
Creating Rational Organizations

Theory of Enterprise Command and Control

Preface to
2nd Edition
March 2012

Jay S. Bayne

A Meta Command Systems Book



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Many of the concepts introduced in these pages, particularly those in Chapters 3-8, are the subject of U.S. patents 7,181,392 (2005) and 7,835,931 (2010). These patents cover the conceptual basis for and key elements of the structure and function of *value production units* (VPU), *command structures*, *control processing* and *performance measurement services*.

Disclaimer

Opinions expressed or implied are solely those of the author and do not necessarily represent the views of the Department of Defense or any other U.S. government agency.

Dedication

This work is dedicated to my wife Carol, whose love and spirit energizes and inspires all that I do; and to Alison, our daughter, who is proof that love can create beauty, grace and intelligence.

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Preface to 2nd Edition

In the six years since the publication of the first edition, the inexorable march of technology and increasing global competitiveness have made our original arguments even more salient. These and other market forces continue to identify and crystalized new applications domains, beyond the first edition's focus on military C2, where distributed real-time control of enterprise value production is not only warranted, but needed to achieve productivity (efficiencies), scale economics, interoperability, and a host of other benefits. Examples include supply chain management within and across manufacturing and healthcare organizations, the architecture and design of "cyber-physical" systems (the so-called "Internet of Things"), and development of the "smart electric grid," to name a few.

Further, the intervening six years have witnessed theoretical interest in the science of "service systems" and of "cyberspatial mechanics," both addressing technical aspects of designing, constructing, operating and maintaining enterprises whose operations exist, in part or in whole, in cyberspace. Such virtual businesses, focused on delivery of location-agnostic (i.e., global) services through the global internet, virtual private networks, private "clouds" and other technical means. Consequently, *Creating Rational Organizations* has laid a theoretical and technical foundation for an expanded treatment of the subject. We plan to offer a companion text applying this material to industrial supply chain management.

While the treatment of an enterprise as a "controllable object" remains foreign to traditional academic training, it is not without precedent. Yet, at the beginning of the 21st century the occurrence of

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science and *management* in the same sentence remains rare. We continue to work towards that goal.

Preface to 1st Edition

*Creating Rational Organizations*¹ and its supporting *Theory of Enterprise Command and Control* are concerned with automated governance services for regulation and supervision of value production in agile enterprise systems. They are about achieving and sustaining an enterprise's *viability*² through establishing and maintaining situational awareness, of both internal processes and the external environment, about *adaptation* and maintaining essential *capabilities* through collaborative, agile and coordinated action. Enterprise command and control (EC2) theory is also concerned with integration of human prerogatives ("commander's intent") and distributed computational systems that, acting in concert, are competent to establish and maintain efficient operations of dynamic enterprises, of any size. The theory maintains that effective collaboration among rational enterprises (e.g., along their supply chains) is not attainable without *shared* supervisory (*command*) and regulatory (*control*) services.

Such an infrastructure necessarily sits above, yet is intrinsically dependent upon, underlying communications systems and data oriented (transactional) information systems. These systems include databases, enterprise resource planning (ERP) applications, intranets such as the Department of Defense's (DOD) Global Information Grid (GIG), associated *network-centric enterprise services* (NCES) and

¹ A *rational organization* is an arrangement of managed capabilities, able to think and act as a unit, efficiently and objectively, in the face of evolving situations for which it is accountable.

² A system is *viable* to the degree it is self-aware and able to regulate its behavior and maintain the *capability* to sustain its value propositions. The *viability* of a system is a measure of its dynamic stability, its agility, its adaptability and therefore its sustainability.

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numerous legacy enterprise applications systems. *Creating Rational Organizations* provides a philosophical and technical framework, sitting above this communications- and data-centric infrastructure, capable of enabling the next generation of *network-centric enterprise governance systems*.

