13th ICCRTS: C2 for Complex Endeavors

Coordination Strategies for Edge Organizations

Topic 5: Organizational Issues

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Coordination Strategies for Edge Organizations

Abstract
This paper provides a critical analysis of coordination strategies related to Alberts and Hayes' (2003) conceptualization of Edge Organizations (EOs). According to Alberts and Hayes (2003), EOs offer a high-contrast alternative form of coordination when compared to hierarchical structures for command and control (C2). In this view, EOs resemble networks in their form and in their decentralized, adaptive, and dynamic functioning. This paper examines and extends current theoretical understanding of coordination strategies for EOs by providing a three-part analytical critique. The first part examines the EO concept from the critical perspective of organization theory. The second part questions the notion of EOs as an archetypical network form that is best able to combat terrorist organizations. We argue that terrorist organizations represent a range of organizational forms rather than a single network form. Consequently, EOs should likewise represent an adaptive range of organizational forms and coordination strategies. The third part provides a conceptual framework that builds upon the previous critiques and identifies a range of coordinating strategies for EOs that would enable leaders to use an analytical model in determining the strategic and operational trade-offs associated with different coordination strategies in multi-actor complex endeavors. We argue that the effectiveness and efficiency of the EO is related to its coordinating strategy. Consequently, the EO needs to be agile enough to choose the right coordinating strategy given the conditions of its internal and external environments. The internal environment includes the work and task allotments, while external environment considers the issues of coalition partners, goals, strategies, etc. Our paper contributes to building a more robust EO framework by providing a critical analysis of coordination strategies related to Alberts and Hayes' (2003) re-conceptualization of military organizations as EOs

Introduction

As indicated by the theme of the13th International Command and Control Research and Technology Symposium (ICCRTS), better understanding the role of command and control in complex endeavors requires new robust conceptual frameworks that account for the disparate differential forms of organizational coordination that are often involved such complex multi-actor networked endeavors. Such environments include not only various military units but also civil authorities, multinational and international organizations, non-governmental organizations, companies, and private volunteer organizations. Such inter-organizational complexity also complicates the definition and measurement of military effectiveness by also including social, political, and economic outcomes as strategic objectives. Moreover, strategic, structural, and operational differences among organizational participants in networked settings make the collective action space complex. And, the relationships between the action and effects spaces further contribute to the complexity of the endeavor. The combination of coordination forms, the diverse forms of entities, multiple goals, and multiple organizational networks that are involved make the coordination problem severe.

There are several dimensions to complexity in the context of national security. On the one hand, there is a complex array of defense and intelligence agencies. On the other hand there is a loosely-coupled complex of state-sponsored and non-state-supported terrorist threats. For both types of complexity, better understanding inter-organizational complexity remains a strategic priority since the events of 9/11 and the succeeding terrorist activities in places such as Spain, Turkey, Saudi Arabia, Iraq, India, and Indonesia, among others, when understanding terrorist network entities surfaced as among the most urgent and important areas of national security intelligence gathering and analysis.[1] In attempts to respond and defend against terrorist threats, the federal government made the most significant changes since World War II towards restructuring its national defense intelligence agencies and in realigning several domestic agencies under the Department of Homeland Security and the Office of the Director of National Intelligence. In responding to the post-9/11 threat environment, the Bush administration declared a war on "global terrorists networks" (Bush 2001) that included efforts to dismantle al Qaeda as well as a subsequent invasion of Iraq. Even as the network warfare metaphor persists, there remains no consensus among policy makers and researchers on how to effectively fight a terrorist network (Stohl and Stohl 2007; Hoffman 2003). And, despite six years and significant resources expended on the war on terrorism, the resiliency of al Qaeda and the Iraqi insurgency indicate limited and suboptimal results. These outcomes call into question whether current conceptions and uses of the network metaphor—such as Edge Organizations (EOs)—provide a sufficiently robust framework for developing organizational forms, strategies, and tactics to defend against terrorist threats. The argument that it takes a network to fight a network suggests that a terrorist network requires government agencies to restructure into network forms. However, this analogy is problematic if networks also have their own limitations, and if some hierarchical structures have advantages over non-hierarchical forms. Consequently, the challenge is to appreciate the pros and cons of these coordination forms and then build more resilient structures that combine the strongest features of the different forms.

