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THESIS

**AN APPLICATION OF SYSTEMS ENGINEERING TO
ANALYZE THE INTERAGENCY COORDINATION
ASPECT OF COUNTER TRAFFICKING AND TERRORISM**

by

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June 2012

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**AN APPLICATION OF SYSTEMS ENGINEERING TO ANALYZE THE
INTERAGENCY COORDINATION ASPECT OF COUNTER TRAFFICKING
AND TERRORISM**

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requirements for the degree of

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ABSTRACT

This thesis utilizes principles of the systems engineering process discussed by Dennis Buede in “*The Engineering Design of Systems: Models and Methods (2nd ed.)*” (2009). The systems engineering process is used to create a functional architecture to analyze interagency coordination in support of counterterrorism efforts in the United States European Command area of operation. The resulting functional architecture serve as tools for policymakers as they determine the best ways to create a synchronous whole of government approach to defend United States interests.

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LIST OF ACRONYMS AND ABBREVIATIONS

AOR	Area of Responsibility
AUTL	Army Universal Task List
CIA	Central Intelligence Agency
CJCS	Chairman of the Joint Chiefs of Staff
COCOM	Combatant Command
CT	Counter Terrorism
DoD	Department of Defense
DOE	Department of Energy
DHS	Department of Homeland Security
DTRA	Defense Threat Reduction Agency
ECJ9	European Command Interagency Partnering Directorate
EUCOM	United States Armed Forces European Command
FBI	Federal Bureau of Investigation
FEMA	Federal Emergency Management Agency
IA	Interagency
INSS	Institute for National Security Studies
J2	EUCOM Intelligence Directorate
J3	EUCOM Plans and Operations Directorate
J5/8	EUCOM Policy, Strategy, and Partnering Directorate
J7	EUCOM Analysis and Assessments Directorate
JHU/APL	Johns Hopkins University Applied Physics Laboratory
JICTC	Joint Interagency and Counter-Trafficking Center
MCTL	Marine Corps Task List

METL	Mission-Essential Task List
NATO	North Atlantic Treaty Organization
NDU	National Defense University
NRC	Nuclear Regulatory Commission
NTTL	Navy Tactical Task List
NSS	National Security Strategy
OSD	Office of the Secretary of Defense
QDR	Quadrennial Defense Review
SECDEF	Secretary of Defense
SME	Subject Matter Expert
TOC	Transnational Organized Crime
TSCTP	Trans-Sahara Counterterrorism Partnership
UJTL	Universal Joint Task List
U.S.A or U.S.	United States of America

EXECUTIVE SUMMARY

The events that transpired on September 11, 2001 serve as a harsh reality check for the United States (U.S.). “*The 9/11 Commission Report*” found that one of the inadequacies that led to the attack was the lack of intelligence sharing between the Central Intelligence Agency (CIA) and the Federal Bureau of Investigation (FBI) (2004). In 2010, United States Armed Forces European Command (EUCOM) stood up the Joint Interagency Counter-Trafficking Center (JICTC). The mission of this organization is coordinating interagency efforts to counter illicit trafficking and terrorism in the EUCOM area of responsibility (AOR). Joint military operations have encountered countless interoperability issues throughout the years. The idea of joint operations to leverage all aspects of the military was never a novel one, but it called for thorough examination of the many systems that comprise the military. Much like joint operations is an iterative process to achieve commendable results, the interagency effort requires analysis to determine how the systems shall coordinate and cooperate to achieve a synchronous whole of government approach to accomplish the mission of counterterrorism.

This thesis utilizes the systems engineering principles outlined by Dennis Buede in “*The Engineering Design of Systems: Models and Methods (2nd ed.)*” (2009). Specifically, the systems engineering design process utilized for this thesis was:

1. To develop the operational concept
2. Define the system boundary with an external systems diagram
3. Develop the system objectives hierarchy; develop, analyze, and refine requirements (stakeholders’ and system)
4. Ensure requirements feasibility
5. Develop a functional architecture that traces back to the objectives and requirements of the stakeholders

A functional architecture defines what a system must do. This is accomplished by setting a single top-level function and decomposing that into its component sub-functions. The functional decomposition identifies all of the functionality that must take place for a system to perform its task. The top-level function for this system is to conduct interagency coordination to support the counterterrorism effort in the EUCOM AOR. The sub-functions were determined to be:

F1.1 – Identify Mission

F1.2 – Share Information

F1.3 – Identify Capability Gaps and Overlaps

F1.4 – Train Partners to Conduct Interagency Coordination

F1.5 – Select Strong Leadership

F1.6 – Assess Progress

Each of these functions contributes to the overall functionality of the top-level function. Further decomposing each of these sub-functions and then tracing those to associated requirements verified these functions.

The creation of a physical architecture is the next step in the design process. This step was not completed in this thesis. The result of this study was to recommend a sub-committee structure within EUCOM. Each sub-committee would be comprised of EUCOM military and civilian staff as well interagency representatives that are also billeted to certain directorates within EUCOM. The sub-committee organization forces directorates to come together to enhance their abilities to accomplish EUCOM missions. Each sub-committee is accountable for their assigned sub-function. The additive nature of these sub-committees results in the “Interagency Committee” at EUCOM.

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I. INTRODUCTION

A. BACKGROUND

The Joint Interagency Counter Trafficking Center (JICTC) supports US Interagency and Country Team efforts, and collaborates with similar international organizations, to effectively and efficiently counter transnational illicit trafficking and terrorism in United States Armed Forces European Command (EUCOM) Area of Interest, and assists European and Eurasian nations to build self-sufficient counter trafficking and counterterrorism skills, competencies, and capacity in support of defending the Homeland forward.

Admiral James G. Stavridis (EUCOM, 2011)

The war on terror is a global fight. Terrorists operate in dynamic ways, in various countries and regions, for various purposes, from low to high capabilities, under many different organizational structures, traditional and non-traditional recruitment, possessing varying levels of funding. This means that the United States must effectively leverage its assets to combat these threats. Interagency coordination is paramount now and in the future. The objective of interagency coordination is to utilize the strengths and skills of the entire U.S. government, and its allies, to pursue and complete shared missions. Governmental agencies must utilize their individual skills to prevent another 9/11-type attack on the U.S. or its allies.

B. OBJECTIVE

This research utilizes a systems engineering process to produce a functional architecture that can be used to design, develop, and/or improve upon a system for interagency coordination with respect to counter trafficking and terrorism efforts. This study also identifies past and current successes and shortcomings. These lessons learned provide the basis for evaluation of a working system.

The results of these architectures will be a functional system design, based on a hierarchy of functions derived from system requirements, which

ultimately trace up to Combatant Command (COCOM) strategy and National Security Strategy. This research also aims to assist the COCOM staffing decision maker to arrive at educated conclusions as to which interagency representatives are performing which functions and which required functions are not being performed, if any.

C. PROBLEM DEFINITION



Figure 1. The Interagency “Network” (After JHU-APL, 2009)

Transnational trafficking is a multi-faceted security concern, which undermines U.S. strategic interest. It contributes to weakening of the rule of law and fosters other forms of illicit activities such as terrorism, insurgency, drug trafficking, weapons trafficking, money laundering, human trafficking and

smuggling. This multi-faceted problem requires that the nation's resources work together to achieve a common goal of disrupting these networks and movements (White House, 2011).

Figure 1 illustrates the "Interagency Network," providing a glimpse of the array of agencies that interconnect as part of their missions in support of the U.S. government. It is clear, as seen in the figure, that the Department of Defense (DoD) must coordinate its global activities with agencies such as the Central Intelligence Agency (CIA), Department of Homeland Security (DHS), Department of Commerce, Department of Energy (DOE), and the Department of State, among many others. Additionally, the 2010 QDR requires that the military strengthen and expand its interagency partnerships. Therefore, U.S. Armed Forces European Command (EUCOM) has responded to this guidance by standing up the JICTC and EUCOM Interagency Partnering Directorate (ECJ9).

The mission of the U.S. European Command is to conduct military operations, international military engagement, and interagency partnering to enhance transatlantic security and defend the United States forward. (EUCOM, 2012)

The Johns Hopkins University Applied Physics Lab (JHU-APL, 2009) published a handbook titled *Interagency Teaming to Counter Irregular Threats*. The handbook claims that there is a fundamental cultural difference between the DoD and other governmental agencies such as the Department of State (DoS) and National Security Council (NSC). Among the claims is that personnel with military background tend to "step on toes, violate lanes, and usurp authority to try to get the job done on their timeline and in their style (JHU-APL, 2009)."

The problem examined in this thesis is how to improve the conduct of interagency operations to counter trafficking and terrorism in the EUCOM AOR.

D. RESEARCH QUESTIONS

1. What are the objectives, requirements, and functions necessary for productive interagency coordination allowing for the successful

conduct of counter trafficking and counterterrorism in the EUCOM area of responsibility (AOR)?

2. How can a stakeholder analysis, objectives hierarchy, requirements definition, and functional decomposition assist EUCOM in its effort to disrupt transnational terrorist networks?

E. SCOPE

Interagency operations apply to a wide range of military operations across the United States and around the world. The focus of this research is on the counter trafficking and terrorism efforts taking place in the EUCOM AOR. Figure 2 is a map showing locations of all COCOMs, and therefore illustrates the breadth of the EUCOM AOR and the large number of diverse nations that it contains.

This thesis provides a functional architecture of how EUCOM, and subsequently other COCOM's, addresses the key counter-trafficking requirements and how they are interrelated. The COCOM level of decision-making allows for a review of top-level, broad analysis of required functions. This thesis provides the preliminary investigation of how basic systems engineering can assist in the design of an organization intended to disrupt trafficking and terrorism. The results of this thesis should then be expanded upon to include modeling and simulation to verify it for implementation.

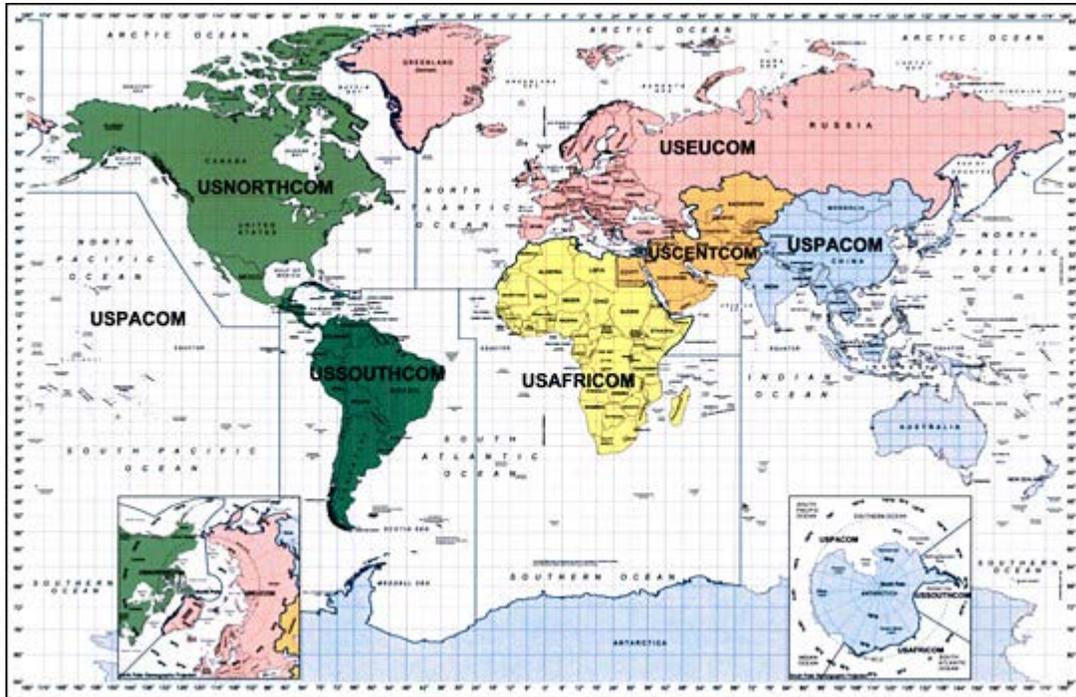


Figure 2. COCOM AORs (From DoD, 2011)

F. METHODOLOGY

This research leans heavily on the systems engineering process described by Dennis Buede's *The Engineering Design of Systems: Models and Method*. The results from this application of the systems engineering process include a list of requirements with a corresponding functional analysis. The systems engineering process is further explained in Chapter III.