On a less philosophical level, we are interested in EC2 as a means of supporting enterprises in their efforts to act jointly—in collaborating purposefully on behalf of mutual objectives. Collaboration (i.e., cooperation) demands shared resources, including (secure) communications, timely and useful information exchange, shared situational perceptions, policy co-development, conflict resolution and compliance (penalty functions), capability (asset) sharing, joint planning, synchronized execution and uniform performance measurement and assessment. Effective EC2 results, at least in part, from consolidation of these services.

Consequently, our thesis is that the definition and development of service-oriented EC2 systems requires a more comprehensive theory of organizational (collective, joint) behavior, a theory more focused on interactive and agile governance capabilities than provided by traditional *ad hoc* structures and methods and one that supports implementation using modern distributed (e.g., “cloud” based) computational systems. We postulate that without higher-level and more robust forms of enterprise automation and control, current institutions of government, commerce and civil society will be limited in their reaction to events in an increasingly complex and interdependent world. In response, the goal of the theory of EC2 is to move the frontier of enterprise system conception, design and operation from its current communications (*net-centric*) and

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information sharing (*data-centric*) orientations forward to a formal theory capable of supporting unified (*service-centric*) operations.

Today the DOD, as do the majority of large government and commercial enterprises, emphasizes communications and data sharing as centerpieces of their information integration efforts. The ability to interconnect arbitrarily large numbers of distributed and diverse information sources (e.g., databases) is clearly a logical necessity, but as a basis for unified and collaborative command is insufficient. Large quantities of volatile information streaming in from a multitude of geographically distributed sources, at various rates, are as likely to confuse a decision maker's assessment of a given situation as to clarify it, thus hindering his ability to act.

In addition, there are important collateral issues of information context, pedigree, timeliness, accuracy, precision, semantics and a host of other matters that connectivity and data sharing alone cannot resolve. These issues of curation are more properly belong to the domain of the *governance processes* (EC2 "service systems") that ultimately use the data. They define the context in which these processes unfold in time and space and the missions of the organizations relying on their operation.

In short, we believe that communications networks (e.g., the GIG) and their ability to support an abundance of data publishers and subscribers have only a supporting role (however critical) in enabling effective and collaborative C2. This thesis motivates the next developmental phases of institutional (military and commercial enterprise) governance systems. It argues that the focus needs to be on the manner in which information is *assimilated* and effectively

utilized within and among communities with allied interests. This is the domain of distributed governance, of institutional and shared awareness, and the essential *processes* of enterprise governance. It is the domain demanding a more general theory of enterprise command and control.

In developing our theory, we take into account current and near-future requirements deriving from the *evolution* in military (including homeland security), commercial and governmental affairs, as viewed at the beginning of the 21st century. Contrary to opinions [1, 74]³ that we are witnessing a *revolution*⁴ in the governance of the military enterprise (e.g., “edge organizations” and “network-centric warfare”), we see instead strong evidence of an *evolution* in governance requirements. This evolution is based on an enduring need for pragmatic incremental (albeit accelerating) steps, important refinements motivated by continuous changes in technology, policy, doctrine, economics and political imperatives. These changes create the need for new capabilities in both present (legacy) and future command and control systems. Such durable forces for change require C2 system concepts that support flexibility and adaptation—continuous evolution in platforms and services that provide individual and shared capabilities sufficient to govern effectively.

These observations are not new or necessarily contentious. Command (decision) and control practices employed to date embody concepts that have a long history in the conduct of military and

³ References, listed beginning on page 213, are designated within the text by square brackets [...]

⁴ Largely a byproduct of stock market euphoria, preceding the 2001 market crash, resulting from technical and financial expectations for any product or services related to the Internet

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civilian affairs. They constitute the principal management frameworks used by military commanders, corporate executives, government ministers, and others responsible for the conduct of complex, evolving, dynamic, typically distributed and (in the case of military force projection and civilian law enforcement) lethal enterprises.

