

INTEGRATING DIGITIZATION IN MULTINATIONAL
OPERATIONS

A MONOGRAPH

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ABSTRACT

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In all its modern wars the United States has fought as a member of a multinational coalition. Multinational operations are a key component of the National Security Strategy of the United States, which is built on the imperative of engagement. Although prepared to act alone, many of America's security objectives are best achieved - or can only be achieved - through alliances and other formal security structures, or as the leader of an ad hoc coalition formed around a specific objective.

Numerous friction points between member nations inherently complicate multinational operations. Technological asymmetry among the potential coalition partners creates additional friction points in an already complicated scenario. The rapid advances in information technologies and their application to tactical warfare further aggravate this situation.

This monograph examines the research question, "Is the establishment of liaison teams a feasible solution to share information on the digital battlefield in multinational operations." The author determines that liaison teams represent only a part of a feasible solution to the problem. Technology transfers and training, supplemented by liaison teams, offers the optimal solution to a complicated problem.

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Chapter 1

Introduction

In all its modern wars the United States has fought as a member of a multinational coalition.¹ Multinational operations are a key component of the National Security Strategy of the United States. This Strategy is built on the imperative of engagement, that is designed to exert American leadership abroad in order to deter aggression, foster the resolution of conflicts, strengthen democracies, open foreign markets, and tackle global problems such as protecting the environment.² This strategic approach uses all appropriate instruments of national power to influence the actions of other states and non-state actors. Although prepared to act alone, many of America's security objectives are best achieved - or can only be achieved - through alliances and other formal security structures, or with America as the leader of an ad hoc coalition formed around a specific objective. The Armed Forces play a key role in this effort.

Implementing the engagement strategy requires a significant resource allocation. Political and fiscal constraints limit the ability to fully implement this strategy. Policy makers are constantly confronted with the need to find ways to contain the costs of such military operations.³ These constraints limit the size of the Armed

Forces. For the foreseeable future the United States will remain reluctant to intervene unilaterally in most crises; as a consequence, the need for coalition partners will shape American strategy.⁴

As the lone superpower left in the world in the year 2000, the United States finds itself leading the majority of multinational operations in which it finds itself. This position of leadership places a unique burden on the American defense establishment, as it must bear the brunt of ensuring successful coalition operations. The current strategic security situation also influences these operations as ad hoc, temporary coalitions replace long-standing alliances.

During the Cold War, alliances designed for warfighting were the most important form of multinational operation.⁵ This is less true in the current strategic security environment, where a convergence of interests among most nations of the world causes very diverse armed forces to join together with little notice.⁶ The emergence of ad hoc coalitions as the dominant form of multinational operation has significant consequences for the United States. Technological asymmetry among the potential coalition partners creates increased friction points in an already complicated scenario. The rapid advances in information

technologies and their application to tactical warfare further aggravate this situation.

This monograph answers the primary research question of whether or not the establishment of liaison teams is a feasible solution to share information on the digital battlefield in multinational operations. It does so by first examining multinational operations, and identifying the inherent difficulties involved. Second, the monograph discusses the complexities of the United States Army's digitization program (Force XXI) and the additional challenges it brings to the battlefield. Third, the discussion turns to digitization's effects of multinational operations, as judged by the selected evaluation criteria of: acceptability, compatibility, standardization, and security. These criteria are designed to assist in answering the primary research question. The definitions of the criteria follows.

Acceptability is primarily a funding and legal issue, defined as meeting the requirements imposed by United States' legal and budgetary constraints. Specifically, does it meet the provisions of Foreign Military Sales, corporate copyright protection, and Defense appropriations?

Compatibility is mainly equipment-focused. It is defined as communications systems (hardware and software) that are capable of interfacing with other systems.

Standardization deals with systems and methods that allow for the closer practical cooperation among different forces by the efficient use of resources and the reduction of operational, logistical, technical, and procedural obstacles.

