard, 1956; Herbert & Trist, 1953). One of the most promulgated models of group development is Tuckman's (1965) phasic model – forming, storming, norming, and performing. Later, Tuckman and Jensen (1977) added two additional stages – adjourning and reforming. Many other researchers use this model for the basis of their work (Gersick, 1988, 1989; McGrath, 1984; Morgan, Salas, & Glickman, 1994; and Wheelan, 1990, 1994). These models also recognize a stage or phase in which the group constructs standards and codes of acceptable and unacceptable behavior. In Tuckman's (1965) model, this is the *norming* stage. In teams, one

of the most important aspects of the norming stage entails how the team will make decisions in order to meet its objectives.

Organizational learning and transformation

While adversity in moderation appears to build adaptive capacity in individuals, is it also a precursor to collective resilience? According to Chan, Lim, and Keasberry (2003), an aptitude for organizational learning and transformation comes from adversity through adaptation to change. A reflective aspect of human agency can be leveraged for learning and building capacity for future changes.

Organizational learning is a characteristic of adaptive systems and it is distinguished by double-loop learning (Argyris & Schön, 1978; Flood, 1999; Gunderson & Holling, 2002; Senge, 1990). Argyris and Schön (1978) differentiated single-loop learning—actors' modification of their actions—from double-loop learning, which is the actors' inquiry into the need for modification of the assumptions, beliefs, and values underpinning those actions. An example of double-loop learning is team debriefing after a project has been completed to reflect upon the effectiveness of the group and its processes in meeting its objectives, as well as integrating the lessons learned from the experience in their approach to further work together.

Senge (1990) recognized learning as study and practice on the path to mastery. Flood (1999) based his view of organizational learning on Checkland's (1999) soft systems methodology to reframe Senge's thesis in terms of systemic structures, functions, and processes. According to Argyris (1999), double-loop learning is necessary for organizational learning and organizations learn through reflective evaluation of their processes. Adversity prompts many organizations to evaluate processes and change through adaptation. Successful adaptation relies upon organizational learning.

Organizational learning is part of the adaptive cycle in ecological and social systems (Gunderson and Holling, 2002). The adaptive cycle includes self-organization, hierarchy, emergence, and learning through four stages (exploitation, conservation, release, and reorganization). The transformative power of resilience is realized during reorganization when learning from adaptation is consciously acknowledged and embedded in the system. For example, organizational learning can be derived from reflection on the team processes of what worked or did not work during team debriefing sessions. The transformative power of the team's learning scales to the organization when the lessons learned are applied in future projects. The inculcation of those lessons throughout the organization results in organizational transformation.