We take as givens, and as the bedrock of our theory, the fundamental tenets of the U.S. experiment in governance—that all men are free and endowed with fundamental *rights*: the right to life (existence) and the derivative rights of liberty (sovereignty), property (wealth) and the pursuit of happiness (*the* reward for achievement). We take the position that enterprise is *the* means to achieve men's objectives, conceived by men and therefore a synthetic embodiment of their desires and means. A viable enterprise, including its human actors, has a physical existence and is, in a practical sense, *alive*. Enterprises, operating in the economic and political conditions of the 21st century, demand certain "inalienable rights:" sovereignty, wealth and happiness, for at least their stakeholders. In this context, sovereign enterprises may wish to "form a more perfect union" for their common defense and their economic well-being (offense) through formation of federations (alliances). For this, they require something analogous to a "constitution" and "bill of rights." We argue that development of a network-mediated enterprise command and control system fulfills, in principle and in large part, requirements for a federation governance system.

Across the many domains of human endeavor, the basic mechanisms of governance include periodic execution of processes that perform information acquisition, situation assessment, policy, resource and response (action) plan development, and ultimately plan execution

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and performance management. There are, however, wide variations in

- the lexicon used to describe the processes of governance,
- the definition and application of their core tenets,
- the attendant social (administrative) systems they require, presume or tolerate,
- the relative emphasis (values) placed on each process,
- the capabilities of extant technical enablers, and
- the social and political contexts in which they are practiced

These issues vary within and across application domains, enterprises operating within those domains and their constituent organizational components. As a result, there is today no broadly accepted *theory* of C2, one sufficient to define a conceptual basis for and core set of governance services. Without such a theory, there can be only a limited scientific basis. Lacking a defensible science, C2 technology is destined to remain fragmented, lack scale and be difficult and costly to apply, share, operate and maintain. Moreover, federated enterprise systems will continue to require improvised (*ad hoc*) solutions to group governance services. This condition will persist for enterprises operating alone or in concert within a single domain (e.g., market or theater), let alone on occasion and under the stress of critical and time-limited situations when they may need to interconnect, interoperate and synchronize across domain boundaries.

Within the DOD, C2 relates to the unification of military governance processes within and across tactical, operational, strategic and national levels of command (e.g., Joint Task Forces, JTF), across the Military Services of the Navy, Marine Corps, Air Force and Army, and

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within the National Command Authority comprising the President (POTUS), Secretary of Defense (SecDef) and Joint Chiefs of Staff (JCS). Within this domain, lack of unified C2 continues to result in fielding well-intentioned but often incompatible and isolated systems. These “stove-piped” C2 systems are costly, enterprise-specific and incompatible in intent, specification, scope and function; in short, they are architecturally unique islands of governance.

Compounded by post 09-11-2001 realities, the emergence of non-state sponsored terrorism and sporadic outbursts of long-standing regional conflicts, national and international political conditions continue to exacerbate attempts at developing *unified command structures* (UCS). Ideally, unified command emerges through continuous improvements and incremental implementations. Unification must certainly involve coordinated development of both new systems and legacy system upgrades. UCS must support the needs of individual authorities at a given level or across levels of command while at the same time allowing for improved coordination within and across military and civil⁵ institutions, domestically and in concert with foreign allies in multiple theaters of operation and against a wide range of threats. This is admittedly a tall order, but one not without precedence.

In the five decades following WWII, primarily motivated by our strategic nuclear posture spawned from Cold War threats, the U.S. has invested heavily in efforts to field unified command structures, and include development of the World Wide Military Command and Control System (WWMCCS) and its contemporary successors, the

⁵ Including non-governmental organizations (NGO) and commercial-industrial suppliers

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Global Command and Control System (GCCS) and emerging Joint Command and Control (JC2) System. These efforts were well motivated, focused and aimed at providing the National Command Authority (NCA) with tools for overseeing key strategic⁶ and operational military capabilities. Nevertheless, literature describing these systems is largely silent on any overarching theories aimed to unifying their designs and their evolution, let alone their respective roles in the overall governance of evolving U.S. military and non-military enterprises.