Towards building such a stronger and more robust EO framework, this paper contributes a critical analysis of coordination strategies related to Alberts and Hayes' (2003) re-conceptualization of military organizations as EOs. According to Alberts and Hayes (2003), EOs

offer a high-contrast alternative form of coordination when compared to traditional hierarchical structures for military command and control (C2). In this view, EOs resemble networks in their form and in their decentralized, adaptive, and dynamic functioning. This paper examines and extends current theoretical understanding of coordination strategies for EOs by providing a three-part analytical critique. First, we examine the EO concept from the critical perspective of organization theory. We review an explicit critique of the EO from organization theory. And, then extend the critique with theoretical perspectives in allied fields. All this sets up a discussion that presents the advantages and disadvantages of EO from different views, and lays the foundation for our argument that what is needed is an integrative conceptual framework that provides a critical view of the trade-offs inherent in EOs, especially when introducing a network approach. Secondly, we question the notion of EOs as an archetypical network form that is best able to combat a terrorist organization. We argue that since terrorist entities represent a range of organizational forms (i.e., clan, hierarchy, market) rather than a single network form, then EOs should also encompass a range of coordination approaches. Thirdly, we provide a conceptual framework that builds upon the previous critiques and identifies a range of coordinating strategies for EOs that enable decision-makers with an analytical model for determining strategic trade-offs as well as operational choices in multi-agency multisectoral complex endeavors. We argue that the effectiveness and efficiency of the EO is related to its network coordinating strategy.

Part One: An Organizational Theory Critique of the EO

Alberts' and Hayes' (2003) conception of the Edge Organization as an alternative form of organizational coordination to hierarchical command and control (C2) provides compelling insights about how to restructure defense and intelligence agencies. Alberts and Hayes (2003) are not alone in their criticism of bureaucratic hierarchies to coordinate governmental agencies in the war on terrorism. Several public management scholars have also criticized the adoption of centralized control mechanisms to address the multi-purpose, multi-agency, and multi-operational functions of defense and intelligence initiatives (Hammond 2007; De Bruijn 2006; Newman 2002; Waugh Jr. and Sylves 2002; Wise 2002). Unlike those public management critiques, Alberts and Hayes (2003) offer a significantly different perspective by positing the network-like attributes of an EO. However, in doing so, Alberts and Hayes (2003) take a rather idealized view of networks.

Indeed, the Alberts and Hayes (2003) conception of an EOs tends to be represented as a stylized high-contrast alternative form of coordination than hierarchical command and control (C2). According to Alberts and Hayes (2003), in contrast to industrial age hierarchies, EOs are characterized by distributed information, collective sensemaking, distributed power, dynamic task allocation, and shared understanding of command intent. Noting a range of organizational forms from bureaucracy to EOs, Nissen (2005B, 3) suggests that modeling organizational archetypes increases the generalizability of research. Building upon archetypical theories of Hierarchy and Edge, recent computational experimentation has revealed insightful differential patterns of organizational capabilities between traditional hierarchical C2 and EOs (Looney and Nissen 2006; Nissen 2005A; Nissen 2005B). Along with these advancements, the EO concept has generated a broader theoretical critique.

Most directly, Scott (2006) argues that Alberts and Hayes' (2003) EO discussion over-emphasizes their positive characteristics and under-emphasizes critical vulnerabilities. Scott

(2006) argues that the EO concept is limited because it: 1) lacks attention to human/social issues; 2) inadequately considers nonmilitary organizations; 3) insufficiently attends to the wider environment in which military organizations operate; and 4) lack consideration of the problems associated with organizational change. In particular, Scott (2006) suggests that the EO framework tends to suggest that every unit of the military needs to become more edge-like. However, the range of tasks and challenges across and within military units vary greatly. Scott (2006) also suggests that Alberts and Hayes (2003) do not fully consider cognitive limits among personnel; potential conflict across people, organizational subunits, organizations, nations; and vulnerability and security concerns. Moreover, Scott (2006, 11) notes that Alberts and Hayes (2003) "do not begin to exploit the considerable organizational literature that currently exists on edge-like organizations, including studies of temporary teams and task forces, communities of practice, outsourcing, delayering, alliances, network forms, and virtual organizations." Scott (2006, 12) goes on to argue that Alberts and Hayes (2003) "do not begin to exploit the full range of insights available from more open system perspectives, in particular institutional theory."

One example of a more open system perspective that is not accounted for in the Alberts and Hayes (2003) argument is coordination theory. Coordination theory is about the interdisciplinary study of coordination (Malone and Crowston 2001). For Malone and Crowston (2001) coordination theory involves characterizing various kinds of dependencies and identifying the coordination processes that can be used to manage them.[2] They emphasize a technological imperative in the effects of information technology (IT) on organizations and markets. They argue that IT reduces coordination costs through the compounding processes of 1) substituting human coordination with IT-based coordination, 2) increasing overall amount of coordination, and 3) shifting toward more coordination- intensive structures.

To be fair to Alberts and Hayes (2003), it is not surprising that coordination theory does not figure in their argument. According to Malone and Crowston (2001, 7), "this new research area—the interdisciplinary study of coordination—draws upon a variety of different disciplines including computer science, organization theory, management science, economics, linguistics, and psychology. Many of the researchers whose efforts can contribute to and benefit from this new area are not yet aware of each other's work."[3] Even so, research about EOs would benefit from closer alignment with coordination theory. For example, that part of coordination theory that addresses human systems includes some attention to incentives, motivations, and emotions as factors influencing the possibilities for EO coordination in complex endeavors.

