

---

# Thwarting Emergence: An Exploratory Project

Mr. Frank Mahncke

Chief Analyst,  
Joint Warfare Analysis Center  
Dahlgren, Virginia, U.S.A.  
e-mail: Mahncke@aol.com

Michael Brown, Ph.D. and  
Andrew May, Ph.D.

Science Applications International Corporation.  
Dahlgren, Virginia, U.S.A.

*Frank C. Mahncke is the Chief Analyst at the Joint Warfare Analysis Center (JWAC), Dahlgren, Virginia. He is a graduate of Bowdoin College (A.B. in Mathematics), the American University (M.P.A. in Operations Research) and the Naval War College. After a career in naval research and development including a tour as the Science Advisor to the Atlantic Fleet, he came to JWAC where he has been primarily involved with the identification of emerging conflict issues and the development of analytic tools to meet those issues.*

*Dr Michael Brown is a division manager and Assistant Vice-President at the Science Applications International Corporation (SAIC). He is a graduate of the United States Military Academy and Harvard University (M.P.A, Ph.D. in Political Economics). As an infantry officer, he served with the 82d Airborne Division and the Berlin Brigade. Later, he was a special assistant to the Director of Net Assessment in the Office of the Secretary of Defense. At the Strategic Assessment Center of SAIC his research interests have been in the application of complex adaptive systems techniques to military and national security issues.*

*Dr Andrew May is a project director with the Science Applications International Corporation (SAIC). He is a graduate of Dickinson College (B.A in History) and Emory University (M.A, Ph.D. in History). At SAIC his research interests have been in military strategy, experimentation and complex adaptive systems. He is currently on assignment to the Director of Net Assessment in the Office of the Secretary of Defense.*

## ABSTRACT

On the hypothesis that successful decision making and command groups demonstrate and exercise significant capability for adaptive and emergent behavior, we set out identify organizational enablers of emergent behavior that might be thwarted. If such enablers can be identified and action taken against them, unanticipated emergent behavior and actions by an opponent might be thwarted thus easing the problems of encouraging compliance.

We researched a wide range of studies on successful emergence in command organizations from the field of organizational science. From these, we identified a small set

of what appear to be common enablers of emergent behavior. We then tested these against the experience in Somalia (as reported in the open press) and found promising correlation. We have not yet determined appropriate action to disable these enablers. We then held a seminar workshop with a group of organizational scientists both civilian and military to review the enablers and begin to explore concepts for operation.

In this paper, we will review and discuss the organizational enablers of emergent behavior, briefly review the Somalia case study and the results of the seminar workshop. Although this work was not aimed specifically at peacekeeping operations, we suggest that it may eventually have application to the problem of encouraging compliance among resistive groups.

### **ENABLERS OF EMERGENCE**

Over the past two years, we at the Joint Warfare Analysis Center and the Science Applications International Corporation, with assistance from the Office of Net Assessment in the Office of the Secretary of Defense, have been researching questions concerning emergent behavior among opponent command organizations. This paper will give an overview of some of that work with emphasis on possible applications to the problems of enforcing compliance in peacekeeping operations.

For this work, we are taking the view that in a peacekeeping operation where compliance enforcement is necessary, there is a party who may be treated analytically as an opponent in that he may oppose or even resist forcibly the actions of the peacekeeping party.

In many peacekeeping and other conflict management situations, the parties to the conflict often exhibit quite unpredicted behavior and actions. That this makes compliance enforcement difficult requires no extensive demonstration.

Our initial hypothesis was that if we could identify those components of the opponent's command organization that enabled them to exhibit emergent behavior, those enablers might be suitable targets for action to thwart such behavior.

Thus we had three initial research objectives:

- First, does the literature indicate that such enablers exist?
- Second, can those enablers be identified and identified in a form that might lead to suitable actions to thwart it?
- Third, what actions might be appropriate and efficacious? We did not plan to nor did we move beyond generic classes of thwarting actions in our initial work.