Security is focused as a policy issue. Does the proposed solution meet the guidelines established by National Security Policy?

The final chapter answers the research question and shows that liaison teams are only part of the solution. A liaison team, in combination with technology transfers, is the most feasible solution to integrating digitization in multinational operations. To logically reach this conclusion a thorough examination of multinational operations and digitization is required.

Chapter 2

Challenges of Multinational Operations

History testifies to the ineptitude of coalitions in waging war. Allied failures have been so numerous and their inexcusable blunders so common that professional soldiers had long discounted the possibility of effective allied action unless available resources were so great as to assure victory by inundation. Even Napoleon's reputation as a brilliant military leader suffered when students...came to realize that he always fought against coalitions-and therefore against divided counsels and diverse political, economic, and military interests.⁷

General Dwight D. Eisenhower

The purpose of this chapter is to examine multinational operations and determine the friction points that create the difficulties described above by General Eisenhower. The chapter's discussion does this by looking at the different types of multinational operation structures (alliances and coalitions) and identifying the points that create friction.

Multinational operations are intrinsically complicated and difficult.⁸ Many different factors complicate this process to include political goals of different member nations, training levels, capabilities, equipment, logistics, cultural differences, doctrine, intelligence capabilities, and language barriers. All of these factors have to be taken into account when planning and executing multinational operations.

Multinational operations are usually undertaken within the structure of an alliance or coalition.⁹ Each of these arrangements presents their own unique dynamics to a multinational operation. While these two examples are the most likely structure for a multinational operation there are other possible arrangements. These include supervision by an international organization such as the United Nations (UN) or the Organization for Security and Cooperation in Europe (OSCE), and cooperative operations, in which nations send forces to a crisis region without agreed upon objectives or a formal command or coordination relationship.¹⁰

An Alliance is the result of a formal agreement between two or more nations designed to advance broad, long-term objectives that further the common interests of the members. The United States currently is involved in formal alliances in the North Atlantic Treaty Organization (NATO) in Europe and the Combined Forces Command (CFC) in Korea. Alliances offer certain advantages in combating the friction of multinational operations. First, the highly contentious issue of sovereignty of member nation forces has been worked out through formal agreements prior to operations. Additionally, a simplified command and control structure for the multinational force commander and questions concerning command relationships are already firmly established in

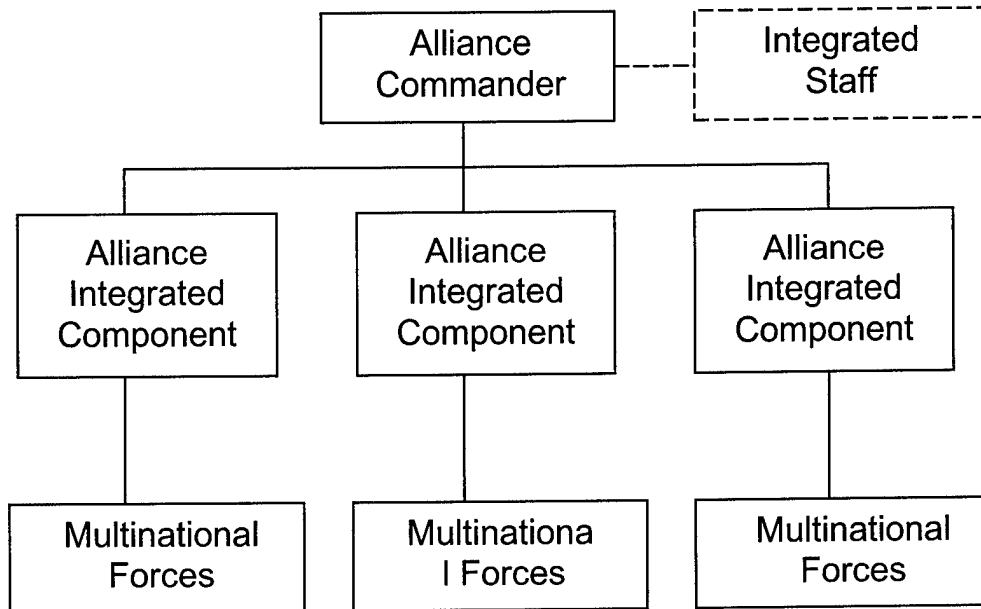
peacetime, and are usually not a contentious issue during operations. Finally, routine tactical operational procedures and techniques have been established and are in practice among member nations. The advantages gained from an alliance are contrasted with the challenges of a coalition.¹¹