Hence, our task includes development of a theoretical basis, along with an associated lexicon, for 21st-century C2 systems, including development of a unified C2 architecture for U.S. military enterprises, one competent to account for demands of multiple user communities, operating alone and in concert, and across various command levels. The work reported here, while intentionally technology-neutral does, however, recognize and respect the existence of certain capabilities of contemporary and near-future computing and communications technologies, and to a degree anticipates their roles as enablers in the DOD's *global information grid* (GIG) and its associated *network centric operations* (NCO) imperatives.

Perhaps most important, unified C2 capabilities might well prove to be our most important next generation strategic (non-nuclear) weapon system. Unified C2 systems can simultaneously serve our national and global policy objectives while providing a coherent and extensible fabric on which coordinated policy and action may evolve and unfold. Kinetic weapons have been and will continue to be a focus of national

⁶ In U.S. military parlance, the term "strategic" is typically synonymous with "nuclear."

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military strategy, helping to maintain historical distinctions between and specializations within the military services. They most certainly help sustain and reinforce long-standing military and industrial political-economic relationships. Arms have experienced an inexorable march from their pre-historic mechanical roots, to chemical, to nuclear and now to information-based designs [69]. However, our thesis supports arguments that, when properly conceived, designed and implemented, real-time distributed and unified C2 systems are of potentially greater value in enabling U.S. political influence and military force projection, enabling (through awareness and agile maneuver on a global scale) greater degrees of deterrence and strategic advantage than tactical kinetic systems.

Finally, our intent here is to avoid perpetuating historical tensions deriving from false dichotomies present in arguments concerning centralization versus decentralization of authority. On the contrary, it is our intent to significantly attenuate, if not dispel, such arguments. The theory of EC2 is predicated on an alternative paradigm, one recognizing the legitimacy of multiple levels of command within and across interdependent enterprises. The theory emphasizes and fortifies the degree of individual operational sovereignty that enterprises require to be agile and effective. Unifying principles include the concept of partitioning complex systems into semi-autonomous, yet federated, subsystems (cf. Jeffersonian principles), compartmentalization and specialization of function into efficient network accessible (shared) services. Such designs allow delegation of responsibility and accountability while providing support for individual *commanders' intent*, the principal operational concept establishing and legitimizing distributed intelligence, leadership, accountability and allegiance through *chains of command* – structures

that create and continually reinforce *accountability hierarchies* and *causal networks*. In this paradigm, the theory of EC2 simultaneously supports semi-autonomous *edge organizations* [1], the cognitive and social art of management and the science of technology-mediated governance.

This book has a decidedly military slant, for good reason—by most measures, the DOD is the largest, most expensive and certainly most lethal enterprise in the United States of America and in the world. We believe that the general theme of this work is equally relevant to the civilian commercial and governmental world, particularly medium- to large-scale industrial and civil (i.e., public services) enterprises. We therefore invite the reader to judge *Creating Rational Organizations—Theory of Enterprise Command & Control*, as we have endeavored to express it, in its most general and domain-neutral context.

The theory extends commercial and military C2 from its historic and largely internal tactical focus, beyond contemporary efforts at achieving “jointness” through integration of stand-alone (legacy, agency-specific, stove-piped) C2 systems, to the realization of a generalized suite of shared governance services capable of effectively supporting network-mediated operations — a *unified command structure*. The primary motivation, as stated previously, is improved performance in distributed, collaborative and real-time operations between and among interdependent enterprises.

As presented in the following pages, effective enterprise governance involves three primary classes of command (decision) and control services: *situation assessment, planning and plan execution*. These services constitute the core activities of an enterprise and federations formed by its interaction with allied organizations. These classes of

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service form the basis of our formalized model of unified (albeit decentralized) governance. Network-accessible EC2 services support a governance structure appropriate for distributed, self-aware, sovereign, always-on, agile, mobile, survivable and interoperable (collaborative) enterprise systems.