And yet, coordination theory does not fully address the central conceptual problem of organizing on the edge. On the one hand, Malone and Crowston's (2001) definition of coordination implies that all instances of coordination include actors performing activities that are interdependent. On the other hand, however, they note that there is no single "right" way to identify these components of coordination in a given situation. Consequently, a critique of coordination theory in the context of an EO is that it under-emphasizes the specific process issues involved in managerial coordination.[4]

Other critiques of EO surface from several other theoretical frameworks (see table 1), and suggest that the Albert and Hayes (2003) EO perspective may not be as conceptually robust as is needed for a high-reliability organization. For example, the EO concept assumes a market orientation. But, the theory of transaction cost economics argues that there are many costs in

such settings. In some situations, such as the repeated transactions associated with recruiting soldiers, it may be very costly to negotiate and contract with each individual recruit. In these circumstances, it may be more cost efficient to use hierarchically-oriented standardized procedures to achieve economies of scale in recruiting processes. Overall, what is needed is a comprehensive framework that accounts for the complexity of organizing and coordinating defense and intelligence activities.

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This paper argues that not fully considering the complex institutional environment in which a military unit operates is a current limitation of Albert and Hayes' (2003) concept of an EO. Compared to a market-based EO, Albert and Hayes (2003) underemphasize the extent that a military edge unit may be constrained by inherent legacy hierarchical accountability, legal accountability, professional accountability, and political accountability. Scott's (2006) critique is especially relevant considering the changing complex networked multi-organizational environment in which the military operates in combat as well as non-combat operations (e.g., security; relief missions). In addition to its own organizational structures, the military often must interact with a range of non-military organizations including for-profit contractors (e.g., Halliburton, Blackwater, Triple Canopy, and DynCorp, among others) and non-governmental and international organizations (e.g., Red Cross, United Nations). In such networked environments, a key question is whether sectoral differences (i.e., governmental, for-profit, non-governmental) influence edge dynamics, especially coordination processes between different organizations. Building upon new theoretical research suggests that sectoral differences offer strategic trade-offs in multisectoral networked environments (Herranz 2007).

Currently missing from existing conceptualizations of EOs is a discussion of how the EO will go about carrying out is work. We argue that the quality of work and performance of the EO is related to its network coordinating strategy. Consequently, an EO needs to be agile enough to choose the right network coordinating strategy given the conditions of its internal and external environments. The internal environment includes the work and task allotments, while external environment considers the issues of coalition partners, goals, strategies, etc.

Part Two: A Critical Review of Conceptualizations of Terrorist Entities

While one of the most serious threats facing the nation is terrorist entities, There are several types of threats: internal domestic terrorism, external non state based terrorism, as well as state-based actors (North Korea, Iran, Pakistan). It is possible that these are mixed. However, for the purposes of this paper's theoretical analysis, it will focus on non-state based terrorism since that remains a threat and continues to present particular challenges. In future work, we can consider the implications of the inter-relationships among the various types of threat.

Conceptualizing EOs as somehow relatively analogous structurally to terrorist networks is another problematic issue. On the one hand, one of the most serious threats facing the nation is

a non-state terrorist entity such as Al Qaeda. On the other hand, there are state-based actors such as North Korea, Iran, and Pakistan that also pose threats in the context of the war on terrorism. Of course, these conflicts will not play out the same way as engagements with non-state terrorist entities. Therefore, the DOD cannot focus exclusively on the networked concept by just analyzing the terrorist entities. Indeed, the country faces a range of threats that include non-state terrorist entities, state-supported terrorist entities, as well as a hybrid mix of terrorist entities with various types of links to non-state and state-based actors. While cognizant of this issue, this paper focuses on the conceptually distinct form of terrorist entity that is not state-based or overtly state supported.

With this view on non-state terrorist entities, we suggest that the current understanding of terrorist networks is as underdeveloped and underspecified as it is urgent and important. In many ways, the scholarly study of terrorist networks shares similar research challenges as terrorism studies more generally. Systematic reviews of terrorism literature find that a majority of published research relies upon popular media sources, declassified intelligence estimates, and speculative "thought pieces" rather than empirical investigations or theory-based analysis (Borum 2004; Silke 2001). Similarly, the emergent research on terrorist networks also remains constrained by lack of detailed access to data about terrorist network structures, internal operations, and coordinating mechanisms. This paper argues that understanding terrorist entities requires a framework and a critical review of extant literature on terrorist networks along a conceptual continuum based on forms of network organization.

