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Collective C2 in Multinational Civil-Military Operations

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# "A Working Model for Considering Civil Military Operations From the Command (and Control) Perspective"

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> A soldier is now expected to exert himself within proper limits to preserve and organize peace. He should labor, in unison with the citizen and the philanthropist, to impress and extend our civilization. So vast is the field of operations of our small army, and so scattered are the troops, it is possible, if not extremely probable, that in a few short years, whatever may be your age and rank, you may be obliged to administer affairs wherein considerable knowledge of civil matters may be necessary.[1]
>
> Colonel Elwell Otis, address to West Point Class of 1882

## INTRODUCTION

Civil-Military Operations (CMO) exist wherever a military force interacts with a civilian population; they are a sub-set of military operations that have the following three distinctive operational support characteristics: (a) minimize civilian interference in military operations; (b) maximize civilian support of such operations; and (c) meet legal and moral obligations with respect to the affected civilian population.[2] Due to the central concept of CMOs, the military interface with civilians, militaries have found them to be particularly difficult to execute and sustain in the modern era for one obvious reason: civilians do not have to follow military orders, thus they frustrate the traditional military pursuit of unity and chain of command.

Reported civilian neglect, abuse or worse by militaries during CMOs tends to make headline news in the global information era.[3] Beginning with Operation JUST CAUSE, a 1989 regime changing combat operation in Panama, the record of American and NATO CMOs in the post-Cold War era has been mixed at best. Some, like PROVIDE COMFORT, have been great successes; others, like

CONTINUE HOPE (UNOSOM II), utter failures.[4] The command and control arrangements of these operations have played an important role in the outcome.

This paper will examine command and control challenges of CMOs from American military doctrinal perspectives; in that respect it must remain culturally restricted in its conclusions.[5] Nonetheless, such an exploration is useful for all militaries to examine if for no other reason than that the Americans engage in CMOS frequently. What makes this paper unique is that it will introduce the theory of adaptive cycles, a robust and valid social-ecological approach to understanding human and natural interacting systems, as a framework from which to explore CMO behavior. The paper assesses the utility of the application of Adaptive Cycle theory to understanding CMOs, with special focus on command and control processes associated with the operations. Specifically, it will evaluate whether the claims of the theory concerning organizational strategies for managing the dynamics of complex human and natural change also hold for the class of civil-military operations. If the findings of Adaptive Cycle theory appear to fit the case of civil military operations, then one can apply the major recommendation from Adaptive Cycle theory concerning command and control to these operations. The short version of that command and control recommendation can be summarized as this: keep C2 processes simple and operational goals modest.

Following an in-depth description of Adaptive Cycle Theory, this paper uses a meta-dataset of thirteen post-Cold War civil-military operations that

included U.S. participation (and thus U.S. doctrine) for the evaluation.

Using expert judgment to analyze the dataset in terms of relative operational success or failure, and in terms of operational goal(s) or end-states interpreted by Adaptive Cycle theory, preliminary findings indicate that the theory does apply. This statement of support carries with it a strong challenge to those who would lead these operations. Civil-military operations that seek transformative end states, for example nation-building where nation-states do not exist or have failed, do not appear as likely to succeed as those operations that more modestly seek to help nation-states and peoples adapt to very strong environmental changes (e.g. natural disaster or civil war.) With respect to command and control, Adaptive Cycle theory recommends that whatever formal C2 structure is used, its processes should be sufficiently adaptive (and implicitly collaborative) to address the unpredictable nature of the social-ecological changes affecting the populations for which civil military operations are executed.

## WHAT ARE CIVIL MILITARY OPERATIONS?

United States Joint Chiefs of Staff doctrine defines civil-military operations as:

> The activities of a commander that establish, maintain, influence, or exploit relations between military forces, governmental and nongovernmental civilian organizations and authorities, and the civilian populace in a friendly, neutral, or hostile operational area in order to facilitate military operations, to consolidate and achieve operational US objectives. Civil-military operations may include performance by military forces of activities and functions normally the responsibility of the local, regional, or national government. These activities may occur prior to, during, or subsequent to other military actions. They may also occur, if directed, in the absence of other military operations. Civil-military operations may be performed by designated civil affairs, by other military forces, or by a combination of civil affairs and other forces.[6]

According to American Joint doctrine, CMOs can be part of existing military operations, or they can be stand-alone operations in a form of a stability operation. CMOs have common supporting objectives:

1. Support to (existing) civil administrations or direct governance if necessary;
2. Population and Resources control;
3. Humanitarian Assistance (mostly foreign, by exception domestic);
4. Nation Assistance;
5. Civil Information Management (when required.)[7]

Civil-Military considerations are an inherent and legal responsibility of military or civilian command.[8] In all CMOs following American doctrine, the operations are commanded by military officers who are answerable to civilian leadership at a social and geographic distance. This point is worth emphasizing as doctrine and fact: *CMO commanders on the ground are virtually always military.*

While the operational commanders are military, and the forces and capabilities assigned to them are predominantly military, the nature of CMOs require that commanders and their military forces must adapt, that is they must modify their hierarchal expectations that their legal orders will be followed explicitly and implicitly, to the realities that these operations have multiple stakeholders, all of whom can be understood to be of equal rank to the military, and that these stakeholders often have different, often significantly different, agendas, goals and objectives. Stakeholders range from the indigenous population of the are where a CMO is conducted, non-government organizations (NGOs) providing material assistance to the population, international

organizations (IOs or IGOs in the American lexicon) that also provide assistance and, where necessary, governance (the United Nations is the primary IO for such actions), sub-national contesting parties where there is civil war within a nation=state, other governmental agencies of the military force's own nation, contractors supporting stakeholders, other interested nations' forces and agencies, and the ever-present eye of the international press,, both formal and informal (bloggers and independent journalists.) The nature of command for CMOs is collaborative and participatory, not directive and ordered.[9] Commanders must make allowances for these considerations when planning and executing their operational command and control (C2) functions; in reality this is easier said than done.[10]

## THEORETICAL BACKGROUND: SOCIAL ECOLOGICAL RESEARCH

One school of systems theory has found that all life can be considered a system that enables mass-energy conversions, organized by information, in a given space and time.[11] This concept encompasses individuals, groups, organizations, nations and supra-national organizations and entities (e.g. the idea of Gaia.)[12] Most relevant to the subject of this paper, it applies to military organizations and the operations they plan and execute.

The most important processes of living systems are those concerned with information: sensation, production, distribution, and evaluation.[13] These enable living systems to exist in far-from-equilibrium dynamical stable states in which they interact with their environments to obtain the energy and mass necessary

for survival and growth. In effect, information obtained by living systems from the larger environmental system holds off the inevitable effects of entropy.[14]

Ecological researchers have observed their subject matter (typically natural systems of a defined nature) from a similar viewpoint, noting the criticality of the social-natural environmental interface, naming the phenomenon the Social Ecological System or SES.[15] An SES can be understood to be a human living system (individual, group, organization, nation) existing in a living environment (both natural and social.) The living system and living environment intimately interact with each other; they are tightly self-referential.[16] SES research has focused on the dynamics of such systems in specific ecological environments; it has found that while SESs are stable, they are not static; they move and adapt according to the shifting conditions of the environment as well as other endogenous and exogenous factors.[17] These dynamics are not routine; they follow a path whose metaphoric model is called the Adaptive Cycle (hence the name of the theory). Figure 1 illustrates that cycle:

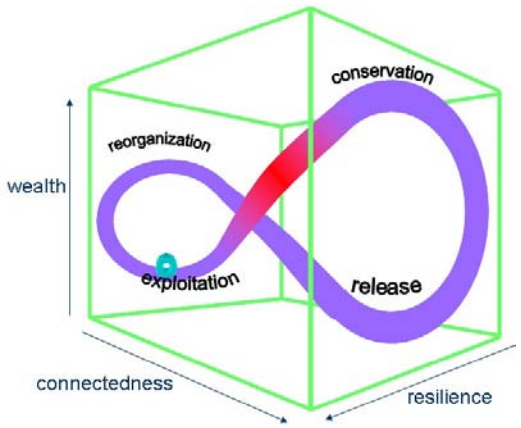


**FIGURE 1**
**The Adaptive Cycle of an SES[18]**

There are three dimensions in which the SES moves. Wealth refers to the consolidated energy, information and mass of the SES at any given point in time. Wealth also can be understood to be system robustness or strength. Connectedness refers to relationships the SES has within itself and its relevant environment. Redundancy is similar descriptor for connectedness. Resilience refers to SES capacity to recover from radical changes in itself and/or its environment. It is important to note that, as described in FIGURE 1, connectedness increases at the expense of resilience, and visa versa. This observation reflects the reality of the vast amount of field research on ecological systems that preceded formal statement of Adaptive Cycle theory.[19] The defining variables of the adaptive cycle provide insight on how this metaphoric model illustrates the conundrums facing all organizations, including military ones. Wealth (capital, resources) is positively correlated with connectedness or networking; as an organization increases its resources, it also tends to increase its connectedness. However, in doing so, the organization sacrifices its