The term enterprise *system* refers to the technical cyber-infrastructure supporting enterprise governance *services*. While not about *information technology* (IT), per se, enterprise governance does refer to application- (software-) based services that ride upon information technology (aka, cyber-infrastructure). IT refers to computing, storage and communications technologies used to host such services. In general, our use of the terms *systems* and *services* are not equivalent or interchangeable.

1. Introduction

Creating Rational Organizations and its supporting *Theory of Enterprise Command and Control* contain both theoretical and technical arguments. They are intended to provide a logical framework for expressing and integrating concepts and requirements for *network accessible*⁷ governance shared services within and among organizational units of moderate to large-scale enterprises, whether commercial or governmental, civilian or military. The term “command and control” (C2) is historically about governance of tactical military operations (e.g., maneuver, fire control). In non-military domains the term “decision and control” is more common. In the theory that follows, we use the term *enterprise C2* (EC2) to encompass and address both domains.

The theory of enterprise C2 is described in terms of, and is primarily concerned with, improving the *effectiveness of governance* within and among large-scale enterprises such as the U.S. Departments of Homeland Security, Defense, the Military Services and their allied organizations, both governmental and non-governmental. Gains in effectiveness, enabled through net-centric EC2 services, are expected to accrue from improvements in institutional speed and agility, inter-agency collaboration for joint assessment, planning and execution, shared resource management, policy compliance, awareness and predictability of effects and economies of scale.

⁷ A *network-enabled* service (capability) is offered as a “cloud” service (via the internet or a corporate or military intranet) and specified, designed and implemented according to *service-oriented* software principles (SOA), www.oasis-open.org

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Development of a C2 theory complements efforts by the Department of Defense to move towards network-centric warfare [101] doctrines. The DOD Chief Information Office's (CIO) Engineering Advisory Board's (EAB) is developing implementation guidelines for the Global Information Grid (GIG) and accompanying application-level (software-based services) implementation standards. These standards, referred to collectively as Network Centric Implementation Documents (NCID), are expected to provide C2 application designers and developers with technical guidance in fielding GIG-compliant systems. C2 applications are arguably the most critical, complex and demanding net-centric applications. As such, they provide key requirements for NCID specifications. Consequently, this work was motivated by and serves as a companion and guidance to the development of NCID application requirements.

The Office of C2 Policy within the Office of the Assistant Secretary of Defense for Networks and Information Integration (OSD/NII)⁸ sponsors work on application-level NCID, and in particular C2 applications. The Applied Physics Laboratory at Johns Hopkins University (JHU/APL) is creating the Application NCID technical specifications. In addition to its more general objectives, the thesis expressed in this *Theory of EC2* supports the JHU/APL activity.

The goal of realizing unified national C2 has significant historical precedent. It is visible in post-WWII efforts at fielding the World Wide Military Command and Control System (WWMCCS) and its successors, the Global Command and Control System (GCCS) and the

⁸ The director of OSD/NII also serves as the DOD CIO

Theory of Enterprise Command and Control

Joint Command and Control (JC2) System. Its need and utility are visible in recent individual and collective failures of local, state and federal agencies and their lack of ability to predict, plan for and respond in a timely fashion to terrorist (09.11.2001) and natural (Hurricane Katrina) disasters. Those events highlighted weaknesses of our intra- and inter-agency governance systems and demonstrated the critical need for developing improved (distributed, shared and fault-tolerant) enterprise governance systems that are at once stand-alone and interoperable.

Domestically, federal departments and agencies such as Defense, Homeland Security, Justice, Health and Human Services, Energy and Transportation must cooperate in order to more effectively prevent and, if required, respond to natural and terrorist disasters. Internationally, these same departments and agencies are required to collaborate with their foreign counterparts in combating terrorism and worldwide disasters. This situation demands development of a more collaborative C2 framework, one that encourages a conversation and, ultimately, specification, design, construction, acquisition, deployment and maintenance (in an incremental and evolutionary way) of individual and interoperable EC2 systems. The theory supports those ends.