The literature on terrorist networks ranges along a conceptual continuum that emphasizes either individuals and their social networks, organizational networks, or vertically integrated networks with chains of command. One end of the continuum tends to overemphasize individual terrorists and their social networks and to underemphasize organizational networks (Jackson et. al. 2007; Cragin et. al. 2007; Libicki et. al. 2007; Sageman 2004; Cordes et. al. 1985). Moving past the particularistic focus on individual terrorists on the conceptual continuum, we find perspectives that offer more generalized notions of networks, but that tend to underemphasize structural differences in network forms and functions (Arquilla and Ronfeldt 1996, 2001; Hoffman 1998, 2006a). Here, the network metaphor is used to describe the tendency of many terrorist entities to be affiliated through loosely coupled, non-hierarchical connections. At the other end of the conceptual continuum is a view of terrorist networks as more centrally controlled (Rabasa et. al. 2007). This perspective seems to derive from Cold War conceptions of KGB-type clandestine networks may structurally appear as decentralized but that function within a larger hierarchic structure. While each perspective along the terror network conceptual continuum offer strengths and weaknesses, most approaches tend to overemphasize archetypal structural forms and underestimate how differences in organizational structures influence the form and function of terrorist entities.

At one end of the conceptual continuum are studies that emphasize the individual terrorist personality and terrorist social behavior as reflected in the study of their social networks. These views do not account for whether or how organizational structure matters in their functioning. These types of studies tend to underemphasize differences in structural form and coordination. Though this conceptual approach was common during the early years of terrorist research in the 1970s and 1980s, these types of studies continue to be conducted (Borum 2004). For example, several recent studies attempt to describe the "terrorist mindset" by focusing on how terrorists try

to get around defensive technologies (Jackson et. al. 2007), share technologies among themselves (Cragin et. al. 2007), and prioritize their targets (Libicki et. al. 2007). While such studies provide insights about terrorists' motivations and potential behavior, this research tends to overlook to what extent organizational forms may influence or interact with the activities carried out by terrorist entities.

Further along the terrorist network conceptual continuum are studies that begin to consider the association, organization, and coordination of terrorist entities. These studies explicitly depict terrorist networks as non-hierarchical interconnected organizational forms (Stohl and Stohl 2007; Hoffman 2006a, 2006b, 2003; Milward and Raab 2006; Raab and Milward 2003; Albert and Hayes 2003; Arquilla and Ronfeldt 2001). Although analysts noted the threats posed by terrorist networks before 9/11 (Arquilla and Ronfeldt 1996; Hoffman 1998), the 9/11 attacks dramatized the operational capabilities of a entity such as al Qaeda to use a decentralized network form of organization to coordinate its activities. Researchers subsequently focused on network-based conflict as a high contrast stylized alternative form of coordination to hierarchical-based conflict between nation-states. An early prominent example of this perspective was the notion of "netwar" posited by Arquilla and Ronfeldt (2001, 6):

> the term netwar refers to an emerging mode of conflict (and crime) at societal levels, short of traditional military warfare, in which the protagonists use network forms of organization and related doctrines, strategies, and technologies attuned to the information age. These protagonists are likely to consist of dispersed organizations, small groups, and individuals who communicate, coordinate, and conduct their campaigns in an internetted manner, often without a precise central command. Thus, netwar differs from modes of conflict and crime in which the protagonists prefer to develop formal, stand-alone, hierarchical organizations, doctrines, and strategies as in past efforts.

Arquilla and Ronfeldt's (2001) discussion of networks reflects a general tendency among terrorist network researchers to overemphasize archetypal conceptions of networks as polycentric, segmented, horizontal structures (i.e., all-channel, hub, chain). Consequently, such conceptions often mischaracterize the extent to which terrorist entities may also include different organizational forms.

Stohl and Stohl (2007) provide another example of a perspective in the middle range of the conceptual continuum that emphasizes archetypal networks. Drawing upon a larger field of studies examining organizational and communication networks, Stohl and Stohl (2007) argue that terrorist entities are best understood as complex systems. They argue that the prevalent conception of terrorist networks is that they are characterized as: 1) information systems instead of multifunctional communication systems; 2) uniplex ahistoric relations instead of multiplex historically constructed relations operating at multiple levels; 3) hierarchically organized, top-down command and control structures instead of temporary, dynamic, emergent, adaptive, flexible structures; 4) having boundaries specified politically rather than functionally; and 5) globalized and homophilous instead of local or global and heterogeneous. For Stohl and Stohl (2007), terrorist networks share the attributes of archetypal notions of networks.