G. THESIS ORGANIZATION

Chapter II discusses the interagency operations that are in place and operating in EUCOM. It will include a literature review of the interagency concept. Chapter III explains the systems engineering process that is used to analyze this interagency coordination system to counter terrorism at EUCOM. Chapter IV describes the functional analysis. Chapter V presents a preliminary generalized physical analysis. Chapter VI offers a summary of the results, conclusion, and recommendations for further research.

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II. INTERAGENCY COORDINATION TO COUNTER TERRORISM IN THE EUCOM AOR

A. LITERATURE REVIEW

1. National Security Strategy (NSS)

Time and again in our Nation's history, Americans have risen to meet -and to shape - moments of transition. This must be one of those moments. We live in a time of sweeping change. The success of free nations, open markets, and social progress in recent decades has accelerated globalization on an unprecedented scale. This has opened the doors of opportunity around the globe, extended democracy to hundreds of millions of people, and made peace possible among the major powers. Yet globalization has also intensified the dangers we face – from international terrorism and the spread of deadly technologies, to economic upheaval and a changing climate.

President Barack Obama (White House, 2010)

The NSS recognizes that the interconnectedness of the world is both a blessing and a curse. The increased lines of communication allow the world to communicate and exchange information more readily, but it also creates more points of vulnerability. The NSS calls for a strengthening of national capacity by utilizing a whole of government approach. It recognizes that there have been significant steps made in the effort to synthesize the skillset and capabilities within military and civilian organizations. One example of this call for increased interagency coordination has been the merging of National Security Council (NSC) and Homeland Security Council staffs. The NSS does point out areas that require improvement to enhance this whole of government approach (White House, 2010). These include:

1. More effectively ensuring alignment of resources with our national security strategy
2. Adapting the education and training of national security professionals

3. Reviewing authorities and mechanisms to implement and coordinate assistance programs and other policies and programs that strengthen coordination

The NSS vigorously defends its policy to disrupt, dismantle, and defeat Al-Qa'ida and its violent extremist affiliates in Afghanistan, Pakistan, and around the world. Key requirements in this fight include building positive partnerships with Muslim communities around the world and utilizing a broad, sustained, and integrated campaign that applies every tool of American power (White House, 2010). The message is clear. The U.S. must grow its partnerships, both home and abroad, to be able to meet the dynamic challenges that the future presents with regard to national security.

2. Strategy to Combat Transnational Organized Crime (TOC)

Despite a long and successful history of dismantling criminal organizations and developing common international standards for cooperation against transnational organized crime, not all of our capabilities have kept pace with the expansion of 21st century transnational criminal threats. Therefore, this strategy is organized around a single, unifying principle: to build, balance, and integrate the tools of American power to combat transnational organized crime and related threats to our national security – and to urge our partners to do the same.

President Barack Obama (White House, 2011)

The Strategy to Combat TOC lays out five policy objectives (White House, 2011):

1. Protect Americans and our partners from the harm, violence, and exploitation of transnational criminal networks.
2. Help partner countries strengthen governance and transparency, break the correlative power of transnational criminal networks, and sever state-crime alliances.
3. Break the economic power of transnational criminal networks and protect strategic markets and the U.S. financial system for TOC penetration and abuse.

4. Defeat transnational criminal networks that pose the greatest threat to national security, by targeting their infrastructures, depriving, them of their enabling means, and preventing the criminal facilitation of terrorist activities.
5. Build international consensus, multilateral cooperation, and public-private partnerships to defeat TOC.

3. Quadrennial Defense Review

The 2010 Quadrennial Defense Review (QDR) re-affirms the Department of Defense's (DoD) aspiration to develop and strengthen its relationships both foreign and domestic to maximize the effectiveness of preventing and responding to crises around the world. For example, in the continual fight against irregular warfare, the United States (U.S) military has had the opportunity to experience how important the partnership amongst U.S. departments and agencies can be. The 2010 QDR calls for a strengthening of interagency partnerships so that the U.S. military capabilities parallel other agencies' abilities such as diplomacy, development, law enforcement, trade, intelligence, and border protection to support a whole-of-government approach to national defense and security.

The DoD's definition for interagency coordination is "Within the context of Department of Defense involvement, the coordination that occurs between elements of the Department of Defense and engaged U.S. government agencies for the purpose of achieving an objective (Joint Publication 3-08, 2006)." The DoD plans to better clarify interagency roles and responsibilities as well as identifying capability gaps that must be filled (QDR, 70). The united effort will help to build capacity and efficiency by identifying duplicitous work, assigning the correct civilian or military leadership to various circumstances, and opening the lines of communication between agencies.

U.S. defense capabilities are the greatest and most expansive that the world has ever seen, but its reach and resources are still finite. The call for increased synthesis between military and governmental agencies is necessary

for the continued fight against decentralized, networked extremist groups. The U.S. should prioritize its efforts against the threats deemed most dangerous and likely to do harm while maintaining an eye on the unexpected occurrences (INSS Proceedings, 6). The QDR also states that, "Sustaining existing alliances and creating new partnerships are central elements of U.S. security strategy. The United States cannot sustain a stable international system alone." The U.S. must rely on its partnerships for like-minded action.

4. Interagency Teaming to Counter Irregular Threats

The JHU/APL handbook on interagency teaming provides a background on the nature of the interagency environment. It provides insights and best practices that can be utilized to further the interagency team at the operational level. The need for interagency teaming is evident from the wide variety of threats faced in today's security environment. The irregular threats include trafficking of persons, weapons of mass destruction, narcotics, threat finance, homeland security and defense, unconventional warfare, terrorism, cyber warfare, insurgency, and piracy (JHU/APL, 2009). All of these aspects are relevant to the EUCOM AOR. The JICTC transnational threat focus areas are narcotics trafficking, terrorism, weapons trafficking, and persons trafficking (EUCOM, 2011).

JHU/APL hosted an Interagency Workshop in May 2009 and identified the following six key functions for successful interagency teaming:

1. Share information across agencies and actors
2. Leverage resources, skill sets, and expertise
3. Coordinate and collaborate
4. Distill issues for elevation to senior leaders
5. Facilitate action
6. Operationalize policy

The handbook goes on to name these current challenges the interagency teaming process:

1. Lack of national integration mechanism
2. Lack of established processes
3. Organizational mismatch
4. Legal constraints
5. Capacity and resource constraints
6. Intramural turf battles
7. Defense is from Mars, State is from Venus
8. Lack of understanding
9. Wicked problems
10. Communications constraints

Additionally, the handbook specifies the top ten best practices that it observed.

1. Get the right people on the team
2. Establish good external communications
3. Practice cross-cultural communications
4. Keep good records
5. Understand and leverage partner capabilities and expertise
6. Provide adequate resources
7. Manage resources effectively
8. Break down barriers to information sharing
9. Tailor leadership style to the networked team
10. Establish personal working relationships

Lastly, the handbook presents case studies of various interagency teams. The counterterrorism case study presented was that of the Trans-Sahara Counterterrorism Partnership (TSCTP). TSCTP is a U.S. government program aimed at defeating terrorist organizations by: strengthening regional counterterrorism capabilities, enhancing and institutionalizing cooperation among the region’s security forces, promoting democratic governance, discrediting terrorist ideology, and reinforcing bilateral military ties with the U.S. (Africa Command, 2012). Table 1 illustrates the wide-ranging efforts required in this Trans-Saharan effort to counterterrorism. This effort required U.S. government agencies to coordinate with military, civilians, non-government organizations, and especially with the host nations.

Key Supporting Agencies
Medical Teams
<ul style="list-style-type: none"> • USAID • Defense • Other State entities (including Ambassadors/Chiefs of Mission)
Other Supporting Entities
<ul style="list-style-type: none"> • Treasury • Justice: FBI • Intelligence Community • NGOs • Contractors
Host-Nation Governments
<ul style="list-style-type: none"> • Chad, Mali, Mauritania, Niger, Algeria, Morocco, Tunisia, Nigeria, Senegal, and Burkina Faso

Table 1. Interagency Effort in TSCTP (From JHU/APL, 2009)

The JHU/APL interagency teaming handbook points out these lessons learned.

1. The program is hampered by the absence of a strategic plan that lays out a common vision, end state, and operational guidance in terms understood by all of the interagency partners.

2. There is no comprehensive, integrated strategy to implement the program. There are no clear goals, objectives, or milestones to reach objectives. Agency plans do not always other agencies' missions.

3. There is a lack of prioritization and de-confliction. Funding streams make it difficult to integrate programs and activities.

4. There is no program in place to evaluate performance.

5. Roles and responsibilities are unclear.

These key functions, best practices, and lessons learned will serve as valuable reference for the functional analysis in Chapter IV.

5. DoD Training for Operations with Interagency, Multinational, and Coalition Partners

The RAND Corporation released a study for the Office of the Secretary of Defense (OSD). The objective of this study was to provide defense planners with recommendations on how to better prepare U.S. military personnel to work successfully with a host of partners. These partners include governmental agencies, multinational organization, and coalition partner countries (Spiras, Moroney, Thie, Hogler, Young, 2008).

The first part of this RAND Corporation study was dedicated to generating an Integrated-Operation task list. This is derived from a list from the Universal Joint Task List (UJTL), Army Universal Task List (AUTL), also in use by the Air Force, Marine Corps Task List (MCTL), and the Navy Tactical Task List (NTTL) that altogether contained 255 tasks that the U.S. military need be able to perform during integrated operations. This combined task list is referred to as the Mission-Essential Task List (METL). This Integrated-Operation task list is separated into these five categories to make the list manageable:

1. Establish relations with partners
2. Provide security operation
3. Conduct operations with and for partners

4. Collect and disseminate information
5. Support inter-partner communications

Each of the 255 tasks identified in the METL fall somewhere in the realm of these five categories. The similarities in categories and tasks delineated in this study and the one conducted by JHU/APL are fundamentally similar if not the same. These five categories served as a resource for the functional analysis and stakeholder analysis presented in later chapters.

5. Global Strategic Assessment 2009: America's Security Role in a Changing World

The Institution for National Strategic Studies (INSS) published this in 2009 and it assessed the state of security in the world, discussed various trends observed in different areas of the world, and provided discussion and subsequent forecasts to serve as a platform to begin reform of the Nation's security policies to match what was to come. This study utilized 125 SMEs from the INSS and National Defense University (NDU). One of the conclusions reached by this assessment echoes that of the previous studies mentioned. They determined that the U.S. remains the only country capable and willing to take the lead role in addressing the world's security, but its resources are finite. The study calls for the government to re-assess, re-prioritize, and reform its security policy to reflect the current and future threats. Most important to this thesis, the study emphasized the role that interagency operations and whole of government approaches must play to guarantee the security of the world in the future.