The Theory of Enterprise Command and Control comprises four primary and three supporting elements. The four primary elements include:

1. A theory of *enterprise*, the beneficiary of C2 services, and its primary objective: *value production* (Chapter 3)

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2. A theory of *enterprise control services*, essential processes governing value production in federated systems (Chapter 4)
3. A theory of *enterprise command structure*, how human and synthetic actors are organized to effectively supervise their enterprises through exercise of the control services, individually and in federated communities (Chapter 5), and
4. A theory of *enterprise performance*, establishing metrics to determine uniformly how well an enterprise performs, when acting alone and in allied groups (Chapter 6)

Three supporting theories address C2 “qualities of service,” including

5. A theory of *enterprise timeliness*, related to issues of enterprises achieving their individual and group completion-time requirements (Chapter 7)
6. A theory of *enterprise engagement protocols*, the means for enterprises to establish markets for and trade in their respective capabilities (Chapter 8), and
7. A theory of *enterprise resource management*, the relation between timeliness and resources requirements (Chapter 9)

The book concludes with a discussion of *rational organizations* and *unified command structures* (Chapter 10) as they emerge from application of the theory.

For reference, the book contains a glossary (Chapter 11) and includes two appendices, one devoted to explaining the cybernetics leading to the *enterprise command structure* (Chapter 13) and one providing introduction to an analytical model of value production (Chapter 14).

2. Background

Rationality requires discipline of mind, and in collaborative situations, consensus. Disciplined group behavior presupposes shared understanding (ontology) and, to a degree, on shared processes. Shared processes require a coordinating framework—a theory of group cognition, of collaboration and consensus, of effective governance, of enterprise command and control (EC2). Our theory of EC2 is motivated by the increasing complexity of modern organizations, the continually changing nature of the environments in which they must operate and the increasing complexity (cost) of developing and maintaining their technical infrastructures. This challenge is exemplified by the U.S government’s continuing *transformation* efforts to improve the efficacy of defense operations, from their traditional tactical war fighting (aka, force projection) role to their support of homeland defense with new requirements for inter-agency collaboration, both domestic and international. In response, the Director of Command and Control (C2) Policy within the Networks and Information Integration Directorate of the U.S. Office of the Assistant Secretary of Defense (OSD/NII) commissioned this work.

Objective

The principal objective of this work is to present a broadly applicable (i.e., domain neutral, logical and scalable) *unified* theory of enterprise command and control consistent with DOD’s *network centric warfare* (NCW) and *force transformation* objectives. In presenting this theory, we assert that it is capable of serving as guidance to subsequent GIG-compliant architectural specifications that lead to the design, development, acquisition and deployment of individual C2 applications systems that, once in operation, are able to contribute individually

and in concert to a *unified command structure* (UCS). UCS-compliant C2 systems must be suitable for sustained *network-centric operations* (NCO) that provide *core C2 services* to our National Command Authority (NCA).

We present the theory of EC2 in nine chapters. Chapter 1 introduces the subject, provides a bit of relevant history and sets the context and lexicon used in the rest of the work. Chapter 3 defines a model of *enterprise*, the focus of net-centric C2 operations. Chapter 4 introduces the core net-centric processes of situation assessment, plan generation and plan execution - services required to support collaborative and coordinated *enterprise command and control*. Chapter 5 introduces a scalable and distributed *enterprise command structure* sufficient to establish and maintain accountability among enterprise actors, both human and synthetic. Chapter 6 describes net-centric *performance measurement services* capable of providing a real-time and context-neutral set of performance measures. Chapter 7 introduces critical *application quality of service* (AQoS) considerations, with special emphasis on task *completion-time requirements*. Chapter 8 describes inter-enterprise *messaging services* in support of intra- and inter-agency collaboration and synchronization. Chapter 9 discusses the theory's critical dependence on effective local and global *enterprise resource management*. Chapter 10 concludes by outlining a rational organization and a unified command structure based on the theory of EC2.