Further along the terrorist network conceptual continuum, some researchers derive perspectives of terrorist networks that are heavily influenced by Cold War notions of network and ideological conflict that may be controlled and hierarchically managed. For example, Rabasa

et al. (2007, xv) argue that there are three broad parallels between the Cold War environment and the war on global terrorism:

> First, the United States, both in the late 1940s and today, was and is confronting a new and confusing geopolitical environment with new security threats. At the beginning of the Cold War the threat was a global Communist movement led by a nuclear-armed Soviet Union; today it is a global jihadist movement striking against the West with acts of mass-casualty terrorism. Second, as was the case in the 1940s, we have witnessed the creation of large, new U.S.-government bureaucracies to combat these threats. Finally, and most importantly, during the early Cold War years there was widespread recognition that the United States and its allies were engaged in an ideological conflict. Policymakers understood this conflict would be contested in and across diplomatic, economic, military, and psychological dimensions.

Along with finding similarities between the Cold War and the war on terrorist networks, Rabasa et. al. (2007, xv) also identify several important differences:

> As a nation-state, the Soviet Union had state interests to protect, defined geographical borders, and a clear government structure. Today, by contrast, the United States confronts shadowy nonstate actors that control no territory (although some have been able to establish sanctuaries outside of state control), reject the norms of the international system, and are not subject to normal means of deterrence.

Such differences notwithstanding, Rabasa et al. (2007) argue that, just as a primary contributing factor to winning the Cold War involved the United States building pro-democracy networks to combat global communism, so also the war against global jihadism should include United States supporting the development of moderate Muslim networks. The Rabasa et al. (2007) study provides an example of how the decades long Cold War continues to influence conceptualizations of identifying and combating terrorist networks. While the offensive and defensive use of networks during the Cold War provide insights, the current global threat environment is sufficiently different enough to require alternative perspectives

Reviewing the range of literature about terrorist networks reveals the overall tendency to overemphasize highly stylized views of network forms. One implication of this perspective is a line of argument that counter-terrorist activities be similarly coordinated as network organizations. By this logic, it takes a network to fight a network (Arquilla and Ronfeldt 1996; Alberts and Hayes 2003). For example, Alberts and Hayes (2003) argue that military and intelligence agencies need to organize more like networks. According to Alberts and Hayes (2003), EOs should also share many of the attributes of twenty first century post-industrial age post-hierarchical organizations that are characterized by distributed information, collective sensemaking, distributed power, dynamic task allocation, and shared understanding of command intent.

As this review of terrorist network literature reveals, many views of the terrorist network and counter-terrorist EO suffer from a too stylized perspective that dismisses conditions of hierarchy, contingency, and hybridity. Instead, what is needed is a more fully comprehensive a multi-foci perspective of the complexity of terrorist entities that enables an examination of the various activities and the structures that are used to execute these activities.

Part Three: Coordination Strategies for EOs

As we revealed in our review of the literature on terrorist networks, there is considerable range in conceptions of terrorist entities. Missing to date is a comprehensive framework that more fully encompasses the complexity of terrorist organizational structures as well as the range of structural coordination options available for EOs. As Davis and Jenkins (2004) note, understanding terrorism and its deterrence would benefit from considering a complex systems perspective. This paper helps address this conceptual limitation by providing a multi-focal framework that enables an analysis of the hierarchical, contingent, and community coordination mechanisms for EOs. Our approach is related to an emergent stream in network research that critiques archetypal notions of networks as high-contrast alternatives to hierarchical forms and instead argues for conceptualizing networks as dynamically multi-structural (Herranz 2007; 6 et. al. 2006; Monge and Contractor 2004). This article extends the work of Herranz (2007) theorizing a typology of three network coordination strategies—bureaucratic, entrepreneurial, community—offering a range of behavior encompassing reactive facilitation, contingent coordination, active coordination, and hierarchical-based network administration. According to Herranz (2007), each of these behavioral sets has strategic and tactical advantages and disadvantages. The definition of sector-based strategic orientations is rooted in organization theory and is based upon a reformulation of Wilkins' and Ouchi's (1983) identification of three basic mechanisms of organizational control: markets (i.e., "contingent orientation"), bureaucracies (i.e., "hierarchical orientation"), and clans (i.e., "community orientation"). These mechanisms of coordination are each associated with different value sets that underlay and motivate different types of coordination (see table 1).

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Extending such organization and network theorizing to EOs, this article develops a theoretical framework offering an analysis of the coordinating capabilities and activities of EOs. Such an analytical framework enables a more comprehensive assessment of the organizational attributes of EOs, as well as their strengths and weaknesses. Drawing upon Herranz (2007) what follows is an overview of the conceptual basis for three different EO coordination mechanisms: hierarchical, contingent, and community.