The study used a systems engineering approach to the interagency problem. It points out that few studies on the inadequacies of interagency operations ever get to the root cause of the problem. "The lack of attention to problem analysis can produce recommendations based on conventional wisdom rather than the careful examination of the facts (INSS, 2009)." Table 2 was extracted from the INSS study and presents various inadequate interagency coordination attempts. The excerpt from the *9/11 Commission Report* indicated

“...Responsibility and accountability were diffuse.” The reform study concluded that interagency coordination required a unifying leader or manager. This leader must act to focus the efforts of the whole.

National Security Reform Studies	Excerpts from Studies (with emphasis added)
Transforming Defense: National Security in the 21 st Century, 1997	The national security apparatus established 50 years ago must adapt itself as it takes on a growing list of new challenges and responsibilities. It so far has been <i>unable to integrate smoothly the resources and organizations needed</i> to anticipate and mold a more secure international environment.
U.S. Commission on National Security in the 21 st Century (Hart-Rudman), 2001	Traditional national security agencies (State, Defense, CIA, NSC staff) <i>will need to work together in new ways</i> , and economic agencies (Treasury, Commerce, U.S. Trade Representative) will need to work more closely with the traditional national security community. In addition, other players, especially Justice and Transportation, <i>will need to be integrated more fully</i> into national security processes.
Beyond Goldwater Nichols: Phase 1, 2004	The past decade of experience in complex contingency operations, from Somalia to Iraq, has demonstrated that success requires unity of effort not only from the military but also from across the U.S. government and an international coalition. In most cases, however, <i>such unity of effort has proved elusive</i> . Time and time again, the United States and its international partners have failed to fully integrate the political, military, economic, humanitarian and other dimensions into a coherent strategy for a given operation—sometimes with disastrous results.
9/11 Commission Report, 2004	In each of our examples, no one was firmly in charge of managing the case. . . . Responsibility and accountability were diffuse. The agencies cooperated, some of the time. But even such cooperation as there was is not the same thing as joint action. . . . <i>The problem is nearly intractable</i> because of the way the government is currently structured.
In the Wake of War, Council on Foreign Relations Independent Task Force, 2005	Despite some welcome initial moves, responsibility within the U.S. government for stabilization and reconstruction operations is diffuse and authority is uncertain. Policies delineating the proper role of the military and civilian agencies have yet to be articulated. Further, the civilian agencies involved in stabilization and reconstruction activities operate <i>without the benefit of a “unified command”</i> structure ensuring that policy, programs, and resources are properly aligned.
The Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction	Everywhere we looked, we found important (and obvious) issues of interagency coordination that went unattended, sensible Community-wide proposals blocked by pockets of resistance, and critical disputes left to fester. Strong interagency cooperation was more likely to result from bilateral “treaties” between big agencies than from Community-level management. This ground was well-plowed by the 9/11 Commission and by several other important assessments of the Intelligence Community over the past decade.
Project Horizon, 2006	U.S. Government <i>interagency effort too often lacks</i> effective concentration of attention, resources, action and accountability.
A Smarter, More Secure America, CSIS Commission on Smart Power, 2007	Implementing a smart power strategy will require a strategic reassessment of how the U.S. government is organized, <i>coordinated</i> , and budgeted.
America’s Role in the World, Institute for the Study of Diplomacy, 2008	The U.S. government <i>does neither vertical coordination within agencies nor horizontal coordination between agencies well</i> .
Agency Stovepipes vs. Strategic Agility, U.S. House of Representatives, Committee on Armed Services, Subcommittee on Oversight and Investigations, 2008	The subcommittee found a <i>lack of unity of direction</i> and unity of command. This results in a <i>lack of unity of purpose</i> . Among the efforts at staffing, training, applying lessons learned, and planning, there is no one person or organization in the lead for the whole of government.

Table 2. The Need to Reform Interagency Coordination (From INSS, 2009)

B. EUCOM INTERAGENCY PARTNERING DIRECTORATE (ECJ9)

“The J9 is a ‘whole of society’ organization seeking partnerships to support enduring peace and stability in Europe and Eurasia.” (EUCOM J9, 2012)

ECJ9's focus is to forge new and enhance existing relationships with like-minded organizations to improve regional security and stability. The U.S. government agencies that have representatives on staff are:

1. Department of State (DOS)
2. Department of Treasury (Treasury)
3. Department of Energy (DOE)
4. Drug Enforcement Administration (DEA)
5. Customs and Border Protection (CBP)
6. U.S. Agency for International Development (USAID)
7. Immigration and Customs Enforcement (ICE)
8. Department of Justice (DOJ)
9. Federal Bureau of Investigation (FBI)

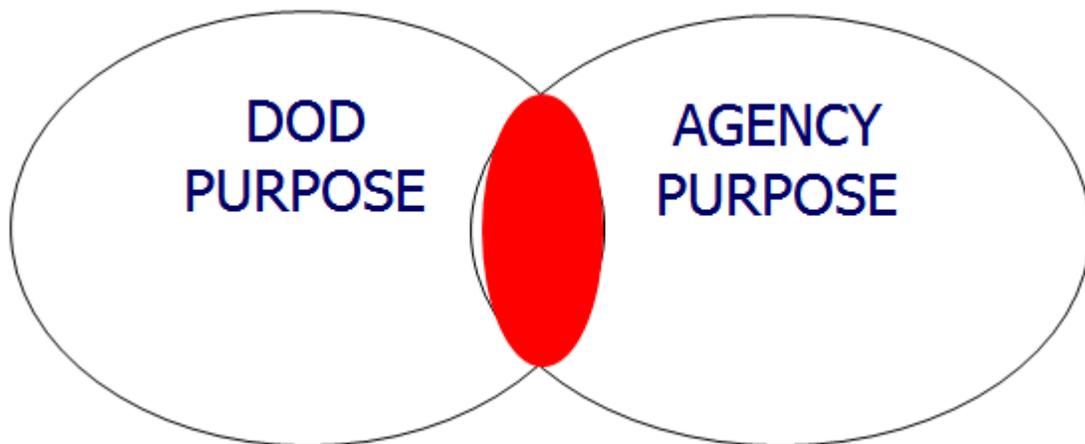


Figure 3. ECJ9 Coincidence of Purpose (From EUCOM, 2012)

These interagency partners are integral members of the EUCOM team. Figure 3 displays that the goal of ECJ9 is to help EUCOM realize that there are shared interests that the DoD and U.S. governmental agencies can work together to achieve. They work with U.S. military planners and staff to ensure close coordination in EUCOM theater activities (EUCOM, 2012).

C. JOINT INTERAGENCY COUNTER TRAFFICKING CENTER (JICTC)

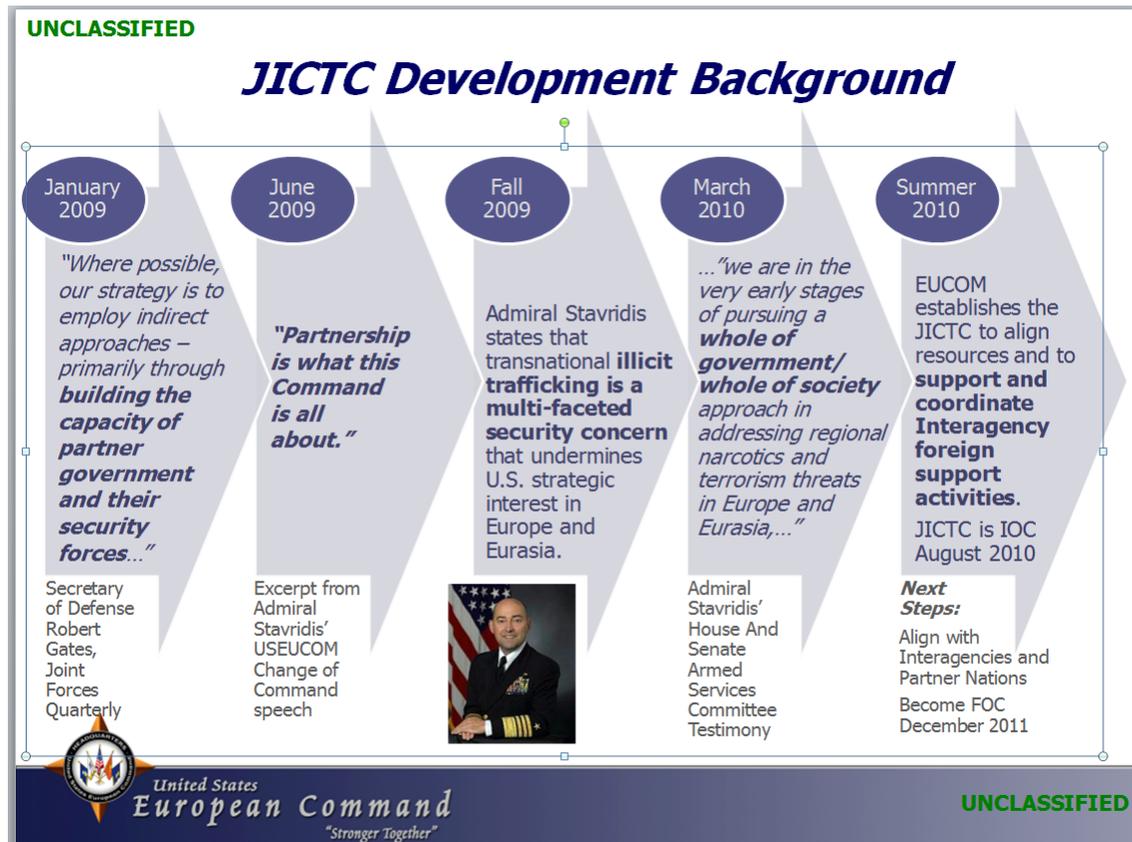


Figure 4. JICTC Development Background (From EUCOM, 2011)

The JICTC missions statement is to "Support the synchronization of Interagency efforts to counter illicit trafficking and terrorism and assist focus nations in building self-sufficient counter-trafficking and counterterrorism skills, competencies, and capacity." (EUCOM, 2011) Figure 4 shows that JICTC is still in its infancy as an organization. Admiral Stavridis, commander of EUCOM and Supreme Allied Commander, Europe, witnessed firsthand the successes that are possible while utilizing interagency coordination to accomplish a mission. His previous command was at Joint Interagency Task Force- South (JIATF-S) at U.S. South Command (SOUTHCOM).

JIATF-S serves as the interagency organization to serve as a blueprint for current and future efforts. The JHU/APL interagency teaming handbook contains

a case study on JIATF-S. The mission of JIATF-S is to conduct counter-illicit trafficking operations. JIATF-S is structured so that interagency partners conduct themselves according to the authority that they inherently possess. Each partnering agency provides support at a level that they are comfortable with (JHU/APL, 2009). Each partner agencies' strengths are utilized to meet mission goals. Success is then translated into metrics that each agency can grasp.