resilience, its "capacity…to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks."[20] An old advertising adage clarifies this technical definition: resilience means the system can "take a licking and keep on ticking." As an organization matures, it increases its wealth and becomes highly interconnected; this in turn leads it to become ever more sensitive (or fragile) to environmental changes. At some critical point during the maturity of an SES (organization-environment interface), one small change will lead to a collapse of SES (release in FIGURE 1) into a different, reduced wealth (energy, mass, information), and reduced connectedness state than it was before.[21] For example, a large mobile military, organized, trained, and experienced to fight on open plains suddenly placed in an environment that compromises that experience and training – a jungle for instance – can find itself unable to operate effectively, becoming incompetent for a time (until it can reorganized and re-learn) leading to a real possibility for defeat.

In FIGURE 1, two phases of growth and exploitation culminate in a conservation phase; these phases of the SES are generally predictable. However, it appears inevitable that system entropy "locks up" available mass, energy and information in the conservation phase; in effect, the system becomes "tightly coupled;" this is the point of sensitivity or fragility noted above. For example, organizations can become rule-bound, inward-focused on efficiency and can ignore changing environmental or market behavior; the result can be

catastrophic collapse of the organization caused by its inability and/or inflexibility to change.[22] Two phases, release and reorganization, capture the idea of SES response to these changing conditions and non-adaptive SES behavior. These last two behaviors are quite unpredictable in terms of when they occur and the extent to which the system is changed.[23]

The adaptive cycle of an SES does not stand by itself within a given environment or niche; it is subject to cross-scalar effects from below and above. Figure 2 illustrates this "panarchy" of SESs:

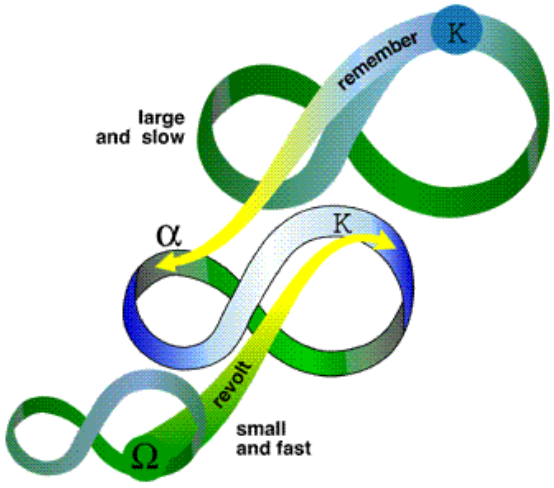


**FIGURE 2**
**Panarchy of SES Adaptive Cycles[24]**

Panarchy is a descriptive term that Gunderson and Holling have used to describe the structure of human-natural system relationships that capture the ideas of interactive system dynamicism, persistence and change, predictability versus unpredictability.[25] The picture in Figure 2 illustrates a simple panarchy: that of one system interrelating with sub- and super-systems to which the one system interacts and is interrelated. One must keep in mind that in theory the picture

could be expanded horizontally to include more systems of the same or similar scale, and vertically to include more systems of both smaller and larger scales. The dynamics of SESs indeed become complex quickly from this perspective.

SESs behaving within their adaptive cycles can react to this continuous buffeting of dynamical systems in two ways: first, through adaptability, or the capacity of humans to manage resilience; this means re-shaping or shifting the SES within its own environmental niche.[26] The second alternative is through transformability or transformation, the creation of an entirely new SES when "ecological, economic or social (including political) conditions make the existing SES untenable."[27] This means both moving the SES to a new environment and necessarily altering the SES itself to fit the new environment.