Herranz (2007) theorizes a typology of three network coordination strategies—bureaucratic, entrepreneurial, community—offering a range of behavior encompassing reactive facilitation, contingent coordination, active coordination, and hierarchical-based network administration. Herranz (2007) developed this typology based on a six year study of a quasi-natural experiment comparing different network designs involving governmental, for-profit, and nonprofit organizations. Extending such organization and network theorizing to EO, our paper will develop a theoretical framework offering a menu of network coordinating capabilities and strategies for the EO. With such a framework of strategic choices, the EO may be better able to develop its strategic capacity for agility. And, the framework may enable the EO to assess and determine a strategic course of action and its trade-offs in a dynamic networked environment. What follows is an overview of the theoretical basis for three different EO coordination

strategies: community, bureaucratic, and entrepreneurial. Each of the EO coordination approaches represent different strategies and tactics that would be used to carry out functions of a traditional C2 approach (see table 2 for illustrative examples)

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A community strategic orientation is mostly characterized by the underlying conceptual values often associated with the civil society sector: identity-based, participative, relational, self-organizing, and dynamic. Indications of an EO with a community-based strategic orientation may be revealed by individual and organizational interactions characterized by dense overlapping inter-personal and inter-organizational connections; agile and dynamic adaptation; reactivity to internal and external pressures; tendency towards tactical and customary responses—rather than strategically planned initiatives—to internal and external pressures; network-embedded information and resource transactions with other identity-based organizations; and individuated particularistic activities. An EO reflecting a community-based strategic orientation is hypothesized to exhibit behavior associated with reactive facilitation. These approaches emphasize information and decision-making processes that are embedded in inter-personal relationships. Such a community oriented approach emphasizes personal ties and knowledge in coordinating activities and moving information through networked environments.

Community-focused behavior coordination activities include repeated social and professional ties with similar identity groups or networks of related identity communities. Trade-offs associated with community-focused EO behavior include: increased personalization and decreased professionalization; hyper-contingent interactions; diminished standardization; and inconsistent performance. Community orientated strategies are hypothesized to be appropriate in environmental conditions where available information is relatively low or highly protected, and that are highly dynamic and where trust levels within the group are relatively high. Community oriented strategies may also provide access to information that otherwise cannot be regulated or purchased. However, community oriented strategies tend to depend on strong personal ties, and may be difficult to implement without such connections. At the same time that strong ties may help sustain activities associated with community oriented strategies, those same strategies are vulnerable to failure—especially in the short term—if key connectors are removed. The preceding discussion about an EO with a community orientation gives rise to the following proposition:

> Proposition 1: An EO with a community orientation is likely to be adaptive in dynamic situations so long as its strong ties persist.

In contrast to the community orientation, an EO with a bureaucratic orientation is mostly characterized by the attributes associated with a traditional C2 hierarchical organization: top-down management; legalistic and procedural decision-making; and routinized functions. Indications of an EO with a bureaucratic strategic orientation may be revealed by interactions characterized by explicitly and formally structured hierarchical accountability relationships; codified and documented procedural-driven activities; and non-agile, change-resistant yet

resilient functions. An EO reflecting a bureaucratic-based strategic orientation is hypothesized to exhibit behavior associated with hierarchical-based directive administration. These approaches emphasize regulatory information and decision-making processes that are standardized and regulated. Such a bureaucratic oriented approach emphasizes clear lines of authority, impersonal interactions in coordinating activities, and moving information through highly structured organizational channels. Bureaucratic-focused behavior coordination activities include maintaining order through code and custom, developing written procedures, enforcing accountability expectations through monitoring and reporting mechanisms. Trade-offs associated with bureaucratic-focused EO behavior include: rigidity; slow or non adaptation; constrained information flows; and restrictions on innovation. Bureaucratic strategies are appropriate under conditions that that are relatively stable, generate moderate and regular levels of information, involve repeated tasks, and require high levels of legal and political accountability. However, bureaucratic strategies are vulnerable to and may contribute to under-performing outcomes if the EO operates in a fast-changing environment with shifting expectations, resources, and alliances. The preceding discussion about an EO with a bureaucratic orientation gives rise to the following proposition:

> Proposition 2: An EO with a bureaucratic orientation is likely to be reactive in dynamic situations so long as it already has set procedures for the conditions it encounters; otherwise it does not react, or if does react it does with a high risk of inappropriate reaction.

In addition to the community and bureaucratic orientations, and EO may also develop an entrepreneurial strategic orientation that is mostly characterized by the behavior associated with businesses in the market sector: profit-seeking, competitive, opportunistic, and customer-focused. Indications of an EO with an entrepreneurial strategic orientation may be revealed by interactions characterized by opportunism, competitive self-interest, quid pro quo relationships, dynamic responsiveness and adaptability to environment, innovation, and meeting customer needs. An EO reflecting an entrepreneurial strategic orientation is hypothesized to exhibit behavior associated with contingent coordination. These approaches emphasize market awareness, agile responsiveness, strategic and business planning, and efficient production and service processes. Such an entrepreneurial oriented approach emphasizes value-added information collection and processing, interactions in coordinating activities, and rapid decision making. Entrepreneurial-focused network coordination activities include flattened organizational structures with distributed authority and responsibility, incentives, and rapid learning and implementation. Trade-offs associated with entrepreneurial-focused EO behavior include: self-interest, moral hazards, exploitation of non-monitored or regulated internal or external resources, narrow niche market focus, non-standardization, and performance contingent on resources and environment. Entrepreneurial strategies are appropriate under conditions associated with high levels of informational exchange, competitive interactions, and repeated exchange. However, entrepreneurial strategies are vulnerable to sub-optimal outcomes if there are high levels of information asymmetry and significant imbalances in informational supply and demand. The preceding discussion about an EO with an entrepreneurial orientation gives rise to the following proposition:

> Proposition 3: An EO with an entrepreneurial orientation is likely to be adaptive in dynamic situations so long as sufficient (human, capital) resources are available.