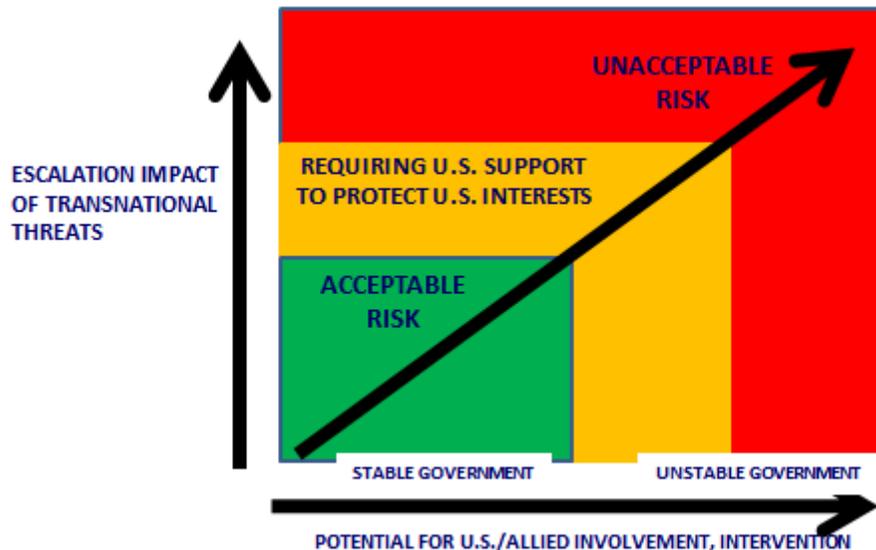


Figure 5. A Theoretical Perspective of the Threat and Potential Impact of the JICTC (After EUCCOM, 2011)

JIATF-S is directly accountable to the Executive Office of the President, and not to the DoD. This ensures that roles and responsibilities are clear. Interagency agreements are designed to meet the mission of the task force as a whole and not an individual agency. In addition, the funding for the task force is separate from the funding stream of each partner agency. Lastly, the process for information sharing is high on turnaround time and efficiency.

Figure 5 illustrates the theoretical relationships that govern the need for interagency cooperation. The need for interagency teaming increases as the

level of instability in a government increases. The same increase in necessity for interagency cooperation is present as the escalation impact of transnational threats increases.

The role that JICTC will play at EUCOM will not be completely analogous to the role that JIATF-S plays at SOUTHCOM. For example, JIATF-S functions include detection, monitoring, and interdiction. However, JICTC can draw from some of the best practices being conducted at JIATF-S and implement those that are corollary at EUCOM. JIATF-S has proven that unity of mission and command promotes teamwork. Shared rewards, equality in decision-making, and a firmly established training protocol are all positive characteristics that JICTC can look to JIATF-S to pattern itself after. Figure 6 depicts the current organizational structure established at EUCOM. The typical hierarchical structure does allow for the easiest flow of information (JHU/APL, 2009).

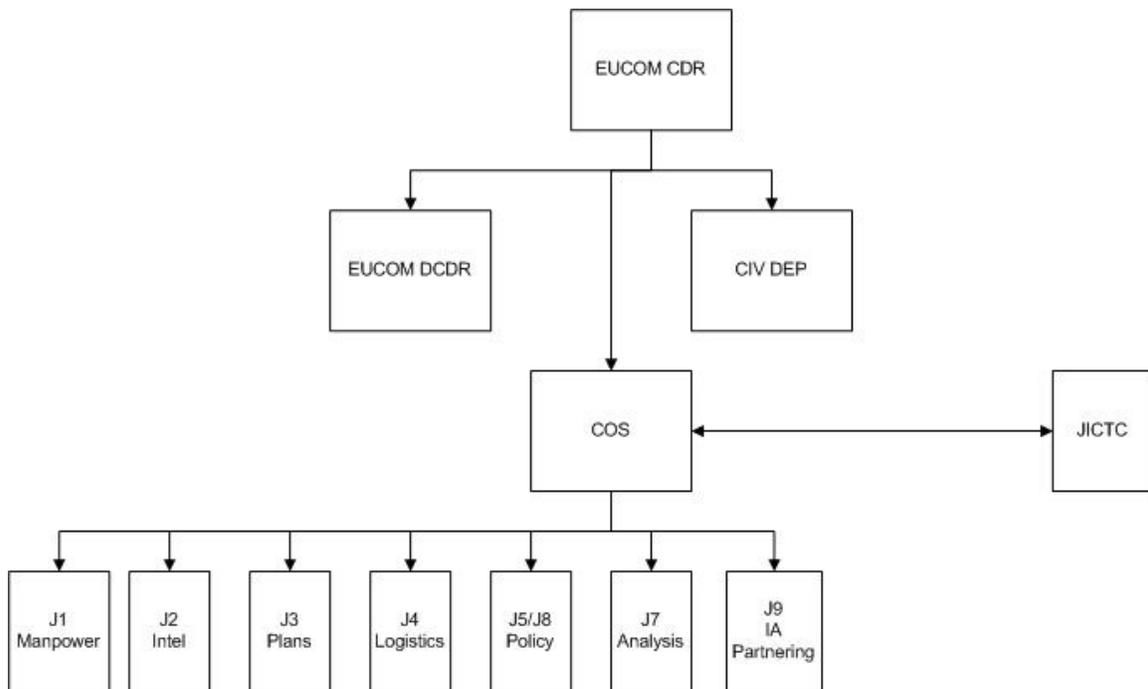


Figure 6.

UCOM Command Structure (After EUCOM, 2011)

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III. SYSTEMS ENGINEERING PROCESS

A. DENNIS M. BUEDE: THE ENGINEERING DESIGN OF SYSTEMS

1. Background

A system is commonly defined to be a collection of hardware, software, people, facilities, and procedures organized to accomplish some common objectives.

Dennis M. Buede (2009)

The systems engineering study is concerned with the entire life cycle of the system. A correctly engineered system pays full attention to the requirements of stakeholders from the time that the system is conceived until the time that the system is no longer needed and is disposed of. The systems engineering process involves a decomposition of a system's functions followed by a re-composition process. During the decomposition process the systems engineer must learn what the stakeholder's requirements are of the system. *The Engineering Design of Systems* identifies a process for system design, and the first several steps of the process are identified below and addressed in this thesis (2009, 51):

0a Define the problem to be solved

0b Define and evaluate alternate concepts for solving the problem

1. Define the system level design problem being solved
2. Develop the system functional architecture

B. DEFINE THE SYSTEM LEVEL DESIGN PROBLEM BEING SOLVED: STAKEHOLDER'S REQUIREMENTS DEVELOPMENT

Buede outlines the following seven functions to develop stakeholder requirements:

1. Develop operational concept
2. Define the system boundary with external systems diagram

3. Develop system objectives hierarchy
4. Develop, analyze, and refine requirements (stakeholders' and system)
5. Ensure requirements feasibility
6. Define the qualification system requirements
7. Obtain approval of system documentation

To remain within the scope of this thesis, only the first four sections of defining the design problem are explored. The remaining sections are open for further research.

1. Develop Operational Concept

Buede defines operational concept as “a vision for what the system is (in general terms), a statement of mission requirements, and a description of how the system will be used. The shared vision is based on the perspective of the system’s stakeholders of how the system will be developed, produced, deployed, trained, operated and maintained, refined, and retired to overcome some operational problem and achieve the stakeholders’ operational needs and objectives. The mission requirements are stated in terms of measures of effectiveness.” (2009, 481)

The JICTC supports U.S. Interagency and Country Team efforts, and collaborates with similar international organizations, to effectively and efficiently counter transnational illicit trafficking and terrorism in USEUCOM’s Area of Interest, and assist European and Eurasian nations to build self-sufficient counter trafficking and counterterrorism skills, competencies, and capacity in support of defending the Homeland forward. (*EUCOM, 2011*)

EUCOM requires a system that will facilitate efficient and effective interagency operations to support the missions of counter trafficking and terrorism. This system will aid the combatant command achieve these missions by promoting interagency coordination, collaboration, and agreement. This whole of government approach traces back to the National Security Strategy

promulgated by the President. The intention of the system is to utilize the capabilities of each agency to contribute to overall mission completion.

a. *Daily Operations Scenario*

Interagency representatives' daily role is to seek out ways to utilize their expertise and training to disrupt transnational threats. A typical day would have these representatives attending briefs that indicate current threats and concerns. Each representative shall comment, as necessary, during these briefings. Information passed during these briefings are inputs for each representative. These representatives, and DoD members, are then expected to use these inputs to collaborate with one another to develop plans of action to counter those threats and concerns.

These plans can be large or small-scale according to the type of threat, timeliness of action required, country in which the dilemma is present, amongst other factors. It is up to the interagency partnership to make recommendations and present the appropriate EUCOM directorates with options to proceed.

Cooperation does not always require the whole of system approach. It is also important that these individuals maintain their own workspace and time that will allow them to focus on implementing their skillset to the problem. An open door policy allows partners to call on their peers to assist in problem solving. This open door policy is supported by ensuring close physical locations for partner's workspaces. The lines of communication between interagency representatives, country team representatives, and the EUCOM directorates are open. For example, the EUCOM Intelligence directorate receives information indicating a newly discovered terrorist cell in Country Red is actively recruiting in a region of Country Orange. The CIA, Federal Bureau of Investigation (FBI), and other intelligence personnel shall corroborate this information. The country teams for Country Red and Orange are contacted to discuss the current situation and to formalize a plan of action to limit the terrorist

recruiting. The COCOM Commander is made aware of this matter and chooses to initiate a police training program in Country Orange to assist in limiting the recruiting activities. The optimal day-to-day system operation will result in each partner conducting push and pull information sharing that will lead to action being taken by appropriate figures to disrupt terrorist networks.

b. Emergency Response Scenario

The interagency cooperation system demonstrates its full capability during emergencies. During an emergency, decisions must be made quickly and decisively. The success of emergency response depends on the level of preparedness. Preparedness requires planning and training. Interagency coordination during the planning process ensures that the gamut of the emergency response is covered.

First, the interagency network holds a conference that solidifies plans for major natural and mad-made disasters. These plans include prevention, preparedness, response, recovery, and training. Input from each partner may not be required, but the opportunity to add to these emergency plans is. The U.S. has a stake in assisting nations cope with natural disasters. It helps build the image of the U.S. as a country that values life.

Second, once an emergency occurs, a notice is issued that calls all required personnel to report to the EUCOM command and control center. This room is akin to NASA mission control in Houston, TX. The room is a semi-circle of theater style rows, lined with workstations. At floor-level are multiple large monitors displaying up to date information. This command center allows all of the EUCOM staff to come together so that all levels of government within the EUCOM organization can come together to coordinate the execution of emergency response. For example, a large nuclear power plant in Country Orange has suffered a partial meltdown. The nearby town is inundated by the catastrophe. The president of Country Orange requests assistance in responding to the disaster. EUCOM responds by dispatching armed forces personnel to

assist in evacuation efforts. The evacuation is headed by the Country Orange military, but assistance is rendered from a Federal Emergency Management Agency (FEMA). EUCOM coordinates the transport of Department of Energy (DOE), Nuclear Regulatory Commission (NRC), and the Defense Threat Reduction Agency (DTRA) personnel from the U.S. to Country Orange to assist in meltdown procedures and cleanup efforts. The USAID representative at EUCOM cooperates with their country team counterpart to organize medical care, shelter, food, and water for displaced individuals.