All SESs exist in their own environmental niche; this niche can be understood to be a state space of the SES. A state space in turn is defined by the critical variables that make up the SES. While the SES exists in a three dimensional space (wealth, connectedness, resilience), the larger state space within which SESs exist are made up of many more possible variables that completely define the SES and its environment. These variables are so numerous in an SES niche, and can vary so much from one SES niche to another as to make enumeration of them impractical if not impossible. They also make visualization of the SES changes quite impossible (we are restricted in our visual perception to only four dimensions.) However, one can consider the complexity of the niche and the SES itself through topological depictions or metaphors from

complexity theory. The one used by C.S. Holling, the inventor of Adaptive Cycle theory and model, is attractors.[28] In a dynamically stable state or niche, the SES tends toward a single equilibrium state from many possible such states – like any such system; the shape of this behavior forms a basin of attraction or *stability landscape* defined by the critical variables. A key observation is that these systems (like SESs) have more than one possible equilibrium state; this means there can be many possible outcomes to disturbing the stability of an SES. Figure 3 shows one such basin, including a position of a system (the big black dot), for three components of resilience change and two state space variables:

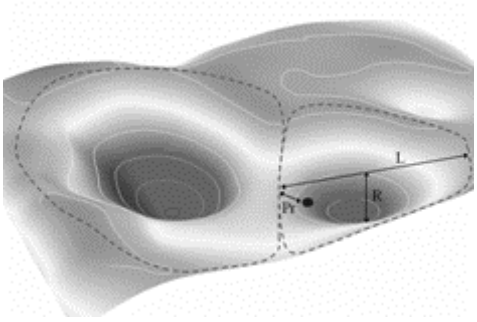


**FIGURE 3**
**Two-variable System Basin of Attraction[29]**

In Figure 3, note that there is one other possible basin that the system could inhabit if pushed or pulled there by internal or external forces. The three components of resilience depicted in Figure 3 are latitude (L), the geometric distance between basins, changes in depth or resistance (R) (for organizations, this can be understood as the variety of possible behaviors the organization can take to accommodate change without radically reinventing itself), the difficulty in moving a system in a basin (steep slopes of the basin infer greater energy, mass

and information to change the state of the system, one way of conceiving organizational inertia), and changes in precariousness (Pr), the distance a system is from its threshold for another basin.[30] Of note is the observation that all living systems appear to operate close to their thresholds to maximize the efficiency of the productive processes; thus they are ever precarious to changes in their environmental niche.[31] For organizational living systems (including military organizations), the nature of precariousness is managed by command and control functions that manage risk.

Living systems, including SESs, can adapt through changing the topology of its particular stability landscape or environmental niche, changing system processes to fit cross-scalar system influences, or changing the movement or trajectory of the system with respect to its threshold. Doing so enables them to retain the basic configurations and relationships that define the original system. Such a strategy allows for meaningful human direction, guidance, collaboration and/or management. For example, a military organization executing an operation can change its formations to fit the requirements of environmental changes, like moving from plains and steppes into mountains and visa versa.

However, there may occur situations in which adaptability is insufficient to ensure survival in existing form. In this case, living systems must alter their very being so much so that they become an entirely new living system, that is the system creates or adapts to a new stability landscape.[32] The complexity of the

change, coupled with the large number of variables involved in the change, make for an indeterminate or unpredictable process: once a system begins such a change, it cannot know with any reasonable statistical certainty how it will change, and the extent of the consequent changes. For transformability, as this phenomenon is named, human direction becomes much less influential, taking a back seat as it were to environmental forces far larger and more complex for human management.[33] It is extraordinarily expensive (from a resource/capital/wealth perspective) and highly risky to undertake transformability. The expense comes from the amount of mass, energy, information, time and space to achieve a transformation; the risk arises because there is no way of knowing whether the transformation will work or be desirable *a priori*. True organizational transformation in the military appears to be an example of transformability. In the current case of the United States Army's effort to reinvent itself, it risks its inherent, existent expertise to conduct large, conventional major combat operations to achieve a capability to be expert in complex irregular warfare, including counterinsurgency and counter-terrorism operations.[34] All researchers of SESs and Adaptive Cycle theory agree on one rule or heuristic of SES change: if change is required, adapt if at all possible; transform only as a last resort.[35]

