

New Strategies for Early Response: Insights from Complexity Science¹

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Introduction

“For every thousand pages on the causes of war,” historian Geoffrey Blainey writes, “there is less than one page directly on the causes of peace.”³ The same may be said of early warning and early response, with the latter (early response) often occupying little more than an afterthought in the mainstream literature on “operational” conflict prevention.⁴ While the gap between warning and response has been the subject of intense debate, the decades long Quixotic quest to bridge this gap is largely instituted on the hope of discovering a general pattern of conflictual interactions that point to the outbreak of armed conflict.⁵ Indeed, the “enormous academic scholarship on the causes of conflict” is basically founded on the dream of finding the ‘silver bullet’ or ‘smoking pistol’ of early warning.⁶ And so, despite the fact that “billions of dollars have been invested in developing sophisticated data banks and early warnings, we have to note that even the most expensive systems have shown a striking inability to forecast political events,” not to mention early response.⁷ While this observation was made 20 years ago, few would dispute its validity today; and this in spite of the revolution in information technology and the many more billions invested since.

In this paper, we argue that the warning-response gap is institutionalized in the very structure of Western institutions. We first draw on simple insights from complexity science to exemplify the structural source of this gap.⁸ Adopting a systems, or networks

³ Cited in Meier (2007). “The Match that Lit the Peace: Triggers of Peace and Implications for Early Warning.” (*forthcoming*).

⁴ The latest addition to the mainstream literature is Trapple (Ed.), *Programming for Peace: Computer-Aided Methods for International Conflict Resolution and Prevention*. (Springer 2006: The Netherlands). This book will set you back \$169 even though a number of the contributing chapters appear to be reprints.

⁵ Rupesinghe 1988; Walker 1992; Buchanan-Smith and Davies 1995; Lund 1996; Adelman and Suhrke 1996; George and Holl 1997; Adelman and Schmeidl 1998; Davies and Gurr 1998; Cockell 1998; Schrodtt and Gerner 1998; Walvaren 1998; Luc and Versteegen 1999; Doom 2000; Krummenacher and Schmeidl 2001; Siegfried 2001; Alexander 2001; Maxwell and Watkins 2003; Ivanov and Nyheim 2004; Schmeidl 2005; Bond and Meier 2005, 2006; Meier 2006; Campbell and Meier 2006; Barrs 2006; Blyth 2006.

⁶ Rupesinghe 1988: 218; Brecke 1997: 1.

⁷ Rupesinghe 1988: 220.

⁸ “Since there may be no single ‘root cause’ [of the warning-response gap], efforts are better directed towards identifying causal structure—a system model of the causal relationships (Cooke and Rohleder 2006: 219).

perspective, “offers some very rich and interesting insights on where power comes from.”⁹ We then use two case studies based on operational conflict early warning (CEW) systems to illustrate our point. In closing, we consider a people-centered approach to early warning as a strategy to “rewire” the critical link to timely and effective response.

Systems as Metaphors

Most human thought is metaphorical.¹⁰ But our Western metaphors of conflict in particular have often been based on narrow unexamined assumptions, even myths. These necessarily taint both our perceptions of conflict and the way we frame our responses.¹¹ This need not be an issue unless our conceptual understanding of reality ceases to reflect the world we seek to change, in which case our metaphors need modifying.¹² However, one of the “fundamental findings of cognitive science is that our frames can be physically present in the synapses of our brains, in our neural circuitry, which can result in a total disregard for [new] information inconsistent with our dominant frames.”¹³ In this paper, we use the metaphor of systems and networks in an effort to redress our understanding of early warning and gain insights into new strategies for effective and early response.

The West has traditionally viewed conflict as the result of natural forces among discrete and independent units.¹⁴ This perspective stems in part from the atomistic-mechanistic and linear worldview championed by Galileo, Descartes and Newton.¹⁵ Their writings had no small influence on the evolution of Western thought and classical political theory.¹⁶ Thomas Hobbes, for example, publicly glorified Galileo, praising his work and

⁹ Nohria 1992: 10.

¹⁰ Campbell 1949; Hofstadter 1996; Holland 1998; Lakoff and Johnson 1999.

¹¹ Salem 1993; Volkan 1991; Kelman 1997; Lewicki, Gray and Elliot 2003; Nadin 2006; Leonard and Howitt 2007.

¹² Meier and Hernes 2007.

¹³ Coleman 2004: 2000; see also Kahneman, Slovic and Tversky 1982; Bazerman 1998. Stressful circumstances also tend to block higher-order cognitive responses (Janis and Mann 1977).

¹⁴ Galtung 1980; Azar 1986; Salem 1993; Cohen 1997; Alon and Brett 2007.

¹⁵ Peat 1991, 2002; Nadim 2006.

¹⁶ Hayles 1991; Dooley 1997; Holland 1998; Wilson 1999.

calling the scientist the most important person ever.¹⁷ In subsequent political writings, Hobbes uses the analogy of a watch¹⁸ and “portrays humans as mechanical systems that pursue what they take to be good; but in cases of scarce resources, conflicts inevitably arise just as bodies in motion in a confined space will eventually collide. This leads to the necessity of instituting a sovereign or The Leviathan, but sovereignty is useless unless it is absolute, or so Hobbes thought.”¹⁹ In short, “the metaphor for this universe was that of clockwork,”²⁰ and supporters of the Enlightenment claimed that scientists would soon “be able to look into the future and see what course of action is best for humanity.”²¹

Such simplistic metaphors still pervade Western thought and more dangerously foreign policy. “It was indeed Eisenhower who provided us with the unfortunate domino analogy.”²² The “Domino Theory” originates from a press conference that Eisenhower gave during the Vietnam War concerning the spread of Communism. A journalist asked: “Mr. President, would you mind commenting on the strategic importance of Indochina to the free world? I think there has been, across the country, some lack of understanding on just what it means to us.” Eisenhower’s response is simple:

¹⁷ Jesseph 2004; Finn 2006. Several scholars suggest the pair also met in December 1635. For an analysis of science’s influence on Hobbes’s political theory of *The Leviathan*, see Meier (2007). “Hobbes, Science and Politics: Physics for *The Leviathan*?” (*forthcoming*).

¹⁸ In the Preface to *De Cive*, Hobbes writes that “everything is best understood by its constitutive causes. For as in a watch, or some small such engine, the matter, figure, and motion of the wheels cannot well be known, except if taken insunder and viewed in parts; so to make a more curious search into the rights of states and duties of subjects, it is necessary, I say, not to take them insunder, but yet that they be so considered as if they were dissolved; that is, that we rightly understand what the quality of human nature is, in what matters it is, in what not, fit to make up a civil government, and how men must be agreed amongst themselves that intend to grow up into a well-grounded state” (cited in Gauthier 1969: 2).

¹⁹ Personal email exchange with Professor Doug Jesseph, August 18, 2006

²⁰ Peate 2002: 92.

²¹ Wilson 1999: 37. “One of the weaknesses of many of the attempts at turning the study of international relations into a science is that they concentrate on means instead of starting with goals, or else they consider the actors’ goals as given or fixed, which is a serious mistake” (Hoffman 1999: 29). More serious still, “scientific analysis in sociology and political science [...] which appears to be most tenacious in the study of international relations [...] is almost inevitably followed by, or almost inevitably leads to, an ethical-political evaluation. [...] The dream of a science of international relations built on the models of the natural sciences and of modern economics” still exists (Hoffman 1999: 34).

²² Brodie 1973: 123.

“You have, of course, both the specific and the general when you talk about such things. First of all, you have the specific value of a locality in its production of materials that the world needs. Then you have the possibility that many human beings pass under a dictatorship that is inimical to the free world. Finally, you have broader considerations that might follow what you might call the *falling domino* principle. You have a row of dominos set up, you knock over the first one, and what will happen to the last one is that it will go over very quickly. So you have the beginning of a disintegration that would have the most profound influences.”²³

This Hobbesian metaphor was molded into myth and thence crafted into US foreign policy.²⁴ “What is really difficult to imagine,” however, “is a political situation that actually approximates the mechanically simple and totally predictable one suggested by the row of dominos.”²⁵ Even Hobbes noted that a true State of Nature was impossible.²⁶ Tragically, however, domino thinking continues to pervade US foreign policy today with talk of the American Empire. “Devotees of the new [US] imperialism argue that such analysis is too literal, that ‘empire’ is intended merely as a metaphor. But this ‘metaphor’

²³ Also available at: <http://www.eisenhower.archives.gov>.

²⁴ Ironically, it was actually an influential American journalist, Joseph Alsop, who first coined the “falling domino” expression used by Eisenhower in 1954. Based in Washington DC, Alsop’s nationally syndicated column “Matter of Fact” regularly aroused readers to the menace of international Communism. He was described as having an eccentric personality and his passions were often said to cloud his judgment, which may account for the “my-country-right-or-wrong” tone of his journalism (Ritchie 1997: 214; Boston Globe, August 21, 1969). “He berated American presidents for not pursuing the Cold War vigorously enough, and demanded huge increases in defense spending [...] His columns exaggerated the dangers facing the nation and painted such a gloomy view of the world that they may have contributed to the public anxiety and anti-Communism hysteria of the Cold War” (Ritchie 1997: 214). Alsop’s newspaper commentary did indeed influence foreign policy by supplying the White House with what were taken to be “Matters of Fact” thereby modifying and also reinforcing public opinion (Yoder 1995: 179). The long-held secrecy of Alsop’s homosexuality came to an end when a KGB provocateur in Moscow caught Alsop in the act and attempted to blackmail the American journalist with pictures. “The KGB photographs did not deter Joe in the slightest; indeed, he became thereafter even more hyperbolic in his denunciations of the Soviet Union” (Schlessinger 1995).

²⁵ Brodie 1973; 150. Clausewitz also recognized that the fog of war tampers total war by algebra. Clearly, a more appropriate analogy for “the agenda of world politics [is] a three dimensional chess game in which one can win only by playing vertically as well as horizontally” (Nye 2003). Besides, “most of the time, most states are at peace with their neighbors, not warring with them,” and yet “international relations are often identified as tantamount to a ‘state of war’” (Hoffman 1982: 17).