Our approach was to first review the organizational science literature for evidence of enablers. From this, we constructed a set of candidate enablers. These we tested against the experience in Somalia albeit based solely on open press accounts of the operation and its problems. Finally, we conducted a workshop with a number of distinguished organizational

science researchers to explore possibilities for classes of actions that might be taken to thwart emergence.

We began the literature search reading numerous studies (both case and general) on organizational adaptation and emergence. Quite unsurprisingly, published researchers did not use a common taxonomy when describing emergence enablers. Thus, our first job was to identify categories and groups of similar enablers based on similarity of language, context and apparent intent.

For reasons having to do with support for research in the academic community, all the case studies we could access were based on corporate and academic organizations in North America and Western Europe. This gave us some initial concern about application to non-Western organizations. Time and resources forced us to overlook this - with caution - in our preliminary work.

None-the-less, we are reasonably confident that we have identified a useful working set of enablers of emergence in command organizations.

Our initial set of enablers of organizational emergent behavior included the following:

- Search agents with different models and diversity.
- Protected search processes.
- Good connections, both internal and external.
- A selection mechanism.
- Time and resources.

These are a work in progress, not a finished product. Thus while these seem appropriate, useful and often intuitively obvious, we are still working on them.

The organization needs to have different search agents, people with different internal models of what the organization needs and a diversity of ideas. These agents need good connections, externally to find new ideas for the organization and internally to test those ideas. Implicit in this are good communications both horizontally and vertically.

The search process needs to be protected in the sense that the search agent does not have his head removed for suggesting such an original or novel idea — trust in the Fukuyama sense of the word.

The organization needs a well-practiced selection mechanism for evaluating and selecting emergent ideas.

Finally, the organization needs the time and resources to conduct thorough searches and evaluations. Organizations under life threatening pressure often do not have this luxury.

While all of these seem necessary, the sufficiency of the set is yet to be established. And, the potential mechanisms for interfering with them, thwarting their result if you will, are not always obvious.

## ***BLACKHAWK DOWN: A CASE STUDY***

### BACKGROUND

With these enablers of emergence tentatively identified from Western sources, we turned with some trepidation to see if they — or at least some of them — appeared to have been evident in the peacekeeping mission in Somalia in the mid 1990s. Specifically, we looked at the situational environment of clans and chaos that surrounded the *Blackhawk Down* incident in October 1993 as drawn from public sources (see references). That incident which has been well documented seemed to be a classic case of unforeseen emergent behavior by the opponent. We traced indicators of the enablers of emergent behavior among the clans during the *Blackhawk Down* incident finding rather better though not perfect correlation than we had expected.

Any attempt to understand politics, society, and warfare in Somalia must begin with an examination of the clan structure. Clans, averaging 100,000 members, generally control territories that often overlap. Clans in nearby territories have established traditions of frequent, but very impermanent, alliances, designed to offer coordinated resistance to external threats.

As one study has noted, “Somali clan organization is an unstable, fragile system, characterized at all levels by shifting allegiances. This segmentation goes down to the household level with the children of a man's two wives sometimes turning on one another based on maternal lines. Power is exercised through temporary coalitions and ephemeral alliances between lineages. A given alliance fragments into competitive units as soon as the situation that necessitated it ceases to exist. In urban settings, for example, where relatively large economic and political stakes are contested, the whole population may be polarized into two opposing camps of clan alliances.” (1)

The depth of these divisions is evident in a Somali proverb that describes the hierarchy of priorities: “Me and my clan against the world; Me and my family against my clan; Me and my brother against my family; Me against my brother.”(2) The clan structure — of constantly shifting alliances and continual struggle for power — emerged over the course of generations, exacerbated by political disputes, contests over access to resources, and brutally repressive regimes. Unattractive as this ruling structure may be to western democratic eyes, it is highly developed and resilient. In that lay its danger to peacekeeping operations.