The preceding discussion and tentative propositions are intended to further develop the concept of EOs towards building a portfolio model whereby the Department of Defense (DoD) can view these strategies as a collection of options, each of which can be employed, either fully or partially, to attain a wide assortment of goals (e.g. transient goals versus long-term objectives, single operations to complex multi-partner engagements, etc). As an example, consider a recent analysis of how terrorist entities (individuals, groups, and organizations) cooperate for the exchange of artifacts (physical goods, information, knowledge/expertise, and even collaboration on actions) (Desouza and Hensgen 2007). Terrorist organizations have been shown to use a wide assortment of coordinating strategies that are analogous to simplistic licensing agreements, to marketing and distribution agreements, production and development agreements, and even equity-based relationships such as minority equity investments, joint ventures, and mergers and acquisitions (Desouza and Hensgen 2007). Each of these coordination strategies can be scaled from those that involve loose coupling to those that have tight coupling. Moreover, the nature of coordination strategies varies depending on the type of artifact being exchanged, the history between entities, and other variables (Desouza and Hensgen 2007). The ideal terrorist group is one that is structured in a flexible manner so as to use the entire collection of coordination mechanisms at its disposal to attain its objectives. Moreover, no terrorist organization only uses one coordination mechanism either throughout its lifetime or at any given time, the portfolio approach is found. What differentiates a mature terrorist group from an immature one is the ability of one to coordinate a diverse set of resources, both internal and external, and leverage these to meet current, and future, goals and objectives (Desouza and Hensgen 2007).

In a similar fashion, we feel that the coordination strategies described in this paper need to be considered holistically. One might use the analogy of portfolio management for appreciating how coordination strategies must be deployed. The DoD is analogous to a portfolio manager whose goal is to maximize the returns from its resource. The internal environment represents the constraints that govern how resources can be utilized. While the external environment represents the market needs and demands, and also determines returns on resources deployed. Hence, the DoD must be able to deploy resources using the appropriate coordination strategy to meet the internal constraints while maximizing its external impact and securing goals and objectives. Let us take the case of recruiting. Recruiting represents a major effort for the DoD. Recruitment of personnel into the various armed forces and also into support and administrative functions is a critical determinant of DoD performance and vitality. In recent times, the armed services have witnessed not only low enlistment numbers but to make matters worse, increased turnover. This coupled with the fact of the DoD has an aging workforces makes for a grim picture. To date, the recruitment strategy employed by the DoD relies heavily on the bureaucratic strategy. Various recruiting stations across the country have personnel who visit high schools and universities and try to incentivize citizens to enlist. These recruiters have limited control over the process of enlistment or even the selection. As such they merely serve as “information heads” for the DoD. This strategy has witnessed minimal success. How might recruitment looks under the entrepreneurial strategy? For one, market based incentives may be provided. These would go beyond the traditional incentives of college tuition waivers. Why? Simply put, the ideal candidates such as high performers will have received tuition waivers from other sources of scholarship. Hence, the DoD must offer something of greater value to entice these candidates (e.g. sign-up bonuses). Now, let us consider the community strategy. Under the community strategy, recruitment may occur using a bottom-up rather than a top-down strategy. Here, the various servicemen and servicewomen will use their personal networks to draw in personnel into

the armed services. Word-of-mouth, personal referrals, and community engagements will attract candidates to the DoD. The real strength of the DoD will be in its ability to use the three strategies in an integrated manner to develop its workforce. The bureaucratic strategy is important to manage the training processes involved in developing soldiers. The bureaucratic strategy works well to develop soldiers through employment of a rigid-hierarchical system of training, indoctrination, and communication. While the entrepreneurial and community strategies may be more suitable for recruiting high caliber candidates to the DoD. Further, the community strategy may be a good approach to employ to develop a sense of belonging and commitment which might prevent turnover. In addition, the development of incentives through the entrepreneurial strategy may also help in retaining the workforce. As illustrated, the workforce management problem requires the deployment of all three strategies in an integrated manner. Analysis of other aspects of the DoD operations will show that too often there is an overreliance on "one" method of coordination, rather than an "integrated" method that appreciates the three advantage and disadvantages of the three methods.