²⁶ Goldsmith 1966. The more one tries to square the circle by turning the study of international affairs into science, the more other scholars realize the philosophical limitation of the attempt (Hoffman 1999). The Bush doctrine of prevention changed the status quo. “It was free-market thinking applied to geopolitics: that just as the removal of economic constraints allows the pursuit of self-interest automatically to advance a collective interest, so the breaking up of an old international order would encourage a new one to emerge, more or less spontaneously, based on a universal desire for security, prosperity, and liberty. Shock therapy would produce a safer, saner world” (Gaddis 2005).

implies a control from Washington that is unrealistic and reinforces the prevailing temptations of unilateralism.”²⁷ Indeed, the “War on Terror” is often justified as promoting a “balance of power that favors freedom,” also called the “democratic domino theory.”²⁸ Stay in Iraq, warns The President. It’s the big domino and if it falls, then all the rest will fall. In a recent speech, ironically given at the National Endowment for Democracy, Bush warns that retreating from Iraq will allow militants to,

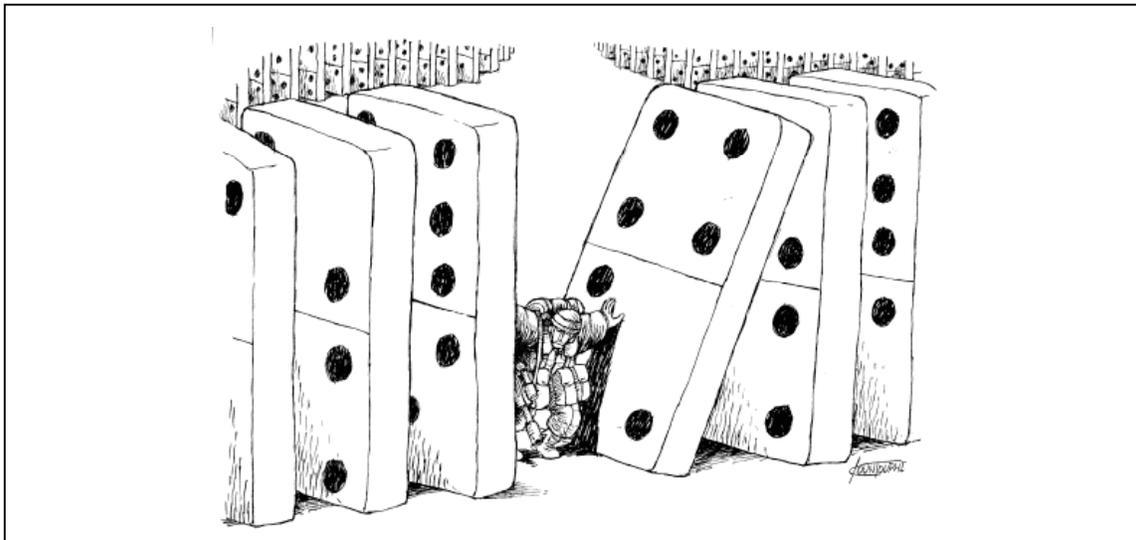
“[R]ally the Muslim masses, enabling them to overthrow *all* moderate governments in the region [the Mid-East] and establish a radical Islamic *empire* that spans from Spain to Indonesia. With greater economic and military and political power, the terrorists would be able to advance their stated agenda: to develop weapons of mass destruction, to destroy Israel, to intimidate Europe, to assault the American people, and to blackmail our government into isolation.”²⁹

Metaphors can lead to policy errors; simple metaphors can lead to political disasters. The image of systems as a metaphor may lend more prudence to foreign policy and early response. This metaphor, for example, would suggest that the infamous dominos might come full circle, as suggested by the figure below. Complex systems are characterized by non-linear behavior; push one domino over and you may never know what hit you.

²⁷ Nye 2003: 4.

²⁸ Mattox 2003; RAND 2005. The reference to the game of dominoes is particularly ironic. Dominoes are in fact descendants of dice and the word “die” is old French for “something played.” This conjures Einstein’s famous retort that “God does not play dice” in response to the unpredictability of quantum mechanics. Two pre-historical inventions are credited for facilitating the move from our ancestral capacity for metaphor to science. The first is numbers and “the second seminal invention is board games [which] may have originated from a metaphorical transfer from human warfare to the more convivial and safer world of a board and stone or wood pieces” (Lane 2005: 12).

²⁹ Available at: <http://www.whitehouse.gov/news/releases/2005/10/20051006-3.html>; “President Bush has insisted that the world will not be safe from terrorists until the Middle East is safe for democracy” (Gaddis 2005). Compare Bush’s speech with the “domino speech” Eisenhower gave some 50 years earlier: “But when we come to the possible sequence of events, the loss of Indochina, of Burma, of Thailand, of the Peninsula, and Indonesia following, now you begin to talk about areas that not only multiply the disadvantages that you would suffer through loss of materials, sources of materials, but now you are talking really about millions and millions and millions of people. Finally, the geographical position achieved thereby does many things. It turns the so-called island defensive chain of Japan, Formosa, of the Philippines and to the southward; it moves in to threaten Australia and New Zealand.”



Source: Michael Kountoris 2006

In sum, “temporary suspension of our often deeply ingrained [linear] modes of thinking and action is sometimes required for the effective application of the principles of complex systems and networks to conflict early warning and response.”³⁰

Complex Systems

In essence, “the systems perspective is based on an image of a simple living cell developing and surviving within its natural environment.”³¹ The term “complexity” denotes the degree to which a system is difficult to analyze, understand or manage. Complexity is said to arise when networks contain a large number of mutually interacting parts at many different scales. The more complex the system, the more detailed, and therefore lengthy, our analysis of the system tends to be. Put differently, the more complex the system, the more nodes and edges we need to describe or represent that system. Clearly, complexity is a key characteristic of natural and social systems.³²

³⁰ Coleman, Wrzonsinska, Vallacher and Nowak 2006: 4. “Organizational culture shapes the type of learning and the shared mental models in use. Complexity and change require mental models that are open to transformation” (Corbacioglu 2006: 214).

³¹ Coleman 2004: 222; Morgan 1986.

³² Corbacioglu 2006. This section is partly based on Meier (2006c). “To Scale or Not to Scale? Complex Systems Theory and The Third Side.” *Third Side Forum*. Available on-line at: <http://thirdside.blogs.com/forum/2006/03/index.html>

The term scale refers to the level of abstraction we choose to describe the interacting parts of a system, which in effect depends on how far away “we stand” from the system we wish to describe, as suggested in Figure 1. For instance, we can easily provide a simple description of a tree from a distance by drawing an edge (for the trunk) and a node (for all the leaves). To describe with more intricate detail the masterful distribution of individual leaves requires a closer look and many more nodes.

Networks at Multiple Scales



Figure 1: Close up pictures provide more detail but require more memory or information—nodes and edges—to describe than pictures taken at a distance.

In formalistic terms, scale refers to the class of objects one chooses to focus on. Choosing the “right” scale to address a problem depends on context.³³ However, the influence of the Galilean penchant for the abstract meant that “scholars and disciplines felt under

³³ Meier 2006b.

increasing pressure to sacrifice knowledge of the individual element for generalizations.”³⁴ What does this have to do with early response? Far more than meets the eye at this scale. Distance is not only a matter of geography. Seeking to perceive “the individual traits of an object is directly proportional to the emotional distance of the observer.”³⁵ The devil, as it were, lies in the details. In what follows we take a closer look at the forest and draw on some basic principles from complexity science to delineate the source of the warning-response gap.

The complexity of social systems arises from the interactions between and among many individuals, communities, and countries, and so on at many different scales.³⁶ At a high level of abstraction or aggregation the interacting units of a social system could be called states or nation-states. This scale necessarily cloaks more local events and domestic dynamics. At an even higher level of abstraction, we might begin using the word civilization to describe the nodes in our system. This would shroud the character or polity of individual states. In contrast, local communities and individuals represent a much lower level of abstraction. The trade-off between complexity and scale is illustrated by the three curves in Figure 2 below.

Describing and managing systems involves taking a decision about the level of detail we wish to provide—and plan to act on. As noted earlier, the amount of information necessary to describe a system is a function of scale, i.e., the detail we seek to observe from a given vantage point. In the complexity profile depicted below, the horizontal axis indicates “how far away” we are from the system we want to describe. In other words, it indicates the level of precision of the description. The closer the object is, the greater the detail and the more involved the description.³⁷ The vertical axis indicates the complexity

³⁴ Lane 2005: 5.

³⁵ Ginzburg 1989: 112. This may be the social equivalent of Heisenberg’s uncertainty principle.

³⁶ The difference between Realism and Liberalism, and even Marxism in the theory of international relations can be summed up as matter of different scales. See Meier (2007). “Applying Complexity Science to International Relations Theory.” (*forthcoming*).

³⁷ “The fine-grained nature of the system not only allows many different paths to be explored, but it also allows the system to continually change its exploration paths, since only relatively simple micro-actions are taken at any time. Employing more coarse-grained actions would involve committing time to a particular exploration that might turn out not to be warranted. In this way, the fine-grained nature of exploration allows the system to fluidly and continuously adapt its exploration as a result the

of the system described by an observer at various scales. This represents the amount of information we need to describe a system.

An Organization's Complexity Profile

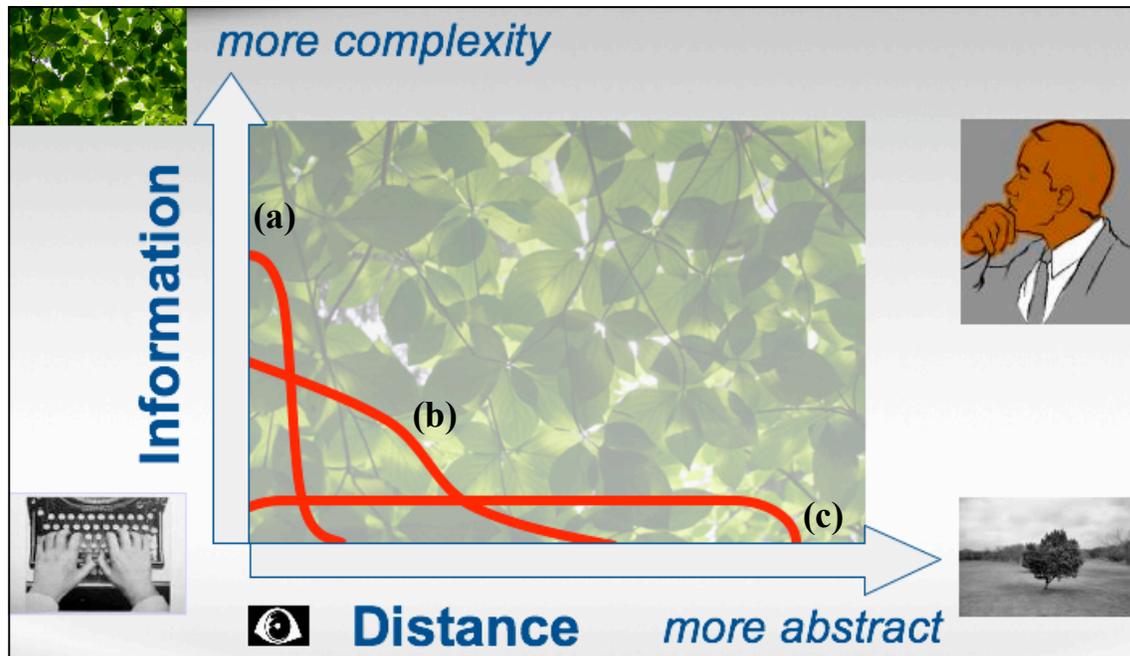


Figure 2: Complexity as a function of scale for three kinds of systems: (a) independent, (b) organized, and (c) structured. The way a system is organized affects how it is seen at different scales. In social systems for instance, people in crowds move more independently than a structured army, while modern international companies reflect some organization yet less hierarchy.

What are the implications of this complexity-scale trade-off for early response? “Like any complex social phenomenon, violent conflict does not result from the linear summation of a neatly defined set of causes, but from interactions among multiple phenomena in a

information it obtains. Note that the redundancy inherent in fine-grained systems allows the system to work well even when the individual components are not perfectly reliable and the information available is only statistical in nature. Redundancy allows many independent samples of information to be made, and allows fine-grained actions to be consequential only when taken by large numbers of components” (Mitchell 2006: 24).

complex system with several levels of organization [...]. As complexity and chaos theories show, in such a system behaviors will not respond in a linear way to changes in one variable, however significant that variable may be.”³⁸ Attempting to prevent or respond to violent conflict at the wrong scale or level of complexity may generate new problems in unlikely locations or scales.³⁹ Furthermore, “conflating the levels of analysis is common,” but means that, “inferences derived from one level of analysis are often applied to another,” leading to invalid and possibly dangerous conclusions.⁴⁰ One way to avoid the confusion of scales is to develop an organizational structure that matches the scale and complexity of the environment within which the organization operates.