## THE CMO HISTORICAL RECORD SINCE THE END OF THE COLD WAR

Does the Adaptive Cycle theory explain the experience of civil-military operations? Framing this question in the form of a hypothesis, one major

testable statement becomes ($H_1$): if Adaptive Cycle theory applies to civil-military operations, then CMO data should reify the rule/heuristic of SESs stated above (that adaptation should predominate ). A second correlated hypthesis also emerges ($H_2$): CMOs that attempt transformation should be less successful that operations that limit themselves to adaptations. To provide some data analysis to explore these two hypotheses (or meta-hypotheses since the strict statistical and measurement conditions for hypothesis testing is not part of the design of this paper), three subject matter experts in military operations examined the results of thirteen recent operations that included a significant CMO subset of objectives.[36] Their finding are summarized in Table 1 below:

| Operation | Summary | CMO Objective* | Adaptability or Transformability[37] | Success Or Failure[38] |
|---|---|---|---|---|
| PROMOTE LIBERTY | PANAMA, 1989-90 | 1-5 | A | S |
| PROVIDE COMFORT | KURDISTAN, 1991 | 2,3,4 | A | S |
| SEA ANGEL | BANGLADESH, 1991 | 3,4 | A | S |
| CONTINUE HOPE | SOMALIA, 1993 | 1-5 | T | F |
| JOINT | BOSNIA, | | | |

| | | | | |
|---|---|---|---|---|
| ENDEAVOR | 1995-? | 1-5 | T | ? |
| UPHOLD DEMOCRACY | HAITI, 1995 | 1-5 | A | ? |
| Post-ALLIED FORCE | KOSOVO, 1999-? | 1-5 | T | ?S |
| ENDURING FREEDOM | AFGHANISTAN, 2001-? | 1-5 | T | ? |
| IRAQI FREEDOM | IRAQ, 2003-? | 1-5 | T | ? |
| UNIFIED ASSISTANCE | Asian Tsunami, 2004 | 3,4 | A | S |
| JTF-KATRINA | Gulf States, 2005 | 1-4 | A | S |
| Operation LIFELINE | PAKISTAN, 2005 | 3,4 | A | S |
| UNIFIED RESPONSE | HAITI, 2010 | 1-4 | A | S |

*CMO OBJECTIVES: 1=Support to Civil Authority; 2=Populace & Resource Control; 3=Humanitarian Assistance; 4=Nation Assistance; 5=Civil Information Management

**TABLE 1**
**Civil-Military Operations (or included in Other Operations) Performance**

Of the thirteen CMO-related operations, eight are focused on short-term adaptation; five attempted long-term transformation (see footnotes from Table 1 for the method used to assess these operations.) The data in Table 1 show that operations attempting adaptation predominate; this is consistent with $H_1$. The data also show that operations attempting transformation appear more likely to fail; this is consistent with $H_2$. Only one civil-military transformation operation, concerning Kosovo, can be deemed successful on the basis that Kosovo has been able to peaceably transition from a province of Yugoslavia, and then Serbia, to an independent nation recognized by the United Nations. Still there is sufficient potential for unrest that the United Nations retains a significant force to suppress a resurrection of violence.[39] One other transformability effort, in Somalia in the early 1990s, ended up in an embarrassing retreat for the United Nations; the

effort simply was too ambitious, involving too many competing insurgent groups, with unclear, grandiose objectives to be successful.[40]

Though the data set is too small to derive quantitative statistics to support or invalidate the two hypotheses, the direction of the evidence seems to support them. Adaptive Cycle theory, with Social Ecological Systems in constant evolutionary flux, seems to apply to civil-military operations. The apparent fact that most such operations limit their objectives to system adaptation, not transformation, indicates that human direction can still play a major role in outcomes. This conclusion has significant implications for appropriate command and control of civil-military operations. What kind of C2 organization and system might lead to success?

## COMMAND AND CONTROL FOR CIVIL-MILITARY OPERATIONS

During its last organizational transformation in the late 1970s and early 1980s, the United States Army investigated the kinds of C2 systems it would require to be successful on the high-intensity, complex battlefields envisioned in its overarching operations doctrine, AirLand Battle (ALB.) AirLand Battle explicitly recognized that future military operations would be so complex and dynamic as to approximate the Adaptive Cycle theory strategy of adaptability, if not transformability.[41]