Also included are two Appendices. Appendix A provides support for Chapter 4, developing the enterprise command structure from

*cybernetic principles*⁹. Appendix B supports Chapter 3 by introducing an analytic (mathematical) model of enterprise value production. Neither of these appendices contains information necessary to understand the central message, serving instead as background and pathways to a deeper understanding.

The theory presented seeks to integrate three interrelated views of C2, with their origins, respectively, in information technology, systems engineering (especially classical control theory and its more holistic offshoot cybernetics), and the less engineering oriented, but nevertheless relevant, social and cognitive sciences. All three disciplines continue to evolve and to various degrees intermingle. For example, given the significant and continuous progress made in the fields of neurobiology and brain research, systems science (cybernetics) is entering a new epoch, especially with respect to concepts and role of associative memory (e.g., reentrant maps) and its role of capturing stimulus-response patterns that support anticipatory behavior and consciousness. EC2 theory, especially the treatment of enterprise command structure, continues to benefit from such developments.

Context

This work considers C2 requirements present in federal, state and local governmental and non-governmental organizations. In particular, we are interested in interactions among the missions, goals

⁹ Cybernetics, among its more general definitions, is about governance of large-scale dynamic and probabilistic systems. First-order cybernetics is concerned with regulation of a given system; second-order cybernetics is concerned with regulation of the environment in which that system is embedded.

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and objectives of U.S. Executive Branch agencies, especially the DOD, since these are the loci of national command authority. In total, these requirements call for more formal, yet more agile and decentralized means of collaborative, distributed, imaginative (i.e., anticipatory), adaptive and real-time governance of their affairs,

- Within a given organization, and
- Among allied organizations

Accordingly, our goal is to develop an enterprise C2 theory that is directly applicable to DOD's core mission, but one supportive of its roles with allied institutions and the communities of interest they form. We recognize that as a sovereign yet interdependent country the U.S., through coordination of its Departments of Defense, Homeland Security, State, Justice, etc, is a primary actor in an increasingly complex, interdependent and evolving global context, especially in regards to diplomacy (sanctions), commerce (trade) and public safety (terrorist and natural disaster management).

Circumstances framing our thesis include other important considerations:

- World populations are growing, with corresponding increases in political, commercial and cultural interdependence and resultant competitive tensions.
- Established institutions of government, commerce and society are increasingly stressed by complexity of their individual areas of responsibility, their growing interdependence and their need to acquire, manage and share scarce and costly

resources, all in more restricted timeframes and economic conditions.

- Legal, political and financial interdependencies continue to expand and evolve within and among sovereign agencies and states, with friction resulting from historical precedents, modes of operation, and political agendas.
- U.S. presence and role in the world is expanding, as is the global media's continuous and increasingly detailed monitoring and reporting, making our actions more visible and requiring more openness, candor, circumspection, collaboration and sensitivity in governance, in essentially all facets of humanitarian, social, governmental and military affairs.
- The U.S. role in the world is manifest, yet paradoxical, resulting from our considerable economic and military capabilities that are increasingly needed and expected in response to third-world development, disaster relief and conflict resolution, and in the face of increasing social polarization caused, in large part, by growing disparities between wealthier and poorer nations of the world.

Starting Point

Given our stated objectives and context, we select as a starting point for development of our EC2 theory a position represented in the *Command Concepts* report written by Carl Builder, Steven Banks and Richard Nordin [29] at the National Defense Research Institute at Rand, published in 1999. Of their many conclusions, not all of which we accept, a central one states that *command concepts* (strategic planning and development of associated *concepts of operations*) are, or should be, the "essential substantive content of the information