“In the organic metaphor, organizations evolve according to contingencies in the environment [where] change typically enhances complexity [...].”⁴¹ Many private sector companies today are not strict hierarchies but rather hybrids of hierarchies and networks, which lend more flexibility and creativity. As Figure 3 below illustrates, this hybrid approach provides numerous lateral connections—or feedback loops—corresponding to communication channels between individuals.⁴² “This implies that the more departments communicate, the more organizational information within a unit is up to date.”⁴³ This concept is not entirely new, “but it has not been fully explored as a system for long-term continuous improvement to organizational performance.”⁴⁴ Feedback mechanisms enable an organization to manage the complexity of their internal and external environments in four important ways. They allow an organization to: (1) scan the environment and collect sufficient information;⁴⁵ (2) integrate and analyze information from multiple sources; (3) respond in a timely manner and observe the results; and (4) reflect on what happened and

³⁸ Rubin 2004: 22,

³⁹ Meier 2006b.

⁴⁰ O’Loughlin 2004: 6. This is termed the “ecological fallacy.”

⁴¹ Dooley 1997: 72

⁴² The behavior of networks as a whole, and the ability of subsystems and agents to learn and evolve, is largely determined by the connections linking the most simple units. See Kauffman 2006.

⁴³ Oomes and Neef 2005: 3. Of course, a diminishing set of marginal returns may accrue after a threshold of feedback loops is crossed. Gladwell (2000) refers to the rule of 150, or Dunbar’s number, which suggests the cognitive limit to the number of individuals with whom any one person can maintain a stable relationship is 150.

⁴⁴ Cooke and Rohleder 2006: 217.

⁴⁵ This means that incidents or precursor events that are “near misses” may lead to no tangible loss, the information from the incidents can still be used to prevent future incidents. See Cooke and Rohleder 2006.

incorporate lessons-learned into the “institutional memory” of the organization, in order to avoid repetition of past mistakes.⁴⁶ In other words, multiple feedback mechanisms allow an organization to “use the right resources at the right place and right time in order to benefit the entire system.”⁴⁷

Networks and Organizations

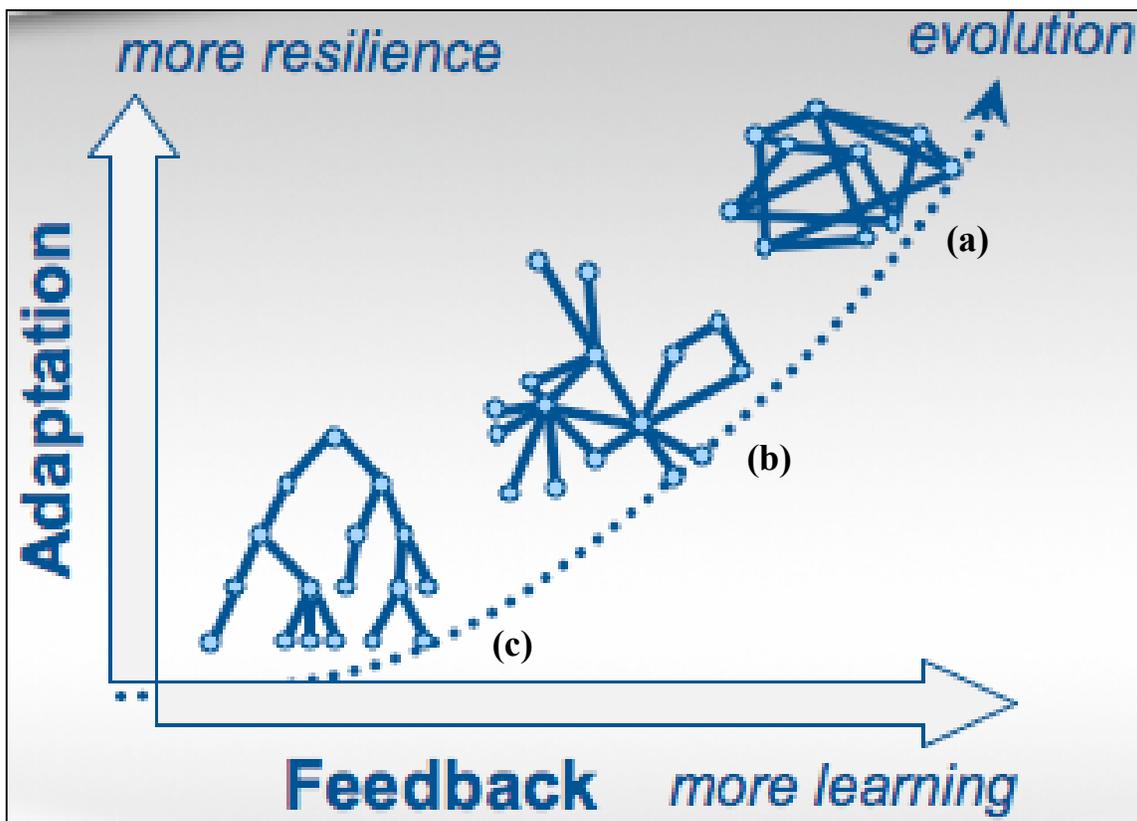


Figure 3: Three types of control structures. Type (a) represents a network; (b) is a hybrid structure while type (c) depicts a hierarchical control structure. In complexity science, the hybrid structure is considered the most resilient and efficient network. Note the variation in the number of feedback loops in each of these network types. In general, the more feedback loops, the more complex the organization or system.

⁴⁶ Bazerman and Watkins 2004: 97; Corbacioglu 2006.

⁴⁷ Mitchell 2006: 21.

In a hierarchical structure, The Leviathan or executive “on the top floor” operates at a higher scale and therefore a higher level of abstraction than those “on lower floors.” At this higher scale, or distance, an individual’s ability to manage complexity (i.e., to scan, integrate, respond and reflect) at the “ground level” is rather limited—as per the complexity-scale tradeoff depicted in Figure 2. In this hierarchical structure, the executive must rely on those individuals four floors down to scan the information. Excellent communication “between floors” is therefore critical. In the process of communication, however, “organizational members filter information as it rises through hierarchies” and “those at the top inevitably receive incomplete and distorted data [and] overload may prevent them from keeping up-to-date with incoming information.”⁴⁸ This limits the organization’s ability to adapt and change, and “any organization that is not changing is a battlefield monument.”⁴⁹ Furthermore, “if the organization does not have a good process for managing change, then actions taken to correct one problem may introduce new problems that were not foreseen.”⁵⁰

To counter this effect and avoid surprises, the business literature recommends that “executives also focus on building networks for *personal* intelligence-gathering and analysis [since] too often, leaders’ beliefs about the potential challenges facing their organizations are based solely on their intuition.”⁵¹ In more formalistic terms, “to the extent that a single individual is in control of an organization, the organization is limited in complexity to the overall complexity of that single human being.”⁵²

To realize why this is an important observation is to understand why an organization (or indeed any other system) needs to be complex. Complexity through diversity is key to survival.⁵³ “Just as a merchant who, not knowing what conditions her ships will face at sea, sends out scores of vessels with different designs, weights, sails and navigational aids stands a better chance of having her fleet make it to port,” in a complex and

⁴⁸ Bazerman and Watkins 2004: 103.

⁴⁹ While 1992: 95.

⁵⁰ Cooke and Rohleder 2006: 223.

⁵¹ Bazerman and Watkins 2004: 174; Arygris 1993.

⁵² Bar-Yam 2004: 66.

⁵³ Darwin 1859; Levin 1998.

competitive environment making the right decision requires an eye for detail.⁵⁴ Being internally complex is generally the only way to succeed in a complex external environment where there are far more possibilities to make the wrong choice than the right decision.⁵⁵ As a general rule therefore, choosing the right ship requires greater internal complexity to simulate which of the many ships will most likely survive a freak wave.⁵⁶

Figures 1, 2 and 3 provide important insights for early response. “The less constrained a system is, the higher its resiliency,”⁵⁷ which means “control must be replaced by an ability to trust individuals and groups to carry out critical organizational tasks without close supervision.”⁵⁸ Consider briefly the difference between a wolf and a human: “The legs of a wolf are designed for the largest scale action: moving the animal as a whole. The structure of a person gives up some ability to run fast. Only two of the four limbs are for moving the entire organism. The arms and hands are designed for finer scale, higher complexity, manipulations. If the environment requires large-scale movement/action the wolf is better suited [but] if the environment requires a finer scale higher complexity manipulation, the person is better suited.”⁵⁹ This example demonstrates both: (1) the trade-off between complexity and scale; and (2) that the success of the organism/organization depends on matching the complexity of its environment. In more formalistic terms, organizational “performance is so environmentally dependent, it cannot be deduced from environmental factors alone. In stable environments, organizations with stalemated nets may do well or at least persist over long periods. When environmental change is sufficiently volatile, even organizations with mobilizable nets may not meet challenges adequately.”⁶⁰ This is worth repeating: “the rule of thumb is that the

⁵⁴ Scott 1999: 22.

⁵⁵ Bar Yam 2004; Mitchell 2006.

⁵⁶ The environment should not be treated as a black box. While organizational theorists talk a great deal about an organization’s environment in such terms as the degree of uncertainty or resource scarcity it presents for the organization, they have tended to be vague about the source of these pressures. In contrast, proponents of a systems or network perspective argue that the most significant elements of an organization’s environment are the other organizations with which it must interact. See Nohria 2002.

⁵⁷ Nadim 2006: 34.

⁵⁸ Corbagioglu 2006: 215; Gladwell 2000.

⁵⁹ Bar-Yam 2004: 68.

⁶⁰ DiMaggio 1992: 137.

complexity of the organism has to match the complexity of the environment at all scales in order to increase the likelihood of survival.”⁶¹ In Figure 3c above, the complexity of the hierarchical control structure is limited to the complexity-handling ability (or complexity profile) of the one individual in control at the top. “A degree of centralization is one outcome of struggles for control,”⁶² and “it limits learning potential.”⁶³

This explains why the increased interest in the concept of networks emerged in the private sector as a result of “the New Competition” (or complexity) during the 1980s and 1990s, e.g., the competitive rise of small entrepreneurial firms and regional districts such as Silicon Valley in California. “This New Competition has been contrasted with the old in one important way. If the old model of organization was the large hierarchical firm, the model of organization that is considered characteristic of the New Competition is a network, of lateral and horizontal inter-linkages within and among firms.”⁶⁴ The new competition increased the complexity of the environment and firms had to change internally in order to survive. Therein lies the genesis of small firm networks. They are more complex because they are more decentralized and also feature more feedback loops (recall Figure 3). “Lateral communication and coordination among a range of organizational and inter-organizational actors and the integration of micro- and macro-level decision-makers through information flow facilitate learning and adaptation.”⁶⁵ In short, the competitive success of networks as organizational forms is due to their dynamic properties or feedback loops and the notable “removal of bureaucratic decision-making hierarchies.”⁶⁶

The same argument can be made in the context of conflict. If the conflict environment within which an organization operates is increasing in complexity because of escalating violence, then the organization itself must be equally complex internally to adapt to this

⁶¹ Bar-Yam 2004: 67. In the terrorizing “War on Terror,” for example, “the best response to transnational terrorist networks is networks of cooperating government agencies” (Nye 2003).

⁶² White 1992: 97.

⁶³ Dooley 1997: 92.

⁶⁴ Nohria 1992: 2.

⁶⁵ Corbacioglu 2006: 214.