In response to armed attacks against UN forces, the U.S. initiated an operation in October 1993 to capture key members of the Habr Gidr leadership and key advisors to Aidid. Based on local intelligence, U.S. helicopter borne forces intended to make a lightning fast raid on a meeting of clan leadership, seize the key leadership and withdraw into the skies before any significant resistance could develop.

Expecting that the mission would take about an hour, U.S. forces met with unanticipated resistance and other unpredicted actions on the part of the Somalis, leading to substantial U.S. losses (18 killed and 75 wounded) before the mission was completed. The details of the action are well reported in Mark Bowden's book *Blackhawk Down*.<sup>(3)</sup> The book (and the recently released movie) is a classic study of hubris and emergence.

As a direct result of the incident and the shocking pictures that accompanied it, U.S. forces were withdrawn in 1994. Without significant U.S. support, the UN mission ended in 1995. We analyzed the *Blackhawk Down* incident and associated clan behavior in the context of each of the enablers of emergent behavior described above.

### AGENTS WITH DIVERSE INTERNAL MODELS

Agents have an experience set, an internal model that is referenced when perceiving and responding to the environment. The ability to both reference a variety of models and to apply and/or deviate from internal models is one of the most important aspects of adaptive behavior in organizations. Beginning with the consideration of individuals as agents, the clans leveraged the variety of internal models to facilitate their efforts to challenge U.S. operations in Mogadishu.

The clan members fighting against the U.S. forces had a range of backgrounds and had received different military training. Some had been trained or educated in the United States, many had received military training from the Soviet Union, and still others had received no formal military training instead learning to live and fight as Somalia disintegrated into chaos. Individuals referenced these experiences to contribute a diversity of operational concepts to their clans' efforts to bring U.S. operations against Aidid to a halt.

Similarly, the group of clan elders helping to guide the Habr Gidr clan in its actions and alliances with others clans included a wide variety of people within the clan: "religious leaders, former judges, professors, and a poet."<sup>(4)</sup> With such varied experiences, individuals' perceptions of and responses to the changing environment differed significantly, leading individuals to pursue alternative adaptive behaviors.

Various internal models were used by the clans in generating adaptive behavior. While the clans possessed tremendous autonomy, frequently making and breaking alliances, each clan was fundamentally distinct and concerned above all with its own survival. Further, it is evident that the clans themselves were by no means identical. For example, some clans were traditionally nomadic while others were agricultural, and its traditions, the territory it occupied, and the resources to which it had access shaped each clan's outlook. This range in experiences provided a diversity of internal models among the clans, ensuring that they would not adapt uniformly.

Agents have strategic well-related objectives and tactical goals. The ability to change goals in response to changes in the environment is a vital component of emergence. In this context, the clans had a strategic objective to remain in power and a supporting tactical goal to drive the U.S. and UN presence out of their environment.

Adaptation of tactical goals within the strategic objective was a major enabler in the clan's emergent behavior. Once U.S. forces began to engage more directly in Somalia, the U.S. rapidly emerged as the clans' principal foe: put another way, each of the clans – and each person within those clans – adopted a goal, or a guideline for action, that the defeat of the U.S. came before all other priorities.

These emergent tactical goals could be even more specific. For example, it seems clear from the history of the October 3-4 conflict that the helicopters were widely recognized as critical targets. “They knew the best way to hurt the Americans was to shoot down a helicopter. The helicopters were a symbol of UN power and Somali helplessness.... Aidid and his lieutenants knew that if they could bring down a chopper, the Rangers would move to protect its crew and could then be targeted.”(5)

More generally, the Somalis shared a goal concerning appropriate means of combat: Somali fighters were prepared to use any means necessary. There was an agreed, implicit sense that traditional limits of warfare such as sparing women and children, would have to be ignored in order to drive the U.S. forces out of the region. In both of these instances, we can see how agents' awareness of the organizations strategic objectives and the ability to adapt and modify tactical goals was an important enabler of emergent behavior.