2. Define the System Boundary with External Systems Diagram

Each directorate within EUCOM will utilize this system. The scope of this thesis limits the system to use within the EUCOM staff, but it could be applied to the larger interagency problem. The system boundaries must be defined to eliminate any doubt as to where the system starts and stops (Buede, 2009). Figure 7 describes the boundaries and the interactions within and across those boundaries. This interagency coordination system enhances information-sharing, establishment of common goals, understanding of partners' capabilities, and overall mission accomplishment within the bounds of the EUCOM staff. Inputs to the system will be requirements set forth by those entities superior to EUCOM and events (data sets, intelligence collection, news sources, etc.) that are external to the system. The non-EUCOM entity that is included in the system is the U.S. country teams. These teams will partner directly with EUCOM staff to provide assistance and also receive recommendations from EUCOM.

a. *Combatant Commander (COCOM)*

The Commander of EUCOM also serves as the Supreme Allied Commander, Europe. His responsibility is to lead and direct his staff of senior military and civilians in the effort to enhance transatlantic security and defend the United States. These efforts include conducting military operations, international military partnering, and interagency partnering (EUCOM, 2012).

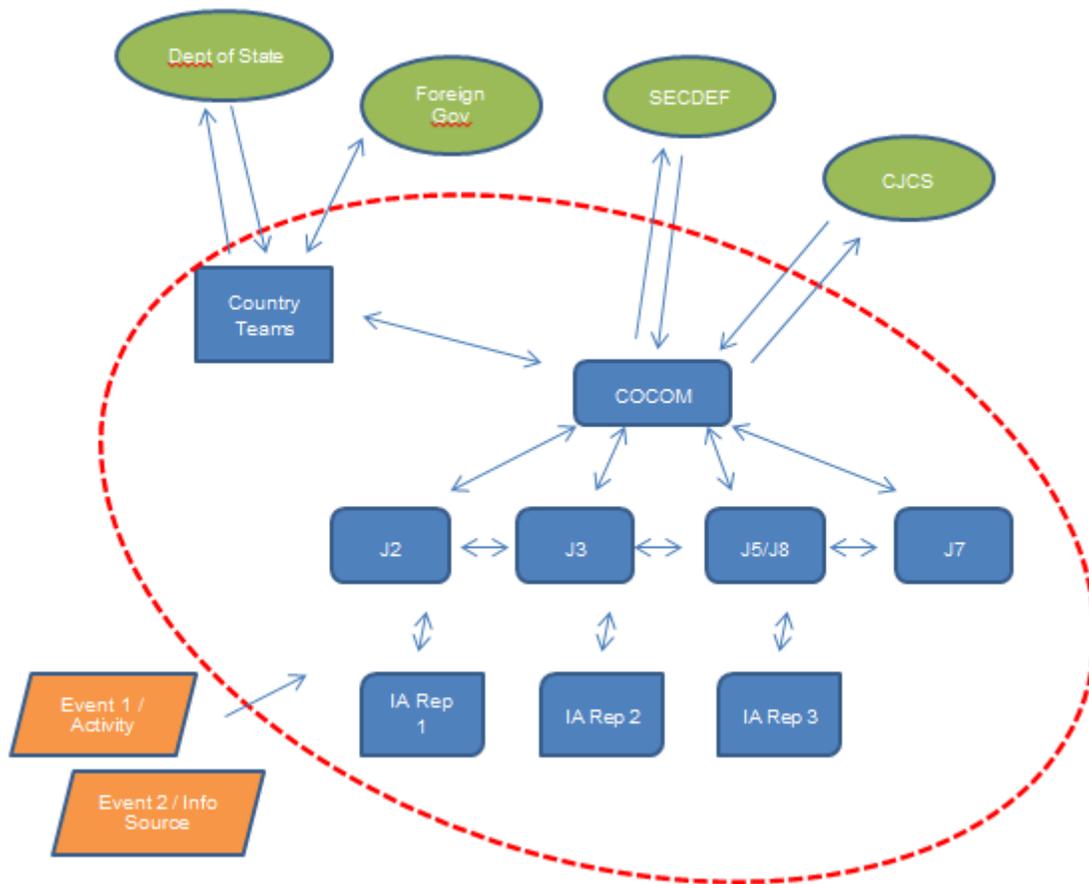


Figure 7. System Boundaries and Interactions

b. Intelligence (J2)

The focus of this directorate is intelligence. The J2 takes its direction from the EUCOM Commander. It provides intelligence to give warning of upcoming problems, to provide information that guides COCOM policy and decision-making (EUCOM, 2012). The J2’s mission set, or “intelligence enterprise strategies include” are (EUCOM, 2012):

1. Command, control, and integrate theater intelligence activities
2. Maximize national, allied, and partner capacity and capabilities through increased collaboration and federation
3. Pursue authorities’ architectures to realize partnership potentials

4. Identify intelligence shortfalls and corresponding risks to develop mitigation strategies

5. Train, educate, and exercise the workforce to ensure readiness

c. *Plans and Operations (J3)*

This directorate is responsible for development and implementation of operations that contribute to the interests of the U.S. and its allies in the EUCOM AOR. The readiness of the U.S. forces at EUCOM is kept satisfactory through the publishing of updated “operational directives, plans, orders, joint training, and exercises.” The J2 serves as the channel for operations and requirements generation between the CJCS, North Atlantic Treaty Organization (NATO), EUCOM and its subordinates. This directorate is divided into these eight subdivisions (EUCOM, 2012):

1. Operations Division
2. Plans Division
3. Information Operations and Space Division
4. Information Superiority and Knowledge Management
5. Integrated Air and Missile Defense Division
6. Anti-Terrorism Division
7. Joint Training, Readiness and Exercise Division
8. Resource Division

d. *Policy/Strategy/Partnering (J5/8)*

This directorate develops military policy, based on political policy, which involves relationships with other COCOMS, international organizations, and subordinate commands. These policies and plans focus on supporting the mission of global peace and regional security. Some of the programs organized by this directorate include (EUCOM, 2012):

1. Partnership for Peace
2. U.S. National Guard Bureau's State Partnership Program
3. International Military Education and Training Program
4. Foreign Military Sales
5. Foreign Military Financing
6. NATO and Coalition Support

e. *Analysis and Assessments (J7)*

This directorate's role is to provide independent assessments of strategic and operational processes (EUCOM, 2012). The J7 assesses regional and country campaign plans, military objectives, and crisis impacts. These assessments are important tools to evaluate the effectiveness of past plans and are inputs to the formulation of new plans. The Decision Support Division develops analytic frameworks to relate the use of resources and conduct of activities to measure the progress of the COCOM's objectives (EUCOM, 2012).

f. *Country Teams*

Country Team is a term applied to the staff at U.S. Embassies. These Country Teams have no concrete organization or structure. They serve the U.S. Ambassador in their particular countries and are recruited according to the needs of the current mission in the country. The Country Teams guide the mission, issue policies, take guidance from State offices, and resolve competing interests of U.S. government agencies. Country Teams interact with COCOMs to assist in coordinating military efforts in countries of interest.

g. *Interagency (IA) Representatives*

IA representatives are those personnel that work for various U.S. governmental agencies assigned to work in EUCOM. The IA representatives serve as subject matter experts for their particular agency. They are relatively experienced individuals that understand the capabilities of their own agencies.

Their purpose is to provide their agencies' perspectives to the problems experienced within EUCOM. They provide recommendations on actions taken to assist in EUCOM mission accomplishment while also supporting the shared mission of their individual agencies.

3. Develop System Objectives Hierarchy

The objectives hierarchy is a hierarchical representation of performance, cost, and schedule parameters that the stakeholder(s) will use to evaluate their satisfaction with the system (Buede, 2009). For the purposes of this thesis, only the performance category was investigated. However, cost is always an important point of discussion and aspects of cost are presented, though in general terms only. A cost-benefit analysis of implementing interagency representatives into COCOM staffs would be beneficial to help determine which agency representatives should be assigned to each COCOM. Schedule might be an even more difficult area of study when it comes to interagency operations because it is an iterative process. Figure 8 depicts the high-level cost and performance objectives developed and organized as part of this thesis. Remember that the overall performance factor is to disrupt terrorist networks.

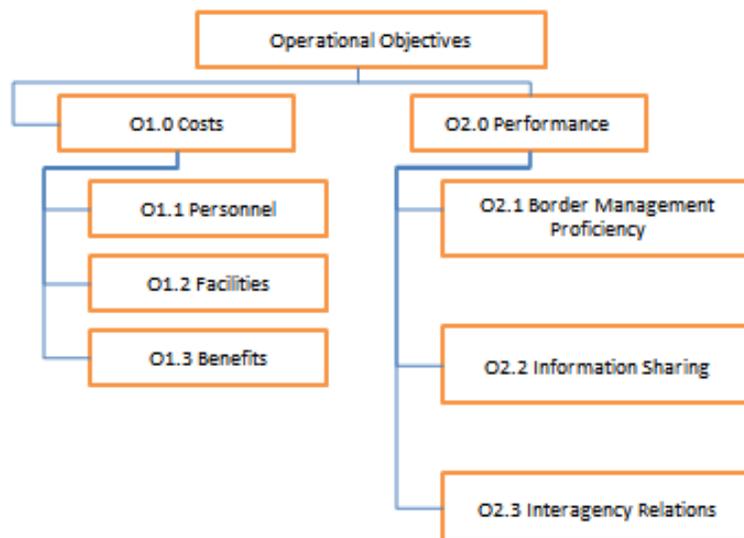


Figure 8. Objectives Hierarchy



Figure 9. Objective 2.1 Aggregation

Objective 2.1 identifies “Border Management Proficiency” as a main objective to disrupting transnational networks. Each subordinate objective serves to substantiate the usefulness of increasing proficiency of each country to maintain their borders. Figure 9 shows the aggregation of these subordinate objectives. Table 3 describes each of the subordinate objectives.

Objective	Description
O2.1.1 Risks Identified	Identify risks that interagency teaming may affect.
O2.1.1.1 Risk Assessment	Each risk shall be evaluated for its likelihood of occurrence.
O2.1.1.2 Risk Tolerance	The system must delineate its risk aversion principles and strategies.
O2.1.2 Resources Identified	Identify a minimum amount of resources necessary for implementation.
O2.1.2.1 Available Personnel	Identify the quantity and quality of person-hours required and desired.
O2.1.2.2 Available Equipment	Identify the quantity and quality of machine-hours required and desired.
O2.1.2.3 Acquisition Process	Does the acquisition process hinder the appropriations process?
O2.1.3 Training Plan	The training plan must derive its curricula from proven interagency practices that focus on counterterrorism.
O2.1.3.1 Ability to Self-Train	People systems must be self-sufficient for increased efficiency and decreased dependence on 3 rd party organizations.
O2.1.3.2 Training Assessment	Establish a minimum threshold for performance during a training evolution.
O2.1.4 Level of Security	Sovereign nations must be able to secure their borders.
O2.1.4.1 Level of Inter-country Criminal Activity	Measure the level of security breach occurring in country.
O2.1.4.2 Ability to Monitor Activity in Country	Measure the ability of each nation's policing.
O2.1.4 Number of Interdictions	Measure the number of potential criminal activity stopped at the borders.

Table 3. Objective 2.1 Description

Objective 2.2 identifies “Information Sharing” as the next main objective to disrupting transnational networks. Figure 10 shows the aggregation of these subordinate objectives. Table 4 describes each of the subordinate objectives.