⁶⁶ Dooley 1997: 91; see Perrow 1992; Maruyama 1963, 1982; Weick 1979; Morgan 1981, 1997.

changing environment.⁶⁷ This is especially important for early warning since a mismatch in complexity profiles necessarily creates organizational barriers to effective and early response. In new crises, for example, the presence of “significant novelty” or complexity implies that “existing routines are inadequate or even counter-productive [since] response will necessarily operate beyond the boundary of planned and resourced capabilities.”⁶⁸ As per the lessons learned in the business sector, decentralization of early response “will tend to quicken reaction time and breed novelty in operations.”⁶⁹ Put in formalistic terms, “the ‘symmetry-breaking’ effects of disasters undermine linearly designed and centralized administrative activities.”⁷⁰ In a crisis context then, “early warning should be viewed as a useful management tool as well as an *ongoing learning process* of developing situations.”⁷¹ The component of early warning should form part of a management cycle of early warning, preparedness, action, and post-action evaluation. *All* of these processes should be handled in a *systematic* way. Early ‘warning’ is an alert function, not merely a forecasting or projection endeavor.”⁷² Furthermore, given the “significant novelty” imposed in crises situations, “significant customization or improvisation is likely to be needed” in early response, which means that existing routines often need to be “adapted and melded in unusual and unpracticed situations.”⁷³ This calls for a “variably flattened” structure or the hybrid network model as depicted in Figure 3c.⁷⁴

⁶⁷ This is a basic principle of complexity science: self-organized criticality. In statistical physics, this is associated with the second law of thermodynamics and in information theory: entropy. See Meier and Woodard (2006). “Conflict Events-Data and Casualty Data: A Comparative Analysis.” *Santa Fe Institute on Complex Systems*, 2006.

⁶⁸ Leonard and Howitt 2007: 9.

⁶⁹ Dooley 1997: 92.

⁷⁰ Corbacioglu 2006: 212.

⁷¹ However, individuals must learn first for organizational learning to occur (Cohen and Levinthal, 2000). Learning becomes organizational when members of an organization detect an error or anomaly and correct it by restructuring the organization’s theory of action (or ‘theory’ in use’), embedding the results of their inquiry in the images of the organization held in its members’ minds (mental models) and/or in epistemological artifacts, such as maps, memories and programs (Arygris and Schön, 1996). See Corbacioglu 2006.

⁷² Kuroda 1992: 216.

⁷³ Leonard and Howitt 2007: 11.

⁷⁴ Leonard and Howitt 2007; Ooms and Neef 2005; Dooley 1997. “We also imagine the dynamic organigram to have the same zoom properties as an ordinary map. It can give you a global view of the organization, but also a detailed view of the structure of a particular operational unit. It will depend on who you are (mayor in the crisis center, policeman on the scene) and what you want to know (size of the entire organization, position of a particular ambulance)” (Oomes 2004: 5).

In summary, while Figure 2 demonstrates the trade-off between complexity and scale, Figure 3 suggests that the success and survival of an organization depends on both internal complexity and scale. Adapting to a dynamic environment therefore requires that an equally complex organization operates: (1) at an appropriate scale and (2) in a decentralized manner. To this end, “a ‘flatter’ organization would be likely to do a better job of observing and assimilating the relevant features of the situation than a more hierarchical structure.”⁷⁵ In the following section, we employ this systems model to evaluate the success of two operational early warning systems.

Operational Case Studies

The following case studies serve to illustrate the structural mismatch in complexity that exists in the practice of conflict early response. The consequences of this mismatch are explicated. New strategies for effective early response based on cross-disciplinary research are outlined in the next section.

The Inter-Governmental Authority on Development’s (IGAD) Conflict Early Warning and Response Network (CEWARN) is mandated to monitor and anticipate pastoral conflict in the Horn of Africa.⁷⁶ In 2002, Swisspeace and Virtual Research Associates (VRA) were solicited to develop and operationalize an appropriate methodology for CEWARN.⁷⁷ The two non-governmental organizations (NGOs) had previously collaborated on the development of Swisspeace’s FAST early warning system, which IGAD had taken an interest in.⁷⁸ FAST is a field-based early warning system that uses Local Information Networks and the Integrated Data Event Analysis (IDEA) framework—originally

⁷⁵ Leonard and Howitt 2007: 10.

⁷⁶ See www.cewarn.org

⁷⁷ For a detailed analysis of the CEWARN methodology see Meier (2007). “Networking Disaster and Conflict Early Warning Systems in Response to Climate Change.” Paper presented at the International Studies Association.

⁷⁸ Disclaimer: The author was formerly a consultant to Swisspeace, VRA and IGAD between 2003-2006. All views expressed in this paper are the author’s alone and all information presented is publicly available, i.e., not internal.

developed by VRA to automatically code events reported in global newswires.⁷⁹

FAST's Local Information Networks comprises three to five part-time local employees who report and code relevant information in accordance with the fixed set of indicators dictated by the IDEA framework. Given CEWARN's specific focus on pastoral conflict however, the IDEAs' generic framework used by FAST was considered sub-optimal, not to mention that "preventive action requires a degree of specificity which usually does not flow from global [or macro] indicators."⁸⁰ VRA therefore proposed and developed a customized and modular approach that went beyond FAST's basic event-logging methodology.⁸¹ Today, CEWARN field monitors use fully customized surveys to report from more than twenty locations along the borders of Ethiopia, Kenya, Somalia and Uganda—collectively known as the Karamoja and Somali Clusters. While a notable improvement over FAST's first-generation early warning methodology, CEWARN's approach nevertheless replicates the structural source of the warning-response gap that this paper seeks to highlight.

The process of decision-making in centralized or hierarchical conflict early warning systems such as CEWARN is fraught with organizational barriers.⁸² This should not come as a surprise. Already 20 years ago, the literature on early warning observed that, "bureaucracies [were] exhibiting their incapacity to manage the complexities of our global village. And today the alternative structures most likely to succeed these bureaucracies are emerging. The most common term for these structures is 'networks.' They tend to be decentralized, where policies tend to be flexible and fluid, where staff relations are not monolithic and hierarchical, where the structure tends to be polycentric rather than monocentric."⁸³ Figure 4 below is a "network map" *interpreted* from both the official CEWARN protocol and the organizational chart available on the official website: www.cewarn.org. The protocol is a state-ratified document that outlines CEWARN's

⁷⁹ (Bond *et al.* 2003; Krummenacher and Schmeidl; 2001Krummenacher 2006). See www.swisspeace.org/FAST

⁸⁰ Ryan 1992: 170.

⁸¹ Bond and Meier 2005, 2006.

⁸² Campbell and Meier 2007.

⁸³ Rupesinghe 1988: 226; Corbacioglu 2006.

mandate and standard operating procedures.

The CEWARN Network

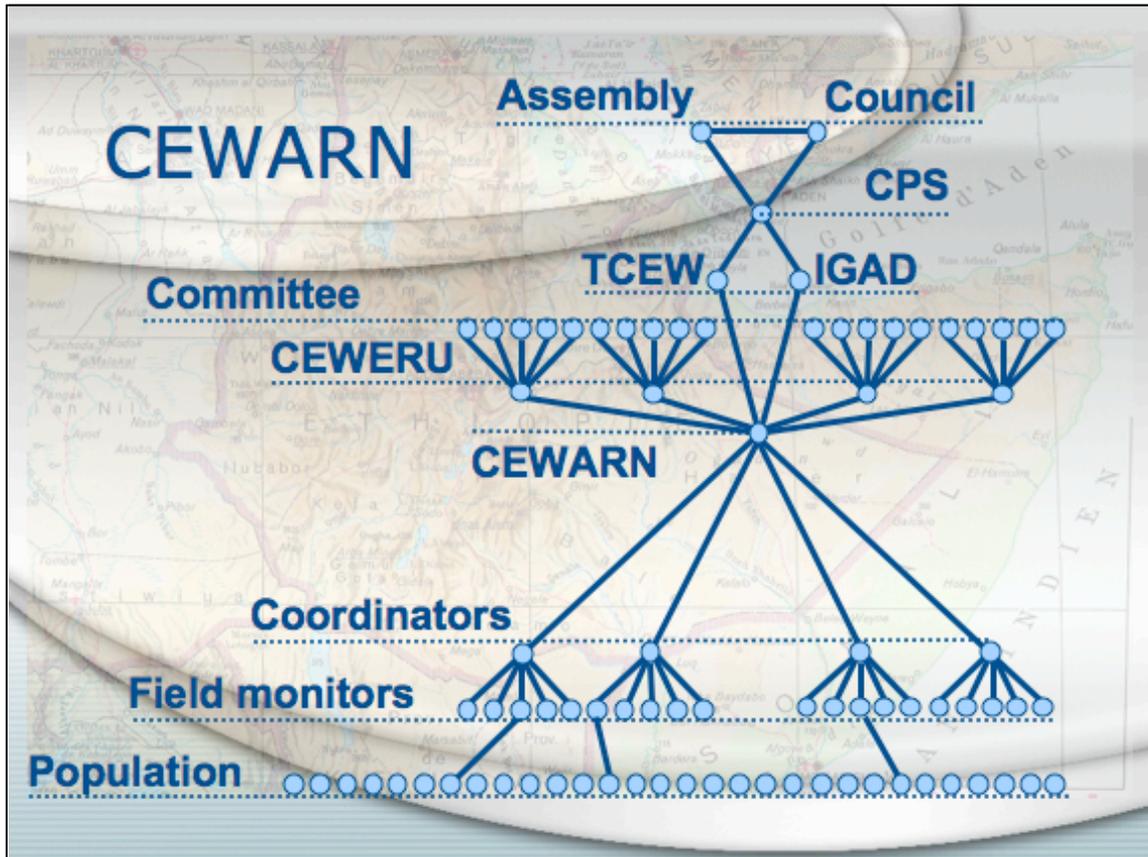


Figure 4: CEWARN’s organizational chart in network form. The network depicted resembles a hierarchical structure type which means it may therefore inherit some of this type’s characteristics, both positive and negative. Please see the CEWARN website and protocol for an explanation of the acronyms.

While the information collection process is described in some detail, the locus for response remains somewhat unclear in the protocol. CEWARN defined role for early response is primarily one of information management and analysis. Instead of operationally responding to conflict escalation via its trained field monitors, CEWARN is tasked with “recommend[ing] mechanisms for regional responses to cross-border and

trans-border conflict.”⁸⁴ To this end, both the CEWARN Unit and the national Conflict Early Warning and Response Units (CEWERUs) are expected to develop case scenarios to formulate options for response. CEWARN is then mandated to communicate “alerts” to the Committee of Permanent Secretaries (CPS), which will (a) “review the options, and make immediate recommendations to the Council” and (b) “decide what parts of this information or analysis should be made available in the public domain.”⁸⁵ Finally, the protocol affirms that Member States may involve the following sectors in early warning and response: national and regional parliaments, academic and research institutions including religious organizations, local NGOs and the media.

Seen in this light, the project may be described as a hierarchical information collection system rather than a horizontal response-oriented network. Even with the CEWARN Unit’s excellent analyses of local conflict dynamics, the hierarchical chain of command and the diffuse nature of the project’s response procedures renders the potential for timely and effective response particularly challenging. This may explain why the first (and perhaps only) successful (publicly documented) early response action actually went through informal channels.⁸⁶ Moreover, this success story occurred right after the CEWARN office was set up in Addis Ababa. During this time, the CEWARN Unit was heavily focused on developing their capacity for early warning. In other words, formal communication channels with respective Member State capitals for purposes of early response may not have been fully operational at the time, which perhaps explains why CEWARN’s response was both informal and a success.