## PROTECTED SEARCH

Adaptive organizations need some means of surveying the landscape, and the agents charged with this duty must be given adequate time and opportunity to undertake that activity. For example, in the case of the Habr Gidr, the clan elders were not expected to defend themselves, or provide for themselves: rather, they were given the opportunity and resources they required to survey the environment, debate possible courses of actions, and consider means of guiding the clan members. This was their dedicated function; their purpose was expressly to help guide adaptation.

A rather different way of thinking about this protected search capability is to consider the widespread use of untrained combatants. Bowden provides startling imagery of the willingness of all members of Somali society to be involved in the fight against U.S. forces: “The shooter had the barrel of his weapons between the women's legs, and there were four children actually sitting on him... He was completely shielded in noncombatants, taking full cynical advantage of the Americans' decency.”(6)

In some sense, the willingness of such people to engage in combat against the U.S. forces allowed the trained militias to consider alternative actions; the freedom from devoting all their energy to constant combat against the U.S. created the opportunity to engage in adaptive behavior.

## CONNECTIONS

Agents need to be aware of other agents' actions, to learn how other agents are adapting to change. In this way, effective adaptations are spread throughout an organization. In the case

of the Somalis, the agents were greatly aided by the relatively small combat area: it was relatively easy to see what was happening and what sorts of measures worked well. For example, they devised methods to modify their weapons and tactics to fight against U.S. helicopters. They learned that shooting against helicopters from rooftops was deadly because an armed man was easily spotted from the helicopters. In response, the clansmen devised ways to safely shoot up from the ground. “They dug deep holes in the dirt streets. The shooter would lie supine with the back of the tube pointed down into the hole. Sometimes he would cut down a small tree and lean it into the hole, then cover himself with a green robe so he could lie under the tree waiting for one to fly over.”(7)

Not only was training a mechanism for sharing effective fighting techniques, but those who observed and/or participated in skirmishes or gunfights learned fighting techniques by watching and doing. As soon as gun-fights began, crowds of Somalis would rush to the scene and, more often than not, when a Somali fighter was killed, members of the crowd would grab the weapon and take his place. (8)

Further, the Somalis relied upon several other means of communications — from signal fires to electronics — to indicate U.S. troop positions, the locations of the downed helicopters, and other vital information. Such connections, allowing for awareness of the environment and learning effective measures, were vital to the Somalis’ successful adaptation. Use of broadcast media — primarily the radio — was also important to the clans in shaping popular perceptions of the nature of the conflict with the U.S. (9)

Connections between agents were key to the adaptive process. Without the transference of knowledge, the communication of intelligence, and the ability to shape the perceptions of the masses, it is unlikely that the Somalis would have been able to identify and exploit the weaknesses of the U.S. forces.

## STRUCTURAL CHANGE — SELECTION MECHANISMS

The ability of an organization to restructure in the face of a changing environment is a key aspect of adaptation. This involves not only changing the relationship between sub-units within an organization, but also the creation or elimination of sub-units.

One of the most critical aspects of Somali adaptation was the clans’ ability to make structural changes; to make and break alliances among clans and sub-clans in response to the changing environment. The fluidity of clan relationships has long been a characteristic of Somali culture. “Membership in the same clan or lineage did not automatically entail certain rights and obligations. These were explicitly the subject of treaties or contracts [and] . . . units formed by contract or treaty could be dissolved and new ones formed.(10) As tensions between Aidid and the U.S. escalated, Aidid’s clan was able to quickly form an array of temporary alliances with unaffiliated militias and other sub-clans in order to increase its military power.

The clans also exhibited regenerative leadership. If the leaders of a clan were killed, the clan did not simply cease to function. Instead, the leadership structure of the clan adapted, elevating new leaders.

Finally, it is important to note that this capability for structural change was fostered by an environment in which agents — that is, clans and sub-clans — that could not form, discard, and re-form alliances were either marginalized or dissolved altogether. That is, there was a selection mechanism that de-selected clans or sub-clans without these traits.

## TIME AND RESOURCES

In order to adapt effectively, an organization must have the necessary resources. Perhaps the most important of these resources is time: an organization must be able to adapt within the time limits of the environment.