The Army quickly discovered that how its C2 systems handled information was *the* critical distinguishing characteristic of effective units in the field.[42] Specifically, effective use of information in combat enabled units to cope with the

extreme uncertainty and fluidity of foreseen ALB battles.[43] Effective (command and control) battle staffs managed the information overload of combat situations better than those that were not as effective. For a leading Army researcher on battle staffs at the time, Dr. Joseph Olmstead of the Human Relations Resources Office (HumRRO), this meant that the C2 members of the battle staff had to be (a) highly skilled in their individual areas of expertise; (b) highly skilled to work as a team; and (c) integrated with respect to unity of purpose and focus on the mission at hand.[44]

Olmstead coined the term, "organizational competence," to identify the desired phenomenon of battle staffs with respect to integration. This term could be measured as (a) excellent capacity of the staff to evaluate reality, especially in terms of time available; (b) adaptability to changing situations and operational environments; and (c) operational proficiency of the battle staff to execute required tasks.[45] Organizational competence also appears to be consistent with, and reinforcing of the type of command and control relationships advocated by Adaptive Cycle theory researchers with respect to SES leadership. Organizational competence is fostered and maintained as a direct result from leaders' efforts to develop their staffs in their individual and team social roles. These measures well match with the attributes humans should have to manage changes in SES adaptive cycles.

With respect to CMOs, this means that an organizationally "competent" C2 system must be able to (a) clearly distinguish and agree which tack the

operation requires – adaptability or transformability; (b) connect and communicate with all possible stakeholder SESs in the relevant operational environmental niche, especially the indigenous SES, with respect to unity of purpose or effort; (c) collaborate among themselves and among the stakeholders to enable rapid shifts of their organizations' actions to accommodate shifts in the relationships of the various organizational stability landscapes such that their objectives are not compromised; and (d) cultivate relationships with the stakeholders that can provide the commander with timely and accurate assessments of changing dynamics in the relevant stability landscape.[46] Information technology provides some means of enhancing the probabilities of success in the battle staff capabilities. For example, an integrated and dedicated "smart phone" network of all relevant parties could meaningfully assist the development and continuation of dialogue, even with those groups that are in conflict with friendly military command; such a network also could de-conflict competing and duplicative efforts, clarifying intentions to interested stakeholders.

However, too much reliance on technology can lead to counterintuitive failure if the stakeholders in a given civil-military operational environment become over-dependent on that technology. Recall from social ecological theory that an SES's adaptive cycle encourages connectedness at the expense of resilience. **It is SES resilience that a CMO wants to increase if the objective is SES adaptability; and recall that adaptability is the option most likely to be successful for CMOs.**

There exists a command and control model that contains the basics for construction of a system that enhances the probability of achieving organizational competence. That model is the C2 Command and Control Approach Space, a three-dimensional construct depicting a universe of possible C2 systems in any type of operations.[47] The Space is bounded by three "meta-variables:" allocation of decision rights, patterns of interactions among actors (agents), and distribution of information. Traditional military C2 systems, being hierarchal, with narrow, constrained and vertical information sharing, and few actors capable of deciding what information is necessary, tend to be at the low end of the C2 Approach Space; they have very limited allocation of decision rights, highly hierarchic patterns of interaction, and restricted distribution of information. The result is a tightly-coupled organizational command and control function that is very efficient, but is prone to catastrophic failure in the presence of unanticipated changes in the operational environment and the interaction of the organization with others sharing that same environment. Conversely, CMOs with staffs that maximize organizational competence maintain wide allocation of deciding what is necessary information, widely distribute information among critical staff members, and have loosely constrained patterns of interaction among themselves as the staff. This is a region of C2 systems that seem almost "edge" organizations with the exceptions that the C2 network retains a leadership role and function situated in one individual and that the connecting social and technology networks are not quite scale-free.[48] Edge organizations by

definition appear to be organizationally competent. They therefore also appear to fit better than traditional C2 systems and structure for the successful management of adaptability of SESs under Adaptive Cycle theory.