This is not to say that CEWARN and related systems such as FAST do not add value—of course they do but just at a different scale or level of analysis. Amongst CEWARN’s many accomplishments, for example, is trust building at the state and inter-governmental level. The project brought together several Member States often at odds with each other, which is how the process of implementing CEWARN served as a very important trust

⁸⁴ CEWARN Protocol: 9; available on-line at:

www.iss.co.za/AF/RegOrg/unity_to_union/pdfs/igad/Protocol.pdf

⁸⁵ CEWARN Protocol: 18.

⁸⁶ Bond and Meier 2006.

building and networking tool. The CEWARN Unit has also trained some 30 field monitors in conflict analysis and has developed one of the most versatile methodologies for early warning, which has since been adopted by the Economic Community of West African States (ECOWAS). Thanks to this methodology, CEWARN has been able to credibly document the widespread social and economic cost of local cross-border conflicts previously ignored by the region's governments. CEWARN's methodology has also enabled analysts to use geographical information systems to compare environmental indicators with conflict triggers. In fact, the most recent econometric analyses confirm that specific environmental factors do indeed influence local conflicts in the Horn.⁸⁷ This knowledge is particularly salient for long-term trends analysis and structural prevention programs. Clearly, CEWARN's commitment to evidence-based analysis is an invaluable contribution to the humanitarian field and especially at the state level.

FAST's added value to governments in developing countries is perhaps less clear. That being said FAST has brought together the world's leading Western development organizations to form the FAST International consortium, which amongst other advantages has provided the project with a more predictable funding cycle. FAST has also trained some 60 local field monitors to code event types by computer using the IDEA framework. The project is also engaged in some of the most advanced and cutting-edge academic research to "develop a reliable quantitative forecasting model to predict future incidences of violent conflict."⁸⁸ FAST has been operational for seven years now but perhaps the only reference to early response on the project's official website is simply in the form of a stated objective: "to develop new concepts of bridging the gap between early warning and early action,"⁸⁹ with no additional information provided or loose references to success stories. Even more odd are the claims that FAST's methodology and specially designed software were used to develop CEWARN, which is factually incorrect and verifiably so.⁹⁰ As for FAST's organizational structure, the links to early response are perhaps even more diffuse than those at CEWARN.

⁸⁷ Meier, Bond and Bond 2007.

⁸⁸ FAST website: www.swisspeace.org/FAST/early_warning.htm

⁸⁹ FAST website: www.swisspeace.org/FAST/early_warning2.htm

⁹⁰ Bond and Meier 2005, 2006. FAST website: www.swisspeace.org/FAST/services3.htm

To this end, if hierarchical and highly bureaucratic structures face multiple constraints in fast-paced environments, why have we not seen more network-oriented approaches in the past 20 years?⁹¹ “Institutions are hard to create and set in motion, but once created, institutionalists claim, they may take on something of a life of their own.”⁹² Indeed, they tend to “organize themselves around their initial success and in the long-run take on a defensive nature to ward of competitors,” which in complexity science is often referred to as path-dependence.⁹³ That said the disaster management community has made more progress in identifying and tackling these barriers than the conflict prevention community. They have also been in the early warning business for a longer period of time than those engaged in designing conflict early warning systems. Unfortunately, the two communities rarely, if ever, share lessons learned and best practices.⁹⁴ This may explain why conflict early warning systems continue to be “wired” vertically in the form of hierarchical systems.⁹⁵

Why are these systems vertically wired in the first place? Perhaps because the first-generation of conflict early warning systems were designed with Western interests in mind—to control and remain abreast of escalating violence well beyond their own borders. Admittedly, “the social process of prediction, whether of physical or social events, is to secure a measure of control.”⁹⁶ However, hierarchical systems are not designed to operate and respond to conflict at a low scale, which means “the view from below”—critical for early warning—often remains hidden.⁹⁷ In sum, this type of CEW is largely an “exercise in understanding how what is happening over there comes be known

⁹¹ The idea of networks is not new. “At least since the 1950s, the concept of networks has occupied a prominent place in such diverse fields as anthropology, psychology, sociology, mental health, and molecular biology. In the field of organizational behavior, the concept dates back even further. As early as the 1930s, Roethlisberger and Dickson (1939) described and emphasized the importance of informal networks of relations in organizations” (Nohria 1992).

⁹² Waltz 2000: 21; Krasner 1984.

⁹³ Wolf 1998.

⁹⁴ Brauch and Oswal 2006.

⁹⁵ Barrs 2006. As the rest of this analysis will argue, this is not a question of exclusively choosing one type of early warning system over another but rather having a multitude of approaches that can match the complexity of the conflict environment.

⁹⁶ Rupesinghe 1988: 217.

⁹⁷ Meier 2006b.

[and controlled] by us over here.”⁹⁸ These centralized systems perhaps reflect the hierarchical power structures that already exist in international relations.⁹⁹ New early warning initiatives that ignore the structural shortcomings highlighted above will only replicate the institutional locus of the warning-response gap instead of recognizing that “a democratic flow of information is the first condition for a democratic and open system of warning and resolution.”¹⁰⁰ But a democratic approach to local early response for civilian networks does not figure prominently since conventional systems take a hierarchical and egocentric view of early warning.¹⁰¹ In fact, local at risk communities often remain completely unaware that formal warning systems even exist,¹⁰² which suggests that the real stakeholders are excluded even though “humanitarian early warning is [allegedly] based on protecting the interest of others who are at risk.”¹⁰³

The lack of local stakeholder participation and ownership means that organizations funded to design and implement early warning systems are seldom transparent in their work let alone accountable to those most vulnerable.¹⁰⁴ So-called beneficiaries and local communities are rarely involved in the mechanics of hierarchical early warning systems and have no way to engage in field reporting despite the fact that early warning signals appear most clearly to those immediately around the disputants.¹⁰⁵ At least in Hobbes’s *State of Nature*, *The Leviathan* is tied to a social contract. Not so in the business of

⁹⁸ Adelman 1998: 2.

⁹⁹ White and Meier 2007. Control of information and through this opinion and images have historically been the anchoring tool of state power (Bollier 2003).

¹⁰⁰ Rupesinghe 1988: 221.

¹⁰¹ Barrs 2006.

¹⁰² Barrs 2006.

¹⁰³ Schmeidl and Jenkins 1999: 482.

¹⁰⁴ Meier 2006b; Donini and Minear 2006. Former UN Secretary General Perez de Cuellar: “In thinking of the future of the Organization one is struck by the fact that the United Nations is almost unique among political organizations in having little direct contact with its basic constituency” (cited in Rupesinghe 1988: 221).

¹⁰⁵ Meier 2007; Bond and Meier 2006; Barrs 2006; Okada 2006; Meier 2004; Ury 2000; Walker 1992. Drawing parallels with the colonial era may not be that far-fetched. During the scramble for Africa, for instance, colonial powers preyed on the resources of developing countries to fuel the West’s insatiable thirst for progress and technological innovation. First and second-generation early warning systems replicate a similar pattern. While not preoccupied with diamonds or coltan, these organizations hire locals to mine information (a resource no less precious) in conflict zones. This merchandise is then shipped to the Global North along secure electronic channels. The data and analysis is then sold to the “highest bidders”, not the populations at risk from whence the information originated but to the headquarters of organizations located at a comfortable distance from any possible mayhem and bloodshed.

conflict prevention which singles out “expert systems as alone able to probe and domesticate further reaches of environmental and social ‘wildness.’”¹⁰⁶ Needless to say, Leviathans may not always be well placed to engage in effective early response.¹⁰⁷

It is not difficult to understand why early warning is seldom linked with effective response. Since Western donors spurred the first generation of early warning systems, these were centralized and based on very technical methodologies for data gathering and analysis. They failed for two reasons.¹⁰⁸ “Firstly, they were too far removed from the conflict context to enable effective early response [...]. The centers that collected information and delivered early warning were based in the West whereas the actual conflict situations were experienced elsewhere.”¹⁰⁹ In other words, there was a mismatch in scale and therefore in incentives to respond. The problem, however, is not only a matter of geography. The central question is who ultimately controls or owns the information,¹¹⁰ since in first-generation early warning systems “little attention is paid to the victims of disasters, or to the competence of local NGOs to strengthen their own capacity to handle information, to evaluate and control their own environment.”¹¹¹

The lesson here is perhaps self-evident, “what is needed are systems that are tailored for local use and [are] generated on site.”¹¹² Evidently, the local human factor—perceptions, needs and interests—is very significant for early warning.¹¹³ Indeed, “there is something

¹⁰⁶ Hewitt 1998: 80.

¹⁰⁷ “The most important question George W. Bush will face in his second term is whether he can [...] shift from shock and awe to the reassurance—and *the attention to detail*—that is necessary to sustain any new system [...]” (Gladdis 2005).

¹⁰⁸ Enderagalle, D. (2006). “Conflict Early Warning and Early Response: The Making of New Generation,” paper presented at Global Partnership for the Prevention of Armed Conflict (GPPAC), Experts Meeting on Early Warning, Netherlands, April 11-12, 2006).

¹⁰⁹ *Ibid.* 25.

¹¹⁰ Drawing parallels with the colonial era may not be that far-fetched (Bankoff 2004). During the scramble for Africa, for instance, colonial powers preyed on the resources of developing countries to fuel the West’s insatiable thirst for progress and technological innovation. First and second-generation early warning systems replicate a similar pattern. While not preoccupied with precious minerals, the organizations manning these systems hire locals to mine for information in conflict zones. This merchandise is then shipped to the Global North along secure electronic channels.

¹¹¹ Rupesinghe 1988: 218. To be sure, “a democratic flow of information is the first condition for a democratic and open system of warning and resolution” (Rupesinghe 1988).

¹¹² Barrs 2006.

¹¹³ Twigg 2002; Walker 1992.

about the complexity of human experience that suggests that a different kind of knowledge will also be needed, the quality called by the ancient Greeks *metis*, or practical wisdom.”¹¹⁴ In other words, long-distance expertise and “analytical capacity alone will never be sufficient for generating effective response,”¹¹⁵ since “to have significance operationally, analysis cannot simply be factual but also has to address the issue of perception (e.g., perceived needs, values and symbols).”¹¹⁶

The second reason that accounts for the limited success of first-generation early warning systems, is that a technology-centered approach tends to “crowd out” local knowledge and perceptions.¹¹⁷ In other words, there was a mismatch in internal and external complexity. Indeed, developing technology-driven solutions requires the “empowering” of highly skilled individuals, i.e., Western-educated consultants, which is often traded against capacity building for local stakeholders. Indeed, “the technological approach almost always serves those who seek control from a distance.”¹¹⁸ As a result of this technological drive for pole position, a related “concern exists due to the separation of risk evaluation and risk reduction between science and political decision” so that which is inherently politically complex becomes depoliticized and mechanized.¹¹⁹

In *Toward a Rational Society* (1970), the German philosopher Jürgen Habermas describes “the colonization of the public sphere through the use of instrumental technical rationality. In this sphere, complex social problems are reduced to technical questions, effectively removing the plurality of contending perspectives.”¹²⁰ To be sure, Western science tends to pose the question “How?” as opposed to “Why?”¹²¹ What happens then is that “early warning systems tend to be largely conceived as hazard-focused, linear, top-down, expert driven systems, with little or no engagement of end-users or their

¹¹⁴ Rubin 2002: 147.

¹¹⁵ Carment and Schnabel 2003: 13.

¹¹⁶ Ivanov and Nyheim 2004: 164.