Conclusion

This paper examined and extended current theoretical understanding of the coordination of EOs (EO) by providing a three-part analytical critique. The first part examined the EO concept from the critical perspective of organization theory. The second part questioned the notion of EOs as an archetypical network form that is best able to combat a terrorist network. We argue that terrorist organizations represent a range of organizational forms rather than a single network form. The third part provided a conceptual framework that builds upon the previous critiques and identifies a range of coordinating strategies for EOs that enable decision-makers with an analytical model for determining strategic trade-offs as well as operational choices in multi-agency multisectoral complex endeavors. We argue that the effectiveness and efficiency of the EO is related to its network coordinating strategy. Consequently, EOs need to be agile enough to choose the right coordinating strategy given the conditions of their internal and external environments. The internal environment includes the work and task allotments, while external environment considers the issues of coalition partners, goals, strategies, etc. Our paper contributes to building a more robust EO framework by providing a critical analysis of coordination strategies related to Alberts and Hayes' (2003) re-conceptualization of military organizations as EOs.

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Table 1: Organization Theory Critiques of the Edge Organization Concept

Theory	synopsis	principles	critique of EO
scientific management (Taylor 1947)	planning of work to achieve efficiency, standardization, specialization and simplification.	science, not rule-of-thumb; worker selected scientifically; scientific training of workers; management/labour cooperation not conflict	*not standardized*
bureaucratic *approach* (Weber 1947)	consider organization as a segment of broader society	structure; specialization; predictability and stability; rationality; democracy.	*not specialized*
transaction costs (Williamson 1981)	cost incurred in making an economic exchange.	search and information costs; bargaining costs; policing and enforcement costs	*unspecified costs*
principal-agent (Jenson and Meckling 1976)	principal's observation of agent's performance is costly or not fully possible	conditions of incomplete and asymmetric information	*goal incongruity & moral hazard*
resource dependency **(**Pfeffer and Salancik 1978)	organizations respond to external actors upon whose resources they depend	costs of giving in to external demands; costs of abandoning use of the resource;	*dependency conflicts*
contingency (Woodward 1958)	management style and organizational structure are influenced by environment	technologies determine differences in span of control, centralization of authority, and formalization of rules and procedures.	*noncontrol*
institutionalism (Scott 1995)	organization earns legitimacy via structural and procedural legitimacy	conform to rules and belief systems prevailing in the environment	*conformity*

Table 2: Strategic Orientation Value-Sets

Values Dimension	*Bureaucratic*	*Entrepreneurial*	*Community*
Ideology	legislated order (e.g., state-focus)	market-focus, individualism, quid pro quo	kin- and clan-focus
Goals, preferences	stability, accountability, equitable treatment	value-maximization	values-driven, social tradition
Power and control	very centralized with more reliance on rules	opportunistic individualism (often oligopolistic)	less centralized with self-interest groups & cliques
Implicit structure	hierarchical, departmental	quasi-autonomous units	loosely-coupled units
Decision process	procedural, rationality, top-down	technical, opportunistic, middle-out	situational, participatory, bottom-up
Decisions	follow from established code routines	follow from maximizing monetary value	result from social dictum and negotiation
Information requirements	reduced by use of rules and procedures	extensive and systematic	ad hoc

Partially derived from Pfeffer (1981)

Table 3: Edge Organizaton Coordination Strategies/Tactics for Command & Control Functions

C2 Function	*Bureaucratic*	*Entrepreneurial*	*Community*
recruiting	draft	sign-up bonus	family referrals
training	structured step-by-step program	incentivized performance	apprentice-ship, mentoring
intelligence	mining large databases	fee-baed rewards	insider double-agent
special operations	specialized branch teams (e.g., SEALS)	mercenary teams	cells
contracting	low-bid contracting	cost-plus contracting	family-tie contracting

[1] Of the more than 100 definitions of terrorism, Hoffman's (2006a, 43) definition is closest to our definition of terrorism as political; violent; designed to spread widespread fear, conducted by an organization with a chain of command or conspiratorial cell structure, and perpetrated by a subnational group or non-state entity.

[2] For Malone and Crowston (1993), coordination theory focuses on managing shared resources, producer / consumer relationships, simultaneity constraints, and task / subtask dependencies. Their theory focuses on ways of applying a "coordination perspective" in three different domains: understanding the effects of IT on human organizations and markets, designing of cooperative work tools, and designing distributed and parallel processing computer systems.

[3] Malone and Crowston (2001, 10) define coordination as "managing dependencies between activities."

[4] Another critique of coordination theory is that it does not fully account for context and time. Moreover, Winter & Taylor (1996) challenge the causal links suggested by the Malone and Crowston (1993) by suggesting that such modes of organization had existed long before the appearance of IT in its current form, and that the causal relationship must take into account social and economic factors in studying the relationships.