## CONCLUDING OBSERVATIONS

Civil-Military Operations (CMO) are the most complex operations that an armed force plans and executes. Until recently, these operations, at least from an American perspective, also have suffered from acute lack of command attention, even though joint operational doctrine places them as a core element of command. Unsurprisingly, the record of CMOs' success, at least from the American experience, is mixed. One fruitful way of envisioning the CMO problematique is the application of Adaptive Cycle theory using Social Ecological Systems (SES) to frame the operational reality of CMOs. The value of doing so is twofold: (1) it places the experience of CMOs is a validated theoretical context; and (2) it provides useful insights on the dynamicism of CMOs. The theory indicates that small changes at critical points in an SES adaptive cycle can lead to catastrophic collapse of the SESs that comprise the human portion of Adaptive Cycle environments; from this, the theory advocates both conservative leadership (small steps) and collaborative leadership further described in this paper as organizationally competent that can make the most from adaptive changes. Organizationally competent leadership providing the necessary command and control for CMO operations under conditions described in Adaptive Cycle theory share attributes with known models of C2 structure and

performance. These attributes approach those of "edge" organizations that also maximize the advantages of information technology (i.e. network-centric warfare) in support of any operations using command and control processes. Implicit in this discussion is a major working hypothesis for future research on CMOs: do C2 systems that maximize organizational competence, thus approaching "edge-like" organizations, significantly make a difference in the success or failure of civil-military operations? That is one military research question that should be answered soon because the envisioned future stability landscape for *all* military operations includes an emphasis on civil-military capabilities.[49] In that regard, the future already is here.

[1] Andrew J. Birtle, U.S. Army Counterinsurgency and Contingency Operations Doctrine 1860-1941; Washington, D.C.: U.S. government Printing Office, 1998, page 92.
[2] From United States Marine Corps Warfighting Manual, MCWP 3-33.1, MAGTF Civil-Military Oprations; Washington, D.C.: Headquarters, United States Marine Corps, 7 April 2003. Page 1-4.

[3] One can make a strong case that such reports, spread globally through the Internet and social networks, actually have *caused* NATO military combat operations in the case of the 2011 Libyan rebellion.
[4] Success or failure of any military-related operation depends on the degree to which the operation's execution meets the goals and objectives set for it by civilian and/or military leaders calling for the operation. This measure of effectiveness is analogous to those used to evaluate governmental or corporate programs. See for extensive discussion of program evaluation measurement and use Kenneth Dolbeare, Program Evaluation; Beverly Hills, California: Sage Publications, 1978. Operation PROVIDE COMFORT is considered successful because it met the objectives set for it by United States and NATO leaders. RESTORE HOPE (UNITAF) failed because it completely failed to meet the goals established for the UN mission to Somalia (i.e. rebuild the civic structure of governance for Somalia.)
[5] One should note that since most of the Western World's militaries, especially NATO countries, have adopted American-like doctrine for all military operations the cultural restriction should be observed with a skeptical eye.
[6] Joint Publication 1-02, Department of Defense Dictionary of Military and Associated Terms; Washington, D.C.: Joint Chiefs of Staff, 31 December 2010, pages 61-62.
[7] Joint Publication 3-57, Civil-Military Operations; Washington, D.C.: Joint chiefs of Staff, 8 July 2008, pages 32-36.
[8] Based upon traditional International Law applied to so-called "occupying forces." Read Hague Convention of 1899, Section III, "On Military Authority Over Hostile Territory," accessed by Internet, April 27, 2011, at http://avalon.law.yale.edu/19th_century/hague02.asp.
[9] This language, if not precisely written as in this essay, is found in Joint Publication 3-57, Civil-military Operations, especially Chapter II, which deals with command and control considerations of civil military operations.
[10] This is a reflection of the author's own participation in two CMOs as a military officer, and in participating in the planning of four other CMOs. It is an opinion that the author has found shared by fellow officers from four decades of service. The tried and trite phrase, "herding cats," applies well to the command and control challenge of these operations. The classic literary presentation of the CMO challenge is found in John Hersey, A Bell for Adano; New York: Vintage Books, 1988.
[11] James Grier Miller, Living System Theory; Boulder, Colorado: University of California Press, 1978, page 11.
[12] Ibid, page xvii.
[13] Ibid.
[14] Ibid., pages 13-16. Also consult Ilya Prigogine and Isabel Stengers, Order Out Of Chaos; Boston, Massachusetts: Shambala Publications, 1984.
[15] First formally noted by C.S. Holling in a now classic research article, "Resilience and Stability of Ecological Systems," *Annual Review of Ecological Systems*, Issue 4, 1978, pages 1-23.
[16] Ibid.
[17] Brian Walker, C.S. Holling, Stephen R. Carpenter, and Ann Kinzig, "Resilience, Adaptability and Transformability in Social-ecological Systems," *Ecology and Society*, Volume 9, Issue 2, Article 5.
[18] The picture of an adaptive cycle is borrowed from C.S. Holling, Lance H. Gunderson, and Garry D. Peterson, "Sustainability and Panarchies," in Gunderson and Holling (editors), Panarchy: Understanding Transformations in Human and Natural Systems; Washington, D.C.: Island Press, 2002, page 95.
[19] The bulk of this research is reported and summarized in Gunderson and Holling (editors), Panarchy…
[20] Ibid.
[21] This phenomenon is particularly well known in natural law. Eric W. Schneider and Dorion Sagan describe this change event using the transformation of water into ice in their most insightful book, Into The Cool: Energy Flow, Thermodynamics and Life; Chicago: University of Chicago Press, 2006. The fragility or sensitivity of highly interconnected systems to very small changes is examined in Chapter 7.
[22] An excellent summary of loosely vs. tightly coupled organizational systems is found in J. Douglas Orton and Karl Weick, "Loosely Coupled Systems: A Reconceptualization," *Academy of Management Review*, 1990, Vol. 15., No. 2, pages 203-223.
[23] Ibid.
[24] This picture is borrowed from Holling, Gunderson, and Peterson, "Sustainability and Panarchy,"… page 75.
[25] Ibid.