¹¹⁷ Meier 2006b; Scott 1999.

¹¹⁸ Email exchange with Professor George Kent, February 3, 2007. See also Scott 1999.

¹¹⁹ Cardona 2004: 51; de Waal 1998; Buchanan-Smith and Davies 1995; Rupesinghe 1988; Galtung 1980.

¹²⁰ Cited in Pulwarty, Broad and Finan 2004: 95.

¹²¹ Nadim 2006.

representatives.”¹²² Those familiar with the basic principle of scale in complexity science will recognize that “mechanical models of action and thinking will not meet the complexities of the linkages, chains, and open-ended processes of contemporary disasters.”¹²³ To be clear, an approach that wants to ‘control’ complexity by combating it with ever more intricate models and measurements is unlikely to succeed.¹²⁴ In sum, early “responses are depoliticized, technologized responses [where] solutions are implemented by experts without consultation with those involved, [and] the victims seen as just that—they have no political voice.”¹²⁵ This means that vulnerability analyses are carried out “only in aspects that are susceptible to technical solutions”¹²⁶—the “How?” question—even though “vulnerability is the result of political processes.”¹²⁷ In short, process is “regarded as politically neutral”¹²⁸ since “the expert is accepted as politically neutral.”¹²⁹ And so, a significant amount of local intelligence simply isn't collected by first-generation systems because local communities are not involved in the process of early warning or in the design of responses.¹³⁰

Even though CEWARN is headquartered in Addis Ababa and not in Berne, the initiative still remains too hierarchical for timely and effective response. “The real question,” as our networks analysis suggest, “is not only timeliness and effectiveness, but also the question of whose interests are to be served.”¹³¹ This means that early warning information has to be actionable and customized to meet the *demands* of the end users. Some have described this using the analogy of planning food for a dinner party. “We not only need to know how many people are coming but who is coming, the time of the day,

¹²² Reid 2006: 2172.

¹²³ Rosenthal 1998: 153. “The message is clear: try as we may to induce order on “nature” and “society” by assigning each kind of entity that supposedly composes them into its place in a hierarchical ordering relative to all the others, as soon as we follow any process in which facts or values are contested, the networks of actors that have to be mobilized to settle the contest involve humans and nonhumans grappling with one another, forming alliances, employing all the resources of science, politics and discourse they can muster” (Lane 2005: 18).

¹²⁴ Hillhorst and Bankoff 2005: 8.

¹²⁵ Edkins 2002: 13.

¹²⁶ Heijman 2004: 117.

¹²⁷ Bankoff *et al.* 2004: 7.

¹²⁸ Heijman 2004: 117.

¹²⁹ Edkins 2002: 14.

¹³⁰ Okada 2006; Donini and Minear 2006; Walker 1992.

¹³¹ Email exchange with Professor George Kent, February 3, 2007.

and the season. Without such knowledge, we may prepare the perfect dinner for the wrong set of people.”¹³² However, this analogy is made in relation to a first generation early warning system, which means that those invited to enjoy the lavish dinner are not the real stakeholders, i.e., the communities at risk. And so, the rhetoric labels the communities at risk as “the intended beneficiaries; but, in practice they [are] not the real clients of early warning activities.”¹³³ From the perspective of hierarchical early warning systems, “we [the West] are the rescuers; aid does not start until we arrive.”¹³⁴ Unfortunately, we rarely arrive—Darfur being just one tragic example among dozens of “neglected crises” in addition to numerous so-called “forgotten emergencies.”¹³⁵

The trouble with CEWARN and similar systems such as FAST is that they are designed to trigger a response from the outside in contrast to people-centered disaster early warning systems, which are wired horizontally as depicted in Figure 5 below.¹³⁶ “When this message [or warning] is targeted internally [or vertically] – that is from the informants to their headquarters – there *must* be an onus upon the headquarters to act. There is little point in investing in warning systems if one then ignores the warnings!”¹³⁷ To be clear, “early warning should not be an end in itself; it is only a tool for preparedness, prevention and mitigation with regard to disasters, emergencies and conflict situations, whether short or long term ones. From a managerial point of view such a system will necessarily depend on the efficiency and effectiveness of the organizational work [...]. The real issue is not detecting the developing situation, but reacting to it.”¹³⁸

In practice, however, information is shaped and revised as it percolates through the layers of a bureaucracy in both international and regional organizations, whether governmental or non-governmental.¹³⁹ In other words, “the inevitable problems of hierarchy (both

¹³² Krummenacher and Schmeidl 2001: 6.

¹³³ Stephen 2004: 106; Draman 2003.

¹³⁴ Stephen 2004: 106; Draman 2003.

¹³⁵ World Disaster Report 2006.

¹³⁶ Barrs 2006; Talentino 2003.

¹³⁷ Walker 1992: 102.

¹³⁸ Kuroda 1992: 217.

¹³⁹ Barnett and Finnemore 1999; Power 2003; Bazerman and Watkins 2004.

formal and informal) include the filtering and distortion of information, a slower pace of decision making, and restricted or highly specified procedures for access to required resources.”¹⁴⁰ Since the “likelihood of information moving from one person to another is proportional to the strength of their relationship,” a hierarchical approach to early warning and response is unlikely to be effective.¹⁴¹

Matching Complexity in Early Response

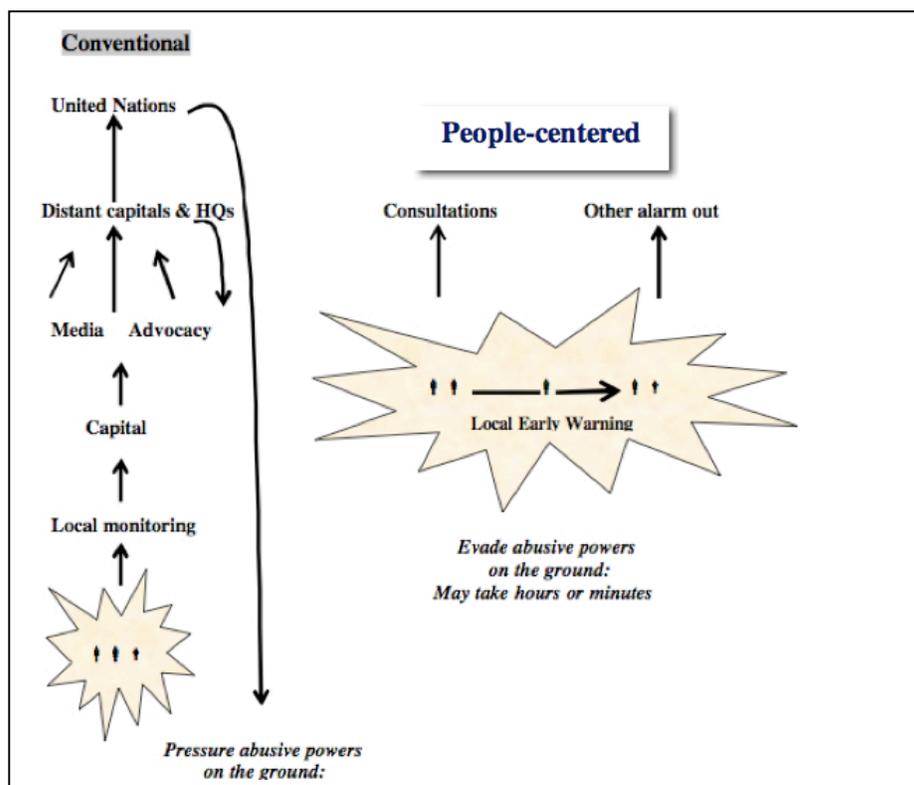


Figure 5: Conventional top-heavy early warning versus people-centered early warning (Adapted from Barrs 2006). This does not imply that one has to choose between the two approaches since each has advantages and disadvantages. Networking both approaches may provide added value. In any case, however, discussions about warning should always be tightly coupled with discussions about responses.

¹⁴⁰ Ibarra 1992: 174.

¹⁴¹ Burt 1992: 66; Allen Nan 2006.

While CEWARN is referred to as a “network” in name, the above analysis that takes into account network characteristics would qualify this network primarily one-directional given the extent to which decision rights, or power, are concentrated among a few individuals several times removed from the at-risk communities. The incentives to react, then, are largely a function of scale. That is, communities at risk “on the ground,” are more likely to react to early warning information within hours than bureaucratic organizations located thousands of miles away. The limited ability of first-generation early warning system to recognize the scale that generates a manageable or self-organized incentive structure for early response is another drawback of the hierarchical approach.

It would appear, then, that the CEWARN project is still an “exercise in understanding how what is happening over there comes be known by us over here.”¹⁴² The direct consequence of hierarchical systems is that they emphasize external prevention over local conflict preparedness. This explains why in the practice of CEW “the aim seems still mainly to predict, not advise,”¹⁴³ even though first-generation systems have a dismal track record in predicting conflict. But as the disaster management community has learned many years ago, in “support[ing] good decision-making, the issue is not one of being able to predict the unpredictable. Rather, the fundamental question is, given that we cannot have reliable predictions of future outcomes, how can we prevent excessive hazard levels today and in the future in a cost-effective manner?”¹⁴⁴ In *The Poverty of Historicism* (1944), Karl Popper distinguishes between two kinds of predictions: “We may predict (a) the coming of a typhoon, a prediction which may be of the greatest practical value because it may enable people to take shelter in time; but we may also predict (b) that if a certain shelter is to stand up to a typhoon, it must be constructed in a certain way...” (38). What is needed is a more serious focus on type (b), i.e., local preparedness and contingency planning based on pre-defined protocols. In short, some kind of insurance policy is warranted in case the first type of prediction fails—which is sadly the rule rather than the exception.¹⁴⁵

¹⁴² Adelman 1998, 2.

¹⁴³ Lund 1998: 2.

¹⁴⁴ Chadná, Motchanova and Obersteiner 2006: 296.

¹⁴⁵ Barrs 2006; Meier 2006b.

The field of disaster response emphasizes the significance of local knowledge and strengthened indigenous coping mechanisms within the context of disaster mitigation and preparedness.¹⁴⁶ “The current emphasis on the importance of this local knowledge in disaster situations is a belated recognition that non-Western peoples have historically developed sophisticated strategies and complex institutions to reduce the constant insecurity of their lives.”¹⁴⁷ This is equally true of conflict as will be demonstrated in the following section. In the meantime, the UN Global Survey of Early Warning Systems for natural disasters defines the purpose of people-centered early warning systems as follows: “to empower individuals and communities threatened by hazards to act in sufficient time and in an appropriate manner so as to reduce the possibility of personal injury, loss of life, damage to property and the environment, and loss of livelihoods.”¹⁴⁸ In other words, people-centered early warning with respect to conflict would therefore “seek to inculcate a situational or security awareness within high-risk communities as it builds on local capacities to address and reduce their vulnerabilities in a sustainable way which differs from the traditionally more ‘remote’ and ‘vertical’ monitoring.”¹⁴⁹

The shift to people-centered early warning for disasters also follows the belated recognition that “mechanical models of action and thinking will not meet the complexities of the linkages, chains, and open-ended processes of contemporary disasters.”¹⁵⁰ To be sure, “the more technological and abstract our work environment becomes, surely it is the more important to go out into the field and confront our abstractions with evidence on the ground.”¹⁵¹ This is especially important in the context of increasingly sophisticated conflict early warning systems.

Top-heavy systems like CEWARN and FAST characterize institutional limitations that also overly simplify the processes of both monitoring and analysis.¹⁵² In other words, the “analysis and intervention may have the theoretical intention of placing vulnerability at

¹⁴⁶ Manyena 2006; Reid 2006; O’Brien *et al.* 2006; Walker 1992.