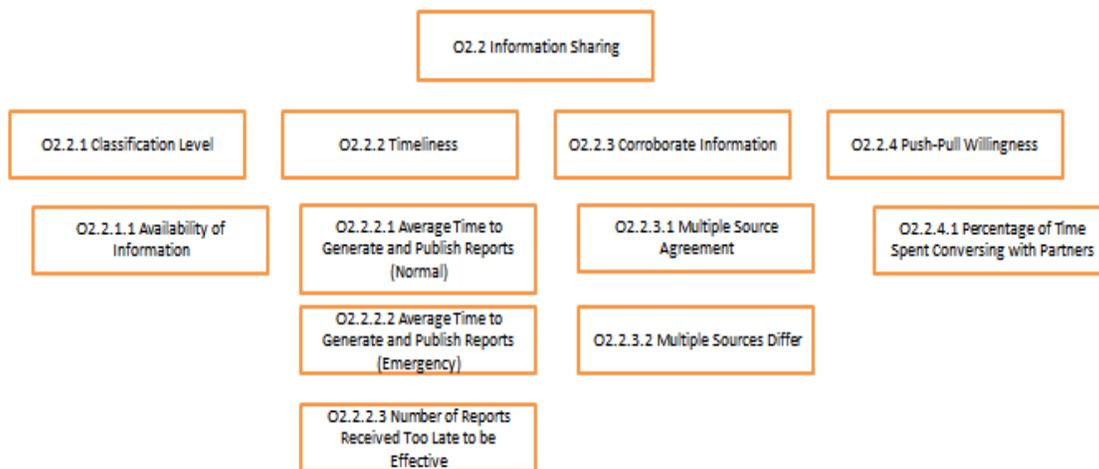


Figure 10. Objective 2.2 Aggregation

Objective	Description
O2.2.1 Classification Level	Operational security is meant to keep classified information out of the reach of enemies, not allies.
O2.2.1.1 Availability of Information	Identify a common information depository designed so that all team members are privy to the same information.
O2.2.2 Timeliness	Average length of time from when a report is written to its publishing to the common database.
O2.2.2.1 Average Time to Generate and Publish Reports (Normal)	Establish a minimum time to report during normal operations.
O2.2.2.2 Average Time to Generate and Publish Reports (Emergency)	Establish a minimum time to report during emergency operations.
O2.2.2.3 Number of Reports Received Too Late to be Effective	Limit the number of reports that go on unused. Identify the reason for this and repair that line of communication.
O2.2.3 Corroborate Information	Maintain a well-organized database that can be used to
O2.2.3.1 Multiple Source Agreement	Database organization allows for multiple agency tagging of reports.
O2.2.3.2 Multiple Sources Differ	Agencies can flag reports to be further explained or clarified.
O2.2.4 Push-Pull Willingness	Is the information being shared equally and effectively? Partners shall forward information to concerning partners.
O2.2.4.1 Percentage of Time Spent Conversing with Partners	Measure the amount of coordination taking place.

Table 4. Objective 2.2 Description

Objective 2.3 identifies “Interagency Relations” as the third main objective to support the disruption of transnational networks to counterterrorism. Figure 11 shows the aggregation of these subordinate objectives. Table 5 describes each of the subordinate objectives.

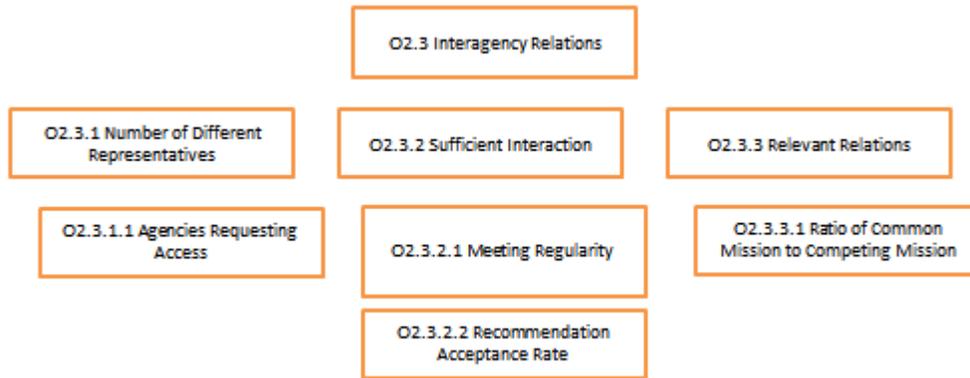


Figure 11. Objective 2.3 Aggregation

Objective	Description
O2.3.1 Number of Different Representatives	Identify the optimal number of agency representatives required to meet the mission goals. Measure the completeness of the whole of government approach.
O2.3.1.1 Agencies Requesting Access	Measure the number of agencies willing to add to the capabilities of the interagency team.
O2.3.2 Sufficient Interaction	Is there enough component interaction to support the interagency process?
O2.3.2.1 Meeting Regularity	Identify the sufficient amount of time allotted for pure, multi-agency collaboration.
O2.3.2.2 Recommendation Acceptance Rate	Track the number of recommendations made by each member that is implemented (strategic, tactical, or operational).
O2.3.3 Relevant Relations	Is the partnership worthwhile? The teaming shall not be conducted for the sake of teaming. The teaming must support the mission.
O2.3.3.1 Ratio of Common Mission to Competing Mission	Measure the common mission and weigh it against any competing missions.

Table 5. Objective 2.3 Description

In the context of this thesis, the objectives hierarchy is an integral part of the stakeholder analysis. It is used to bridge the stakeholders needs to requirements and functions. The objectives hierarchy is meant to break down

broad objectives into their progressively more specific objectives. Ultimately, the objectives reach a specificity that allows them to have some measurable terms.

4. Develop, Analyze, and Refine Requirements (Stakeholders' and System)

A stakeholder can be the owner, funds provider, user, operator, maintainer, or any other individual affected by the operation of the system. Each stakeholder has their own perspective as to how the system should operate, what the inputs and outputs to the system are, and which items should be priorities to the system. It is important to identify all system stakeholders and address each of them to understand the expectations system with greater granularity.

a. Stakeholders

Policymakers:

- Chairman of the Joint Chiefs of Staff
- Secretary of Defense
- Department of State
- EUCOM Commander

These stakeholders provide the constraints and performance parameters for which the system is designed. These stakeholders provide the problem statement for which the system conception is derived. These stakeholders expect the interagency coordination process to improve results in the realm of threat network identification and disruption, border management in the EUCOM AOR, development of interagency procedures and compliance standards, and overall commitment of U.S. government agencies to collaborate.

System Components:

- JICTC Director
- EUCOM J-Code Directors

- U.S. Government Agencies' Representatives Assigned to EUCOM
- Other COCOMs

These stakeholders need to commit to the implementation of the system for the system to become operational. These leadership positions are crucial because these are the positions that must continuously convey the importance of interagency coordination. At times, it may seem cumbersome or ineffective for individuals to collaborate with their agency counterparts, and it is up to these leadership positions to demand that the system be utilized.

System Victims:

- Transnational Terrorists
- Personnel or Equipment deemed unnecessary when capability overlaps are discovered

These stakeholders will feel the negative effects of the system. Transnational threats will find it more and more difficult to operate. Their operations will have to resort to seclusion and hiding which will in turn, delegitimize their efforts. The ability of the system to share information and coordinate efforts will allow for the removal of many positions within all portions of the government.

b. Stakeholders' Requirements

These are the requirements derived from the stakeholder analysis. In lieu of direct stakeholder feedback, the stakeholders' requirements for this system were developed based on the literature review that was conducted. This literature review included testimony from many interagency coordination practitioners. These practitioners included the DoD, Department of State, FBI, CIA, USAID, Country Teams and Ambassadors, and foreign agencies to name a few.

Requirement	Name	Description
R1.0	Stakeholders' Requirements	
R1.1	Partner Capabilities	Each partner shall contribute to the overall system capability.
R1.2	Partner Mission	Each partner will make clear their expectations for themselves and for each other partner.
R1.3	Whole of Government	Each partner shall provide training sessions on their specialties to contribute to the overall level of knowledge of the team.
R1.4	Success	Each partner shall report what they deem are successes of the system.
R1.5	Failure	Each partner shall report what they deem are failures of the system.
R1.6	Obstacle	Each partner shall report what they deem are obstacles to achieve success.

Table 6. Stakeholders' Requirements

c. *Input Requirements/Output Requirements*

These requirements are developed within the context of the inputs, outputs, and controls of the system. Buede explains that the external systems diagram, shown in Figure 7, is the main tool used to support the development of these requirements (Buede, 2009).

Requirement	Name	Description
R2.0	Input Requirements	
R2.1	Verification	The system shall depend on multiple partners corroborating information.
R2.2	Design	The system shall draw from experience of currently functioning interagency groups and implement as necessary.
R2.3	Information Sources	The system shall request information from U.S. government agencies as well as partner countries.

Table 7. Input Requirements

Requirement	Name	Description
R3.0	Output Requirements	
R3.1	Coordination Assessment	Every system component shall receive system evaluations to review system successes and failures.
R3.2	Quantitative Mission Assessment	The system shall report the number of detections and interdictions it supported.
R3.3	Qualitative Mission Assessment	The system shall solicit the partner countries for their overall feeling of improvement or decrement concerning counterterrorism in their country.
R3.4	Partner Evaluations	The system shall determine which partners are actively contributing to the counterterrorism mission.
R3.5	Partner Request	The system shall identify which capabilities are missing and provide recommendations for partner recruitment.
R3.6	Leadership	The system shall provide a rubric to assist in detailing interagency coordination billets.

Table 8. Output Requirements

d. System-Wide Requirements

The system wide requirements are those that do not explicitly relate to specific inputs or outputs. These requirements deal with the whole system.

Requirement	Name	Description
R4.0	System-Wide Requirements	
R4.1	Incentives	The partners will be incentivized according to their relative contributions to mission success.
R4.2	International Law	The system shall abide by international law and will not overstep its jurisdictions.
R4.3	Partner Regulations	The system shall abide by partner regulations. The system shall not request partners to violate their agency codes to accomplish COCOM missions.
R4.4	U.S. Law	The system shall not disobey U.S. law inside or outside of the U.S.
R4.4	Language	The system components shall limit the use of component-based language and will utilize common system language.

Table 9. System-Wide Requirements

e. Technology Requirements

The technology requirements refer to those requirements based on compatibility and/or interoperability issues. The complexity of an interagency coordination system requires that these individuals define common technology capabilities to foster the information sharing needed for successful operations.

Requirement	Name	Description
R5.0	Technology Requirements	
R5.1	Data Entry	The system shall use a common report generation form.
R5.2	Data Storage	The system shall store all reports in a common archive for an agreed length of time.
R5.3	Data Search	The system shall incorporate “Google” type search algorithm to allow for expedient research capability.
R5.4	Training Module	The system shall incorporate a web-based training component to enhance minimum levels of interagency coordination comprehension.

Table 10. Technology Requirements

Buede calls the requirements the cornerstone of the systems engineering process because they define the design problem (Buede, 2009). The next step is to develop a functional architecture. The requirements guide this process. Each function must have at least one requirement that is satisfies. If a function is discovered not to satisfy any requirements then it must be reviewed to determine if a new requirement must be generated of if the function must be done away with.

IV. FUNCTIONAL ANALYSIS

The functional architecture of a system contains a hierarchical model of the functions performed by the system, the system's components, and the system's configuration items.

- *Dennis M. Buede (2009, 211)*

The development of a functional hierarchy is an integral step in the design process. Buede defines a function as “a process that takes inputs in and transforms these inputs into outputs.” The system's purpose is to produce a particular and specific output from a set of given inputs.