From several histories of the crisis, it seems clear that the Somalis had ample time. Although events moved rapidly, the clans appeared able to adapt and emerge within the time cycles. The Habr Gidr were able to form new alliances and dissolve old ones extraordinarily quickly as the environment changed. In the midst of the October 3-4 crisis, the Somali forces were able to shift emphasis, move throughout the city, and adjust tactics with considerable rapidity.

Organizations also require the physical materiel to behave in different ways. Again, the Somalis seem to have had what they needed. For example, they had a range of different weapons. Receiving guidance from Afghani fighters, they learned how to modify their RPGs to be used against the Blackhawk helicopters. Similarly, they had equipment they needed to construct highly effective roadblocks in response to U.S. rescue efforts.

In addition, information is a resource. The Somalis had adequate access to information about U.S. locations and operations. They were able to learn promptly about the timing of coming raids, about the locations of the downed helicopters, and the likely routes of rescue efforts. Without this information, the Somalis would have been unable to assess accurately the nature of the environment and thus would have been unable to adapt as effectively and efficiently as they did.

## EMERGENCE IN *BLACKHAWK DOWN*

Across the events in Somalia, the posited enablers appeared to be in effect as the Somalian clans demonstrated effective emergent behavior. It seems clear that the U.S. was confronting a complex adaptive organization; that is, an organization composed of many smaller pieces that could and did change in fundamental ways to adapt to the rapidly changing environment.

To various degrees, all of the enablers of adaptation identified in the body of the work were in action. Agents, both as individuals or as clans, had different internal models. When the environment changed these agents reacted differently, depending on their experiences, training, and outlook, yet continued to be guided by acknowledged objectives. Connections between agents existed so that successful adaptations could be communicated throughout the organization, allowing for a correlation of these adaptations. Search mechanisms — means by which the organization could survey the landscape for effective adaptations and fitness peaks — were present. The organization effected structural change; alliances and coalitions

were formed, dissolved, and re-formed in response to changes in the environment. Finally, the organization had access to the resources it needed, particularly time, in order to effect adaptation.

Most significant of all is the fact that the organizational adaptation flowed from the bottom up: almost without exception, critical changes in the organization were the cumulative effect of agents' reactions. In this way, the behavior of the Somalis was emergent. It is this quality that made their behavior not just surprising and fundamentally unpredictable but truly emergent as experienced by the U.S. and UN forces.

## **THWARTING EMERGENCE: THE WORKSHOP**

After we had completed the initial identification of emergence enablers, we gathered a group of organizational scientists — people with established expertise at encouraging successful adaptation and emergence in organizations — and asked them to think about the other side of the coin, thwarting, disrupting, disconnecting organizations and networks.

We asked the participants to prepare and discuss several papers on general, non case specific approaches to thwarting, disrupting and disconnecting adaptation and emergence in command organizations. We also gave them a hypothetical scenario involving a resurgence of troubles in Somalia upon which to explore the efficacy of their concepts and ideas.

Two basic concepts emerged for thinking about organizations such as the clans in Somalia.

- First, it is useful and important to think about these and similar organizations as networks of networks. This brings into play the work and insights of the new academic field of social network studies and applications. Within successful organizations there are typically networks for generating and maintaining the mission, for acquiring and disseminating knowledge, for undertaking adaptation, for generating and distributing resources and for conducting the organizations actions. Each of these has different characteristics, strengths and vulnerabilities. Disrupting the flow between them may be a useful way of thwarting their successful emergent behavior.
- Second, organizations are at their most creative, adaptive and emergent when they function at what the complexity science people call “the edge of chaos.”

## **DISRUPTING AND THWARTING ORGANIZATIONS AND NETWORKS**

Perhaps the key, central finding of the workshop — yet to be verified and validated — is that organizations composed of networks of networks have characteristic or preferred modes of failure. They tend to fail towards excessive stability or towards excessive chaos. In the first case, they become too stable and set in their ways to adapt to external threats and cannot adapt to a changing environment. In the second, they become too internally chaotic and cannot gather themselves together enough to adopt a consistent course of action.