¹⁴⁷ Bankoff, Frerks and Hilhorst 2004: 32.

¹⁴⁸ UN 2006: 2.

¹⁴⁹ Bond and Meier 2006: 130; Oomes 2004.

¹⁵⁰ Rosenthal 1998: 153.

¹⁵¹ Hewitt 1998: 88.

¹⁵² Stephen 2004; Scott 1999.

the [local] level; but institutional and systemic constraints force users to apply them to higher geographical scales. As a result, a selected methodology may merely be an action through which the discourses within early warning are reproduced.”¹⁵³ Take for example CEWARN’s three field monitors who cover Kenya’s Turkana District in the Karamoja Cluster. While the discourse labels them as “field” monitors, which suggests a “local” presence, these three monitors are tasked with monitoring events and processes taking place on a weekly basis across more than 70,000 square kilometers—equivalent to the landmass of Lebanon, East Timor and Burundi, put together. “But it is hardly surprising that organizational form has a determining effect on the process and quality of the reporting.”¹⁵⁴ Given CEWARN’s organizational form however, the process of monitoring and analysis—unlike people-centered early warning—is not carried out on a human scale where the complexity of the environment can be matched.¹⁵⁵

This organizational form is hardly accidental as argued above. “The top heavy systems are distinctly different from the people centered ones because they serve different purposes: centralized systems are more likely to serve the top.”¹⁵⁶ This places significant constraints on the effectiveness of early response. Admittedly, “no administrative system is capable of representing [or monitoring] every existing social community except through a heroic and greatly schematized process of abstraction and simplification.”¹⁵⁷ This may well reduce the level of complexity to be managed but will also generalize local conflict dynamics which significantly limits the specificity and effectiveness of early response. But the constraint is “not simply a question of capacity [...]. It is also a question of purpose. State agents have no interest—nor should they—in describing an entire social reality [...]. Their abstractions and simplifications are disciplined by a small number of objectives,” often dictated by self-interest which seeks to consolidate “political control.”¹⁵⁸ Indeed, “national politicians are unlikely to be interested in insights from

¹⁵³ Stephen 2004: 108; c.f. Wittgenstein 1953. According to Jürgen Habermas the complexity of contemporary societies has produced a linguistification of the public sphere. See Crossley and Roberts 2004.

¹⁵⁴ Benini, Minnaar and Pretorius 1998: 507.

¹⁵⁵ Eakin and Luers 2006.

¹⁵⁶ Email exchange with Professor George Kent, February 3, 2007

¹⁵⁷ Scott 1999: 22.

¹⁵⁸ Scott 1998: 22-23.

highly localized, micro-level, spatial data analysis while those with responsibility for local problems and local-scale resource allocation are most likely to find this scale of analysis useful.”¹⁵⁹

The generalization factor in part explains why humanitarian interventions often have the “propensity to follow a paternalistic mode that can lead to a skewing of activities towards supply rather than demand.”¹⁶⁰ Putting a twist on an old cliché, “if every problem begins to look like a nail, then the solution will always appear in the form of a hammer.” In short, where you stand—scale—matters. Recall that seeking to perceive “the individual traits of an object is directly proportional to the emotional distance of the observer.”¹⁶¹ If the devil really lies in the details then it must be responded to and confronted at that scale. In this sense, a decentralized people-centered approach to violent conflict is a logical evolution since response at this scale may more effectively match complexity of violent conflict¹⁶²

In summary, a people-centered approach enables an early warning network to carry out more effectively the four crucial information processing tasks for early response as identified earlier: (1) scan the environment at a lower scale and collect more detailed information; (2) integrate and analyze information from multiple sources using a decentralized model; (3) respond in a timely manner at the appropriate scale where the incentives already exist and observe the results at all scales; and (4) reflect on what happened using feedback mechanisms and incorporate lessons-learned into the “institutional memory” of the organization, in order to avoid repetition of past mistakes.¹⁶³

¹⁵⁹ Haining 2003.

¹⁶⁰ Manyena 2006: 438.

¹⁶¹ Ginzburg 1989: 112. This may be the social equivalent of Heisenberg’s uncertainty principle.

¹⁶² Meier 2006b. Note that the same has occurred in the evolution of conflict. Indeed, 4th Generation Warfare is characterized by small independent and autonomous units (terrorist cells) that can take decisions and actions far quicker than the top-down structure of Western defense departments. See Shultz and Dew 2006; Barnett 2004 and Arquilla *et al.* 1999.

¹⁶³ Bazerman and Watkins 2004.

New Strategies for Early Response

The persistence of the warning-response gap should not come as a surprise. It was explained 20 years ago in simple terms: “These systems have been developed in advanced environments where the intention is to gather data so as to predict events in distant places. This leads to a division of labor between those who ‘predict’ and those ‘predicted’ upon. And this in turn tends to draw attention only to those efforts which continue to reinforce the existing unequal distribution of information.”¹⁶⁴

This is asymmetry in information and response is not an isolated feature of first-generation early warning systems. In complexity science, “an asymmetric tie requires and implies a whole larger structure [...] An apparent case of isolated dominance, for example, will be found on closer inspection to lock into a larger structure.”¹⁶⁵ This may hark back to the linear-mechanistic mode of Western thought championed during the Enlightenment. In any case, the networks analysis above suggests that more informed, autonomous, and decentralized communities are more likely to render social systems more adaptive and resilient to both endogenous and exogenous shocks.¹⁶⁶ Perhaps the main advantage of this distributed method over a centralized approach is that there is no single point of failure.¹⁶⁷ In formalist terms, the network approach is more resilient to shocks and more adaptable to change. This explains why “increasing attention is now paid to the capacity of disaster-affected communities to ‘bounce back’ or to recover with little or no external assistance following a disaster.”¹⁶⁸

Unfortunately, the case studies analyzed in this paper suggest that formal institutional structures are “often centralized and do not necessarily result in enhanced capacity [...] at the grassroots or local level.”¹⁶⁹ While it is true that, “structures as complex dynamic systems are also subject to the process of adaptation,” a flexible network approach to

¹⁶⁴ Rupesinghe 1988: 224.

¹⁶⁵ White 1992: 95.

¹⁶⁶ Schneiderman and Preece 2007; Meier 2006, 2007; Homer-Dixon 2006; Allen Nan 2006; Bar-Yam 2004; Tierney and Trainor 2004; Schuster 2004; Perrow 1999.

¹⁶⁷ Oomes and Neef 2006.

¹⁶⁸ Manyena 2006: 433.

¹⁶⁹ O’Brien *et al.* 2006; Rupesinghe 1988.

capacity building is more adept in responding to highly dynamic conflict environments.¹⁷⁰ In fact, efforts that have employed a centralized framework to improve the human condition have repeatedly failed on a catastrophic scale.¹⁷¹ Instead, “the actions being suggested [here] must be firmly based upon the known local capacities and coping mechanisms. Any outside action should extend, not supplant local initiatives.”¹⁷² Centralization—not to be confused with better coordination—is neither necessary nor desirable since the scale that ensues pays little attention to “local adaptation strategies, culture, heritage, knowledge and experiences [which] are the building blocks for boosting disaster resilience.”¹⁷³ Furthermore, a hierarchical structure “increases the risk of disaster since the experts who run these institutions are not up to the task while, at the same time, the people who are exposed to risk have less and less control over the direction of public affairs [recall Figure 5]. It is the lack of accountability of the institutions of the modern state that causes disasters.”¹⁷⁴

Better coordination between international, regional, national and local actors is certainly a good idea,¹⁷⁵ but this in no way implies that yet another vertically wired global warning system is required. A genuine change in discourse towards people-centered early warning and response would be far more effective and significantly less expensive.¹⁷⁶ For example, instead of “local” or indigenous knowledge, we should speak of “indigenous technical knowledge” or “appropriate technology.”¹⁷⁷ Although the conflict prevention community has yet to embrace a new discourse let alone a people-centered approach, nonviolent social movements may be the closest parallel we have to people-centered early warning systems for natural disasters. Indeed, lessons learned in disaster early warning systems suggest that, “the usefulness of this [people-centered] approach lies not

¹⁷⁰ Manyena 2006: 444.

¹⁷¹ Scott 1999; Azar 1986.

¹⁷² Walker 1992: 102.

¹⁷³ Manyena 2006: 445; Azar 1986.

¹⁷⁴ Stallings 1998: 130.

¹⁷⁵ Campbell and Harnett 2005. “Although the increased solidarity during disasters can be very helpful, it is hard to coordinate many people and different organizations that have not collaborated before and do not know each other’s command structures. Such interaction must be exercised before hand if fast and reliable actions are to be performed without the need for much discussion; in other words it should be based on certain codes and protocols” (Helbing, Ammoser and Kühner 2006: 333).

¹⁷⁶ c.f. Najam, Christopoulou and Moomaw 2004.

¹⁷⁷ Bankoff 2004: 32.

so much in predicting [...], but in building up a strong partnership between local community and the relief agency.”¹⁷⁸ Similarly, “prevent[ing] violent conflict requires not merely identifying causes and testing policy instruments but building a [social and] political movement” since “the framework for response is inherently political, and the task of advocacy for such response cannot be separated from the analytical tasks of warning.”¹⁷⁹

Why then are CEW and nonviolent movements erroneously assumed to be conceptually and operationally distinct in the practice conflict prevention?¹⁸⁰ Isn't communication central to the effectiveness of both early warning and nonviolent action?¹⁸¹ Yes it is. In fact, some of the most successful nonviolent campaigns detailed in numerous case studies turned on the ability to get accurate, timely information.¹⁸² The literature on military history also demonstrates that “success in counter-guerrilla operations almost invariably goes to the force which receives timely [local] information.”¹⁸³ Tactical evasion, in particular, is a central component of strategic nonviolence: people must be capable of concealment and dispersion. However, getting out of harm's way and preparing people for the worst effects of violence requires sound intelligence and timely strategic estimates.¹⁸⁴ In short, reliable people-centered early warning is vital when conducting maneuvers of defensive dispersion within the context of strategic nonviolence. To be sure, a realistic appreciation of impending violence based on people-centered early warning makes it possible to motivate civilian groups to respond early in conceiving plans for evasive action and protection.¹⁸⁵ At-risk communities can, for example, “learn what dispersed and hidden livelihoods look like. They can be shown how they might dismantle their village homes and build temporary huts near their fields as the Vietnamese sometimes did in the face of American airpower. Or use crop colors and canopies that are less noticeable from the air, as Salvadoran peasants sometimes

¹⁷⁸ Walker 1992: 103.

¹⁷⁹ Rubin 2002: 37-38, 147.

¹⁸⁰ Meier, Barrs and Stephan 2007.

¹⁸¹ Meier 2006b; Martin and Varney 2003.

¹⁸² Ackerman and Kruegler 1994; Merriman and DuVall 2007.

¹⁸³ Thompson 2002: 52; Shulz and Dew 2006.

¹⁸⁴ Ackerman and Kruegler 1994; Helvey 2002.