[26] Holling, Carpenter and Kinzig, "Resilience, Adaptability and Transformability…"
[27] Holling, Carpenter, and Kinzig, "Resilience, Adaptability and Transformability…"
[28] As in Lorenzian "strange attractors." Read Edward N. Lorenz, "Atmospheric Predictability as Revealed by Naturally Occurring Analogues," 1969, *Journal of Atmospheric Sciences*, 26, pages 636-646. This article established the mathematical basis for one subset of chaos theory (strange attractors.)
[29] Picture borrowed from Holling, Carpenter and Kinzig, "Resilience, Adaptability and Transformability…"
[30] Ibid.
[31] Ibid.
[32] Ibid.
[33] Ibid.
[34] This is one of the transition challenges identified by the incoming US Army Chief of Staff (GEN Martin Dempsey) Transition Team. Read CSA Transition Brief, 23 April 2011, "What We Heard."
[35] Ibid.
[36] This is a convenience sample, not a statistical one. The sample is appropriate because the aim is exploration of the utility of theory, not the testing of the theory itself. Also, the subject matter experts included this author, a fellow faculty member from the Joint Operations course, and a fellow colleague from the National Security Affairs course, U.S. Naval War College, all located at the Monterey tenant campus at the Naval Postgraduate School, Monterey, California.
[37] Adaptability and Transformability determined by individual (author) judgment, checked by two independent researchers (colleagues on faculty using definitions from Holling, et.al article.)
[38] Same technique.
[39] Read Larry Wentz (editor), Lessons From Kosovo: The KFOR Experience; Washington, D.C.: Department of Defense Command and Control Research Program, 2002, especially the articles in Section 4, Civil-Military Dimensions.
[40] Read John T. Fishel, Civil-Military Operations in the New World; Westport, Connecticut: Praeger, 1997, Chapter 15, pages 204-206. Also consult Gary Ohl's most recent monograph from the Naval War College Newport Paper series, Somalia…from the Sea; Newport, Rhode Island: Center for Naval Warfare Studies Paper Number 34, 2008.
[41] The milestone document for AirLand Battle was FM 100-5, Operations; Washington, D.C.: Headquarters, United States Army, May 1982. Specifically, the complexity and dynamics of future operations is captured in Chapter 1.
[42] D. Michael Malone, "X = H," monograph, Task Force DELTA, 1980.
[43] Joseph A. Olmstead, "Battle Staff Integration," monograph, Alexandria, Virginia: Institute for Defense Analyses, Paper # P2560, February, 1992, page I-2.
[44] Ibid. Page S-6.
[45] Ibid. Page VIII-1.
[46] These four actions are adapted from Olmstead, page VIII-3.
[47] David S. Alberts and Richard E. Hayes, Understanding Command and Control; Washington, D.C.: Department of Defense Command and Control Research Program, 2006, pages 74-75.
[48] Ibid. Page 111. Recall again the warning of social-ecological theory not to become *too* connected. What that means precisely relies far more on art than science and engineering.
[49] Quadrennial Defense Review; Washington, D.C.: Office of the Secretary of Defense, February, 2010, pages 7-9.