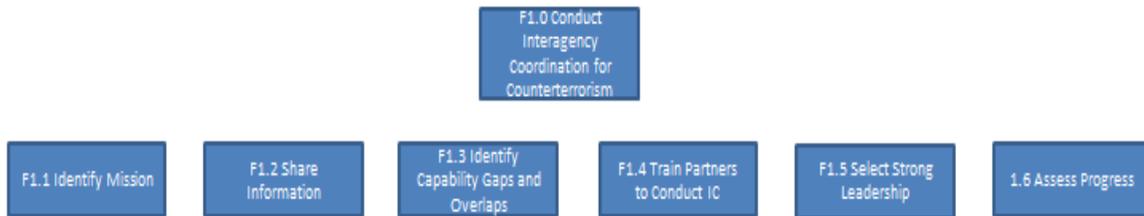


Figure 12. Top-Level Functional Decomposition

A. FUNCTIONAL DECOMPOSITION

Buede describes the functional decomposition as a process to breakdown top-level functions into their corresponding sub-functions. He explains that there must be a conservation of inputs and outputs. The sum of the sub-functions will account for each input and output specified at the top-level functions. Figure 12 illustrates the interagency coordination top-level functions.

The top-level function of “Conduct Interagency Coordination for Counterterrorism” describes the overall concept for the system. All sub-functions support this overarching one. The JICTC Design Concept Draft calls for a system that will “...contribute to synchronization, prioritization, and coordination with/for

non-governmental organizations, country teams, partner nations... (EUCOM, 2010)” These six sub-functions are integral to satisfactory system performance.

1. Identify Mission

This function establishes the relationship between interagency coordination team members. The shared goal must be one that each partner organization believes they can contribute to. The policy of the team is to improve the rate of success of this mission by acting together.



Figure 13. Identify Mission Decomposition

Function Number	Function Name	Description
F1.1	Identify Mission	Common end-state(s) must be determined to govern the need for coordination. This vision is necessary for team unity.
F1.1.1	Determine Explicit Shared Interest	The leadership must agree on each of their respective agencies vested interests
F1.1.2	Agree on Scope of Coordination	Each agency involved must agree on the level of coordination (strategic, tactical, operational, or a combination)
F1.1.3	Identify Agency Roles	Manage expectations of each agency to maintain accountability
F1.1.4	Discuss Agency Incentives	Reward agencies fairly according to mission fulfillment to maintain relationships between agencies

Table 11. Function F1.1 Description

2. Share Information

The interagency coordination effort must establish a network in which reports, cables, data, messages, and all other information is disseminated to every partner equally. Each member of the group must be included for the concept of coordination to succeed. Each partner should be able to either confirm, question, or deny any other partner's information to make for the most accurate common operational/tactical/strategic picture possible. Figure 14 shows the sub-functions of "Share Information." Table 12 describes the sub-functions.

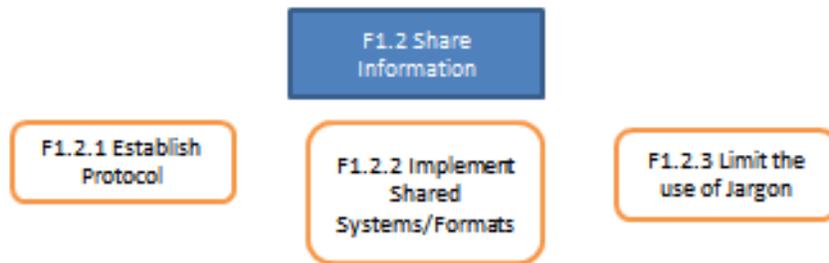


Figure 14. Share Information Decomposition

Function Number	Function Name	Description
F1.2	Share Information	The dissemination of intelligence is of the utmost importance for coordination.
F1.2.1	Establish Protocol	Issue guidance from executive branch to require agencies to share information. Establish an “internal affairs” to monitor compliance within each agency.
F1.2.2	Implement Shared System Format(s)	Establish a shared network. Using a government wide SIPRNET or NMCI type of secured network.
F1.2.3	Limit the use of Jargon	Eliminate the use of acronyms that inhibits communication.

Table 12. Function F1.2 Description

3. Identify Capability Gaps and Overlaps

The purpose of interagency coordination is to leverage all aspects of the government to further the likelihood of some type of mission accomplishment. This synchronization of partnership calls for each partner to understand what each other’s strengths and weaknesses are. Where one organization struggles, another should fill that gap. In addition, resources can be conserved or put to use elsewhere if capability overlaps are identified. The decomposition of this function is illustrated in Figure 15. Table 13 contains the descriptions of these sub-functions.

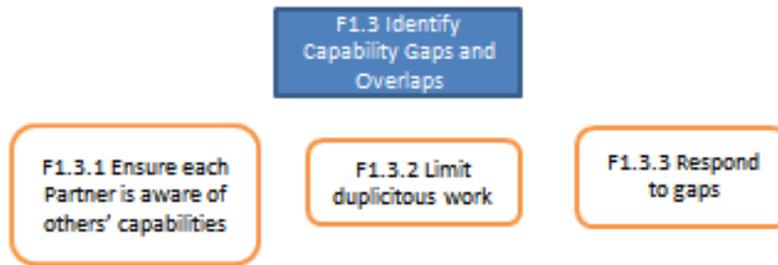


Figure 15. Identify Capability Gaps and Overlaps Decomposition

Function Number	Function Name	Description
F1.3	Identify Capability Gaps and Overlaps	This function clearly pertains to the needed synchronization and prioritization of U.S. government agency resources.
F1.3.1	Ensure Each Partner is Aware of Others' Capabilities	Each partner shall understand the skill sets provided by every other partner to allow for easier and quicker task completion.
F1.3.2	Limit Duplicitous Work	Establish a system that monitors the actions of each agency to identify where work is duplicated. Then agree on how to proceed to ensure that resources are not wasted.
F1.3.3	Respond to Gaps	The same system that is monitoring overlaps will also identify where resources are not allocated. These gaps need to be filled when identified. Agencies should recognize when they can be of help and/or assist in identifying which agency is capable of filling that gap.

Table 13. Function F1.3 Description

4. Train Partners to Conduct Interagency Coordination

A major problem in the current efforts to integrate the government's capabilities is that these efforts are usually ad-hoc in nature. Agencies have long recognized the need to utilize the strengths of others to cover for the weaknesses in their own abilities, but this coordination requires practice. Training allows

interagency relationships to prosper by establishing performance baseline requirements that all partners can draw upon for guidance. The decomposition of this function is depicted in Figure 16. Table 14 describes these sub-functions.



Figure 16. Train Partners to Conduct Interagency Coordination Decomposition

Function Number	Function Name	Description
F1.4	Train Partners to Conduct Interagency Coordination	Just as joint forces needed to practice before achieving success with joint operation, so is the case with interagency coordination.
F1.4.1	Develop Training Doctrine	A formal training curriculum developed to establish knowledge and capability thresholds for interagency coordination.
F1.4.2	Stand Up a Career Path for Specialization in Interagency Teaming	Establish a cadre of experts in interagency affairs.

Table 14. Function F1.4 Description

5. Select Strong Leadership

...interagency coordination at the operational level really depends on the persuasiveness, commitment, and the credibility of the leaders involved. The more engaged and flexible the leader, the more effective the coordination. (Bogdanos, 2005)

The function of selecting strong leadership is important because the implementation of change to policy requires an advocate with relevance. Figure 17 decomposes this function and Table 15 describes these sub-functions in detail.



Figure 17. Select Strong Leadership Decomposition

Function Number	Function Name	Description
F1.5	Select Strong Leadership	Leaders of interagency groups are key to successful coordination. The leader must buy into the system and must demand the same of his/her subordinates.
F1.5.1	Add Interpersonal Skills to Individuals Periodic Evaluations	Supervisors shall comment on individuals' abilities to interact with people outside of their own agency.
F1.5.2	Screen Personnel Before Filling an IC Billet	Evaluate personnel rigorously prior to placing them into interagency coordination leadership positions.
F1.5.3	Allow for Peer and Subordinate Evaluation	Allow for a dialogue up the chain of command that allows for interagency partner subordinates to provide leaders with feedback on the IC process.

Table 15. Function F1.5 Description

6. Assess System Progress

A system for interagency coordination must be dynamic. This system must continuously evaluate its efforts and adjust as necessary to respond to the demands of counterterrorism. The enemy is an ever-changing one and this interagency coordination system must leverage all of its assets in a manner that

allows flexibility to alter its strategies to cope with this fluid enemy. Figure 18 illustrates this function and its sub-functions. Table 16 further describes each of these sub-functions.



Figure 18. Assess System Progress Decomposition

Function Number	Function Name	Description
F1.6	Assess System Progress	All systems require evaluation of performance.
F1.6.1	Trace Outputs to Requirements and Top-Level Functions	Ensure that outputs are lining up correctly with their associated functions.
F1.6.2	Identify Lessons Learned	Learn which strategies and techniques work and which ones do not.
F1.6.3	Initiate Change to Policy	Allow for adjustment without difficult bureaucratic hurdles. Use lessons learned to determine how policy should change.

Table 16. Function F1.6 Description

B. TRACING REQUIREMENTS TO ELEMENTS OF FUNCTIONAL ARCHITECTURE

Buede states that it is important to trace requirements to functions to check consistency (Buede, 2009, pg 246). This technique is a method to ensure that the correct input/output requirements are contained in each specification created during the design of the system. Tracing of requirements to functions also aids in checking the individuality of each function. If two functions contain the same requirements, that is a sign that they may be the same function. It also allows for

the identification of missing requirements or functions. Table 17 identifies which requirements from Tables 6–10 trace to corresponding functions from Tables 11–16.

Function Number	Function Name	Requirement(s)
F1.1	Identify Mission	R1.1, R1.2, R2.1, R4.2, R4.3, R4.4
F1.1.1	Determine Explicit Shared Interest	R1.1, R1.2, R2.1, R3.4
F1.1.2	Agree on Scope of Coordination	R1.1, R1.2
F1.1.3	Identify Agency Roles	R1.2, R3.4, R4.2, R4.3, R4.4
F1.1.4	Discuss Agency Incentives	R3.4, R4.1
F1.2	Share Information	R1.1, R2.1, R2.3, R4.4, R5.1, R5.2, R5.3
F1.2.1	Establish Protocol	R1.3, R2.1, R2.3, R5.1, R5.2, R5.3
F1.2.2	Implement Shared System Format(s)	R2.1, R2.3, R5.1, R5.2, R5.3
F1.2.3	Limit the use of Jargon	R2.1, R4.4
F1.3	Identify Capability Gaps and Overlaps	R1.1, R2.1, R2.2, R3.4, R3.5, R5.1, R5.2, R5.3
F1.3.1	Ensure Each Partner is Aware of Others' Capabilities	R1.2, R1.3, R1.4, R1.5, R1.6, R2.1, R2.2, R3.5
F1.3.2	Limit Duplicitous Work	R1.3, R2.2, R3.4
F1.3.3	Respond to Gaps	R1.4, R1.5, R1.6, R2.2, R3.4, R3.5
F1.4	Train Partners to Conduct IC	R1.3, R3.2, R3.3, R5.4
F1.4.1	Develop Training Doctrine	R1.3, R3.1, R3.2, R3.3, R4.2, R4.3, R4.4, R5.1, R5.2, R5.3, R5.4
F1.4.2	Stand Up a Career Path for Individuals to Specialize in	R3.1, R3.6

Function Number	Function Name	Requirement(s)
	Interagency Teaming	
F1.5	Select Strong Leadership	R1.1, R3.5, R3.6
F1.5.1	Add Interpersonal Skills to the Individuals Periodic Evaluations and Promotion Boards	R3.6
F1.5.2	Screen Personnel for their Willingness to do IC Before Filling a Billet	R3.6
F1.5.3	Allow for Peer and Subordinate Evaluation	R3.4
F1.6	Assess System Progress	R1.3, R1.4, R1.5, R1.6, R3.4, R3.5, R5.1, R5.2, R5.3
F1.6.1	Trace Outputs to Requirements and Top-Level Functions	R3.1, R3.4, R4.2, R4.3, R4.4
F1.6.2	Identify Lessons Learned	R1.1, R1.4, R1.5, R1.6, R2.2, R3.1, R3.2, R3.3, R3.4, R5.1, R5.2, R5.3
F1.6.3	Initiate Change to Policy	R2.2, R3.1, R3.4, R3.5

Table 17. Function to Requirement Mapping

Systems engineering relies on the correct identification of the functions that a system must perform to accomplish an overarching mission. This functional analysis of a system is important to the physical analysis. The functional architecture developed in this thesis is a top-down structuring; it has six top-level functions that are supported by its multiple subordinate functions. The functional architecture links the functions to requirements.