¹⁸⁵ Meier, Barrs and Stephan 2007.

planted.”¹⁸⁶ In sum, indigenous energies and strategies have almost always been the predicate for successful resistance to oppression.¹⁸⁷

Unlike highly technical and hierarchical early warning systems, nonviolent social actions are more effective in responding to conflict since they recognize the inherently political nature of armed conflict.¹⁸⁸ According to the rich literature on nonviolence, the organizational template most useful in responding to repressive environments is a community-based network rather than a hierarchical structure since networks are more likely to innovate tactically and weather repression.¹⁸⁹ Indeed, “networks are more flexible and effective than hierarchies in responsiveness to changing conditions: new information is more easily disseminated, interpreted, and acted on without the constraint of passing information or searching for resources up and down a hierarchy.”¹⁹⁰ This explains why “nonviolent action is non-institutional; it operates *outside* the bounds of the institutionalized political channels” (Kurt 2003: 705).¹⁹¹

First-generation warning systems are still in high supply but there is a pressing demand for more “Track Two” or people-centered approaches to early warning.¹⁹² To draw on the language of economics, the “market” of warning systems does not clear because of the monopoly in first-generation systems.¹⁹³ This prevents “New Competition,” stifles innovation and leads to market inefficiencies. As avid consumers of early warning

¹⁸⁶ Barrs 2006: 7. Casey Barrs at the Cuny Center has over the course of many years developed a complete manual for Locally Led Mobile Aid (LLAMA). The manual includes over 1,600 citations from diverse studies on humanitarian aid, civilian protection, people-centered early warning and nonviolent action. For more information, please email Casey at: cbarrs@mt.gov

¹⁸⁷ Herriman and DuVall 2007.

¹⁸⁸ USIP 2002.

¹⁸⁹ Stephan 2006; Allen Nan 2006.

¹⁹⁰ Ibarra 1992: 169.

¹⁹¹ Adopting a systems, or network perspective in the context of nonviolent action also, “offers some very rich and interesting insights on where power comes from” (Nohria 1992: 10). In fact, a systems approach provides is an elegant way to explain the basis for strategic non-violence. Truth be told, fully hierarchical networks don’t actually exist in practice. Power is not a monolithic entity residing in the person or position of a ruler or ruling body (Coleman 2004). Instead, power is pluralistic, residing with a variety of groups and in a diversity of locations (Sharp 2005). The loci of power provide a countervailing force against the power of the ruler, especially when the loci are numerous and widely distributed throughout society (Martin 1989).

¹⁹² Meier 2004.

¹⁹³ See Meier (2007). “The Political Economy of Conflict Early Warning Systems.” (*forthcoming*).

information, we buy expensive alerts, flashy bulletins and colorful reports. We email our purchases around the world in the blink of eye but these “rarely touch the ground where the killing happens. They fly through cyberspace, high over the victim’s heads. People at risk on the ground might never learn that the *demarches* we write on their behalf even exist.”¹⁹⁴

Interestingly, although not surprisingly, people-centered early warning predates today’s centralized early warning by centuries. Africa, for example, has enjoyed a long tradition of people-centered approaches to conflict prevention and resolution.¹⁹⁵ However, because these operate on a much lower scale, remain informal, and do not figure in peer-reviewed journals they are virtually invisible to The Leviathan. But a Track Two approach to early warning in no way excludes the competent use of rigorous analysis or the parallel pursuit of top-down initiatives. Indeed, both hierarchical and network systems have distinct comparative advantages. A multi-track approach to early warning is therefore the most prudent strategy to match and manage the complexity of conflict. “This proposal reflects a pragmatic approach to vulnerability research in which the needs of stakeholders and decision makers are explicit in the assessment design, and scale concerns are driven by these interests.”¹⁹⁶ Indeed, complexity studies suggest that the hybrid network type in Figure 3c is often the most resilient and effective of the three network-types. In more formalistic language, “action that is both innovative and critical usually requires joint activation of prescribed [top-down] and emergent [bottom-up] networks.”¹⁹⁷ This means that top-down systems should increasingly be judged on their empowerment of local systems. Community based codes and protocols need to be jointly defined and rehearsed “if fast and reliable actions are to be performed without the need for much [vertical] discussion.”¹⁹⁸ Empowerment of local systems also means the promotion of traditional knowledge systems for risk reduction and the blending of high technology with

¹⁹⁴ Barrs 2006: 2.

¹⁹⁵ Ury 2000; Condé and Meier 2004. The author co-founded an NGO specifically designed to promote traditional mechanisms for conflict resolution and prevention: The American Council on Africa or (ACA). Available on-line at: <http://www.americancouncilonafrica.org>

¹⁹⁶ Eakin and Luers 2006: 381.

¹⁹⁷ Ibarra 1992: 183.

¹⁹⁸ Helbing, Ammoser and Kühner 2006: 333; Ooms and Neef 2005.

indigenous settings.¹⁹⁹ In sum, pathways for technology transfer need to be identified and community-based protocols implemented to mitigate the impact of conflict and create alternative futures.²⁰⁰

Conclusion

The purpose of this paper was to explore how one specific paradigm of modern science—complexity science—can be used to understand the warning-response gap. Adopting a systems, or networks perspective, “offers some very rich and interesting insights on where power comes from.”²⁰¹ We drew on two case studies to illustrate this point. In closing, we considered a people-centered approach to early warning as a strategy to “rewire” the critical link to timely and effective response. As our networks-analysis of the case studies suggest, neither organization appeared to demonstrate an effective ability to trigger effective response.²⁰² Their progress essentially occurred at the state level by “introducing new linear strategies, without altering governing values.”²⁰³ This paper therefore suggested that warning-response be managed at a lower scale in order to match the complexity of conflict. Otherwise, when complexity profiles are mismatched, change that is not internalized is inherently unstable, and “only through empowerment of the other can we affect stable, internalized change and, in turn, empower ourselves.”²⁰⁴

These words, however, will continue to sound hollow unless we in the West internalize the fact that “no more than 10 per cent of survival in emergencies can be attributed to external sources of relief aid.”²⁰⁵ In other words, “the notion of ‘victim’ here is very far from what is usually conveyed by the mass media, nongovernmental organizations (NGOs), or by major international organizations.”²⁰⁶ Instead of treating “victims” as part

¹⁹⁹ Pattie 2006; Abramovitz 2001.

²⁰⁰ Pattie 2006; Corbacioglu 2006.

²⁰¹ Nohria 1992: 10.

²⁰² c.f. Cooke and Rohleder 2006.

²⁰³ Corbacioglu 2006: 220.

²⁰⁴ Bond 1994: 102.

²⁰⁵ Hillhorst 2004: 62.

²⁰⁶ Gilbert 1998: 98.

of the problem, complexity science would suggest they are in fact part of the best solution. Put differently, we must recognize the Hobbesian hubris underlying our assumptions that local communities are unable or incapable of dealing with disaster.

In any case, social systems evolve and adapt which explains why “in a world where centralized modes of risk management lose effectiveness, we also see tendencies toward increased cross-sectional complexity, increased effective participation by people, broadening liability on international scales and a move towards a ‘claim culture.’”²⁰⁷ In essence, the warning-response gap stems from the use of “linear public policies to address a complex policy issue.”²⁰⁸ Ultimately, what is required is a less egocentric approach to early warning and response—one that seeks “the proper balance between the need for external assistance and the capacity of local people to deal with the situation.”²⁰⁹

Complexity science and network theory could make further contributions in this respect. This includes learning from biological and ecological systems such as food webs since these have optimized network interactions over millions of years.²¹⁰ In these complex systems, “it is the collection of cells, ants, or active molecules themselves [that take] actions depending on statistics they sample locally, via other individuals they encounter, or via the local chemical environment.”²¹¹ In terms of other strategies, further studies on local human adaptability and the triggers of peace and cooperation in a decentralized setting may also shed light on new principles for effective response.²¹² To this end, a promising avenue might be the development of new protocols and principles based on self-organizing and adaptable systems.²¹³

²⁰⁷ Chadná, Motchanova and Obersteiner 2006: 317.

²⁰⁸ Corbacioglu 2006: 221.

²⁰⁹ Bankoff *et al.* 2004: 33.

²¹⁰ Pascual and Dunne 2005; Krakauer 2007; Flack 2007). “While the concepts of chaos and self-organization have evolved from the physical sciences, the notion of complex adaptive systems has its roots in the biological sciences” (Dooley 1997: 77).

²¹¹ Mitchell 2006: 22.

²¹² Meier 2007b.

²¹³ Helbing, Ammoser and Kühner 2006.

In conclusion, early response may be more effective when based on autonomous units with predefined codes and protocols for interaction. This new strategy for effective early response could increase resilience and flexibility using the principles of decentralized control and collective intelligence—the subject of the author’s ongoing research.

References (available by email)

Biographical Note

Patrick Meier is a Henry Luce Fellow and PhD Associate at The Fletcher School of Law and Diplomacy based at Tufts University. He is a recipient of the distinguished Robert E. Stewart Award for most outstanding graduate student at The Fletcher School in 2006. His academic and professional interests focus on the application of complexity science to social systems analysis, particularly in terms of risk, resilience, vulnerability and adaptation to systemic change and extreme events. His doctoral research therefore centers on the study and design of early warning/response systems that seek to anticipate, mitigate or prevent the impact of unscheduled change on social systems. This research applies complexity science as an analytical framework to explain why and when these systems fail. Mr. Meier is especially interested in the interdependence and synchronicity of cascading shocks—armed conflicts, natural disasters, pandemics, climate change—and complex emergencies. To this end, Mr. Meier teaches seminars on “Preventing Catastrophes: Disaster and Conflict Early Warning/Response” and on “Managing Complex Systems: From Dynamic Networks to Tipping Points” to both graduate students and UN professionals. He has published widely on the subject of early warning and has presented his cross-disciplinary research at dozens of respected conferences worldwide.

As a professional consultant, Mr. Meier has worked on numerous conflict prevention and early warning projects with multiple offices and agencies of United Nations (UN), including the UN Secretariat, OCHA, UNDP, UNICEF, UNEP and the UN Millennium Secretariat. His work on early warning also includes projects with the International Crisis Group (ICG), International Alert (IA) and the Swiss Peace Foundation—establishing the latter’s UN-liason Office in New York where he served as interim director for the FAST International Early Warning Project. In addition, Mr. Meier has regularly consulted on the joint OSCE-NATO-UNDP regional early warning project for environmental security in Central Asia. He played an instrumental role in establishing West Africa’s regional early warning system for the Economic Community of West African States (ECOWAS) and significantly scaled-up the Horn of Africa’s Conflict Early Warning and Response Network. Most recently, he was solicited to develop the methodology for the regional early warning system being developed by the Economic Community of Central African States, and was also solicited by the UN Office of the Deputy Secretary General to evaluate the UN’s capacity for early warning, which formed part of the external contribution to the Secretary-General’s Report on the Prevention of

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Mr. Meier is currently a Research Associate with the Peace Research Institute, Oslo (PRIO), where he works closely with Norway's former Secretary of State and Deputy Foreign Minister on a health and conflict project for the Norwegian Ministry of Foreign Affairs. He is a Fellow with the Conflict Prevention Program at Columbia University's Center for International Conflict Resolution (CICR) and a Research Assistant with the Conflict Analysis Resource Center based in Bogotá, Colombia. He is a recent graduate of the Santa Fe Institute's (SFI) program on complex system and the New England Complex Systems Institute (NECSI). Previous academic studies include an MA in International Affairs and Conflict Prevention from Columbia University's School of International and Public Affairs (SIPA) and a BA (Hons) in Political Science, Economics and Philosophy from the University of York, England and California at Berkeley. He is the co-founder of both the American Council on Africa (ACA) and Partners for Conflict Reduction (PCR). Mr. Meier was born in Cote d'Ivoire, raised in Kenya and holds dual nationality from Switzerland and France. He is fluent in English and French, proficient in German and has studied Arabic in Morocco and Tunisia.

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