The trick is to determine promptly as the crisis is emerging which failure mode is embedded in the organization. The workshop participants suggested that the preferred failure mode of an organization could be determined from high level observations of the network's behavior. They suggested that it might not be necessary to know every connection and node of the networks within the organization to make a reliable estimate of its failure mode, an estimate reliable enough to begin to take action against the networks.

This is clearly important to the field commander in a rapidly evolving peacekeeping operation. However, further research will be necessary to categorize the indicators of failure modes to the degree needed by the field commander.

### FORCING NETWORKS TO STABILITY

The participants in the workshop generally argued that networked organizations with a penchant for failing towards excessive stability might be hurried along their way by any of the following actions, all unverified at this time. Central to these is that such organizations have embedded in them standard, even ridged, practices, habits and procedures to which they will revert when threatened or disrupted. In that case, they may well be unable to respond, adapt or emerge when there may be a need to do so.

- First, blocking synergistic relations (and communications) between networks within the organization may limit the ability of one network to support, respond to, or create new adaptive and emergent approaches with another.
- Second, if the fundamental organizational structure and its associated assumptions are threatened, the organization, by practice and habit, will revert to standard operating procedures with their associated limitations.
- Third, if feedback and learning from failed operations is blocked — i.e. if the organization is lead to perceive success where none existed — it will fail to adapt or emerge. This is because organizations with a penchant for stability are often prone to presume and assume their own success.
- Fourth, if communications among the networks within the organization are cut, the isolated of the organization are likely to revert again to standard operating procedures again with all their limitations.

### FORCING NETWORKS TO CHAOS

For organizations whose internal structure gives them a penchant for failing to chaotic behavior where the individual networks and pieces cannot come together for a common cause — i.e. they cannot get their act together — a rather different set of disruptive actions may be effective.

- First, they are vulnerable to having their internal timing upset somewhat like getting inside their OODA loop. If things happen to them faster than they can

assimilate, especially unexpected things, they may be unable to coalesce around an appropriate response in time to act on it.

- Second, cutting their line from their staff may result in line organizations not having data they need for action and thus floundering. There was some disagreement on this point among the workshop participants as many felt they had been in organizations where removal of the staff would have freed them to take effective action!
- Third, if significantly different perceptions of external reality are received by the individual organizational elements, they may be unable to coalesce around a common solution.
- Fourth, if trust relations between the networks and elements are disrupted, they may not be able to act for the common good.
- Fifth, if the central leadership is removed, the individual networks and elements may spin off doing only what they perceive to be in their immediate and local good.

### CONCLUDING NOTE

While this work is far from complete and a great deal of further work will be necessary to establish a complete set of vulnerabilities of networked opponent organizations, it is hoped that this preliminary work will stimulate the necessary detailed and specific research in organizational emergent behavior. If such research uncovers techniques for managing unexpected emergent behavior in a hostile organization, it may give important tools to those who will enforce compliance in peacekeeping operations.

### REFERENCES

1. Metz, Helen Chapin, ed., 1992. *Somalia: A Country Study*, Washington, DC: Federal Research Division, Library of Congress.
2. Ibid.
3. Bowden, Mark, 1999. *Blackhawk Down*, New York: Atlantic Monthly Press.
4. Ibid., p72.
5. Ibid., p109-110.
6. Ibid., p46.
7. Ibid., p110-111.
8. Ibid., p148.
9. Ibid., p93.

10. Metz, OpCit.

For historical development, see:

Clapham, 1995. The Horn of Africa; A Conflict Zone, in *Conflict in Africa*, New York, New York: I.B. Tauris Publishers.

Lyons, Terrence and Ahmed I. Samatar, 1995. *Somalia: State Collapse, Multilateral Intervention, and Strategies for Political Reconstruction*, Washington, DC: Brookings Institution.