V. PHYSICAL ANALYSIS

A. PHYSICAL ARCHITECTURE

Buede states that the physical architecture of a system is a description of the resources that make up that system (Buede, 2009). The tracing of physical components to functions and requirements ensures that a system is complete. Again, this iterative process can go through many instantiations before a system is complete. A complete physical architecture was not completed for this thesis. The following is a general discussion of the physical architecture.

The generic physical architecture is a general description of system components. The instantiated physical architecture is concerned with the specific performance characteristics of each component with regard to the requirements each component addresses. This thesis is only concerned with the general physical architecture.

Recall that the top-level functions for the system are:

- Identify Mission
- Share Information
- Identify Capability Gaps and Overlaps
- Train Partners to Conduct Interagency Coordination
- Select Strong Leadership
- Assess System Progress

1. Proposed General Architecture

The command structure of EUCOM was explained in Chapter two of this thesis, and depicted in Figure 6. It is not the intent of this thesis to recommend command structure changes at any level of the DoD or U.S. government. The hierarchical architecture of the command does not easily lend itself to conduct

interagency coordination. Instead of changing the command structure of the COCOM, the JICTC and J9 were established to coordinate and enhance the interagency process.

The overarching function analyzed in this thesis is to leverage the abilities of multiple U.S government agencies and international partners in a way that makes the sum of the whole better than any of the individuals to aid in the performance of counterterrorism operations. The J9 and the JICTC share many functions. Instead of employing two separate entities charged with taking the lead in interagency coordination, this thesis recommends this effort should be shifted to a sub-committee within EUCOM. The goal of interagency coordination is to enhance the accomplishment of a mission shared between two or more agencies. The J9 and JICTC are not immersed in the EUCOM mission. They are more of a 3rd party entity attempting to supervise coordination.

The alternative would be to create an interagency committee within EUCOM. This committee would pull key individuals that are filling billets already in the EUCOM command structure. These EUCOM staffers would be chosen based on their ability to interact with other agency representatives. Each interagency representative recruited by EUCOM would be placed in the most appropriate directorate according to their skillset. These interagency representatives would also be members of the interagency coordination committee. Figure 19 illustrates how this EUCOM committee might look. The committee calls for participation of the partners to come from personnel that are capable of initiating action within EUCOM.

Once the committee is established, it will be further decomposed into sub-committees. These sub-committees will be structured so that they line up with each function in the functional architecture. Figure 20 illustrates the six proposed sub-committees established for the accountability of system function satisfaction. The COCOM Commander retains overall responsibility of the actions of the Interagency Coordination Committee. The sub-committee organization promotes the ability of the Interagency Coordination Committee to accommodate for

multiple missions and multiples roles. A mission tasked to the committee is attacked as a whole. Again, this fluid structure requires that the sub-committees are able to determine the shared mission, decide which agency/person will assume leadership, pass information adequately, assign partners tasks to assist in mission accomplishment, demand that partners assess themselves and one another, and commit to implementing form learned during training to practice in the field.

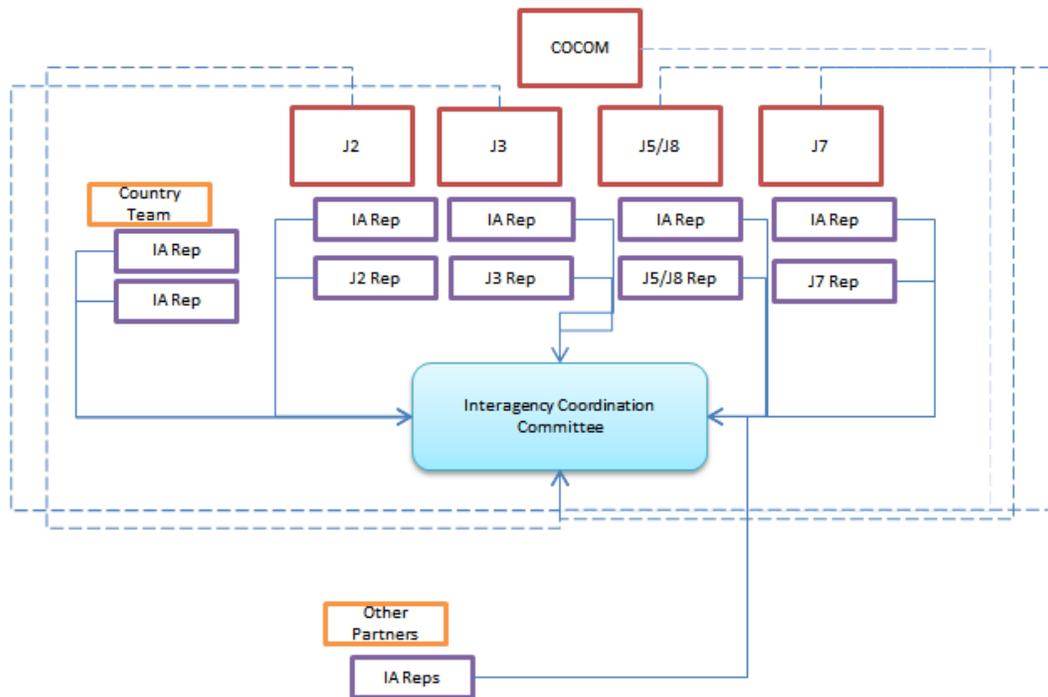


Figure 19. Proposed Physical Architecture

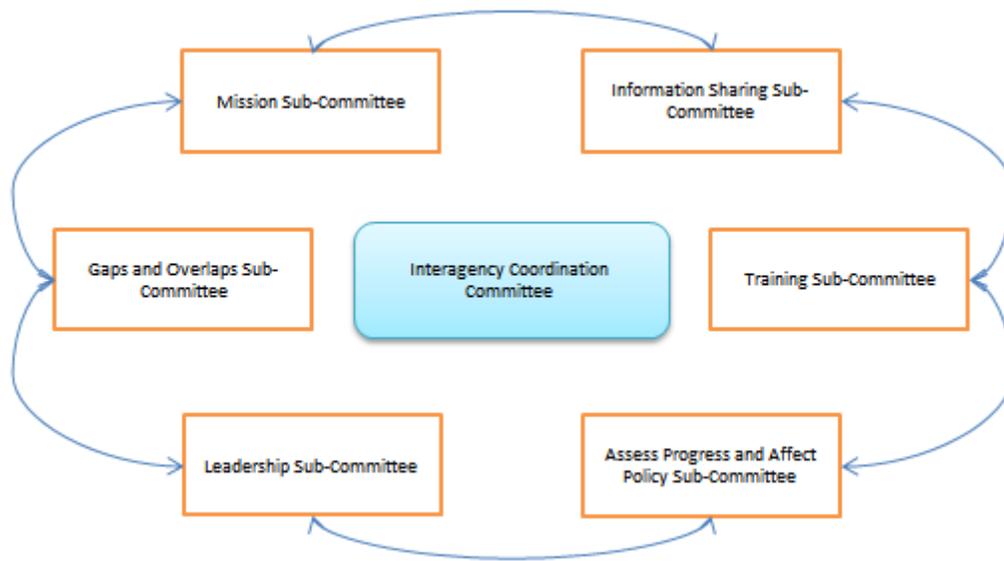


Figure 20. Proposed Interagency Coordination Committee Physical Architecture

VI. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

This thesis utilized systems engineering principles and methods, most notably the processes detailed in Dennis Buede's *The Engineering Design of Systems*, to analyze the interagency coordination efforts that are required to make a more synchronous and efficient whole of government effort to combat terrorism in the EUCOM AOR. This thesis conducted an expansive literary review that assessed the need for an interagency coordination system. This literature review was combined with information gathered during a research trip to EUCOM headquarters in Stuttgart, Germany. This research trip brought to light the organizational troubles that hinder interagency cooperation. From this, a functional decomposition of the top-level function was derived. This functional decomposition was verified by tracing each function to associated requirements and objectives. An external systems diagram was constructed to assist in the formulation of those objectives and requirements.

A preliminary physical architecture was proposed based on the functional architecture created. The physical architecture recommended called interagency participation to be "in-house." This recommendation was made to limit third party involvement. The interagency coordination functions are best accomplished when the members involved have a stake in the mission. The physical architecture calls for sub-committees being formed, from existing EUCOM directorates, that match the second-level functions created in the functional architecture. These sub-committees would ensure that each of the functions necessary for synchronous performance of interagency coordination are met by utilizing personnel that already have a stake in the success of EUCOM AOR operations. The most important aspect of these sub-committees is the elimination of the need to employ multiple interagency organizations, such as J9 and JICTC within the same COCOM. This eliminates overlapping jurisdictions, billets, and funding.

The research questions addressed in this thesis were:

1. What are the fundamental attributes required for productive interagency coordination allowing for the successful conduct of counter trafficking and counterterrorism in the EUCOM area of responsibility (AOR)?
2. How can a stakeholder analysis, objectives hierarchy, requirements definition, and functional decomposition assist EUCOM in its effort to disrupt transnational terrorist networks?

The systems engineering process revealed that these fundamental attributes are dependent on the functionality of the system. The functions that must be performed during the conduct of interagency coordination for successful counter trafficking and counterterrorism in the EUCOM AOR are:

- Identify Mission
- Share Information
- Identify Capability Gaps and Overlaps
- Train Partners to Conduct Interagency Coordination
- Select Strong Leadership
- Assess System Progress

This thesis created a functional architecture based on an objectives hierarchy and requirements generation. A literature review of national policy on interagency coordination and past interagency efforts and studies was conducted to serve as part of the stakeholder analysis.

B. RECOMMENDATIONS

This thesis provides only a cursory look at top-level functions for interagency coordination to combat terrorism. Research should be conducted to determine more specific functions and requirements. The next step in the systems engineering design process would be to conduct a complete physical analysis. The physical architecture is necessary to ensure that each functional

component is allocated to a physical one. Then an analysis of alternatives should be conducted to determine the best organizations to include accomplishing specific mission sets.

Other opportunities for further research include analysis of interfaces between U.S. government entities and foreign government entities, cost-benefit analysis of U.S. government presence in certain countries, case-study preparation of foreign interagency processes, terror network analysis to determine weaknesses that U.S. government entities can exploit, studies on alternative organizational paradigms within the U.S. government, and many others. It must be said that, with a system as complex as interagency coordination, systems engineering and systems thinking is already being conducted. The principles of systems engineering are common ones. The principles may not always be explicitly carried out, and that is why a systems engineer can have an impact by analyzing the system objectively.

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