A Coalition is defined as an ad hoc temporary arrangement between two or more member nations for common action. It is usually in response to an unforeseen crisis situation. The goals and objectives of coalitions are usually short term in nature and narrowly focused. Operation Desert Shield/Storm is an example of a multinational coalition operation. Coalitions do not have many of the advantages afforded by alliances. First, the highly contentious issue of sovereignty of member nation forces is more acute with the issue normally not fully worked out at the time active operations have commenced. Additionally, a simplified command and control structure for the multinational force commander, and questions concerning command relationships are usually not established in peacetime and can become a contentious issue during operations. Finally, routine procedures and techniques have not been established and the practices vary among member nations. Coalitions by their inherent nature aggravate an already complicated issue.

The issue of command structures is one of the biggest challenges facing a multinational force commander. No single command structure best fits the needs of all alliances and coalitions. Each coalition or alliance creates a structure that best fits the needs, political realities, constraints, and objectives of the participating nations.¹² Alliances have the benefit of a high degree of stability and political consensus, and contentious issues such as command structure have been worked out over time. Within coalitions, the political consensus of member nations has not been fully developed over time. The political views of member nations tend to have greater influence over the issue of command relationships.¹³

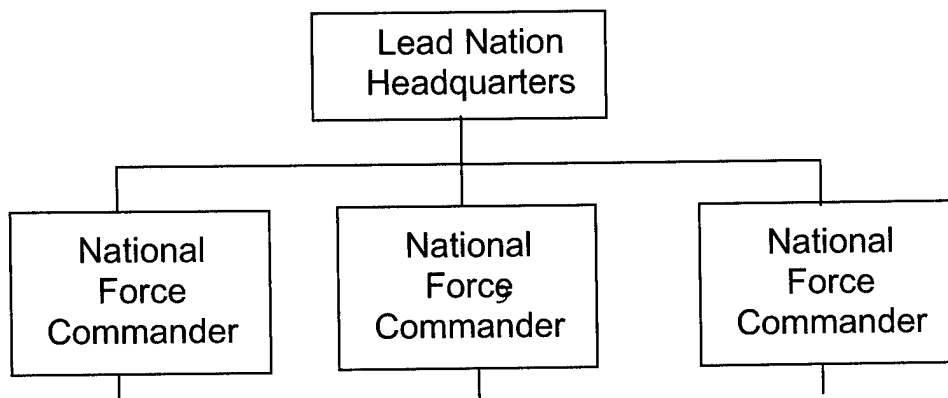
Several command structure formats exist to support multinational operations. Typical command structures that support alliances are integrated and lead nation. An integrated command structure calls for single multinational commander (MNC), designated by member nations. The multinational commander's staff and the commanders and staffs of subordinate commands are also of a multinational makeup. The North Atlantic Treaty Organization (NATO) and the Combined Forces Command (CFC) are current examples of integrated, multinational command structures.

Figure 1
Alliance Integrated Command Structure



The lead nation format is used both for alliances and coalitions. This structure exists when all member nations place their forces under the control of one nation. This type of command structure is characterized by a dominant lead nation (in either an alliance or coalition) command and staff arrangements with subordinate elements retaining national integrity.¹⁴ The Allied Command Europe Rapid Reaction Corps (ARRC) is a current example of a lead nation (United Kingdom), multinational command structures.¹⁵

Figure 2
Lead Nation Command Structure

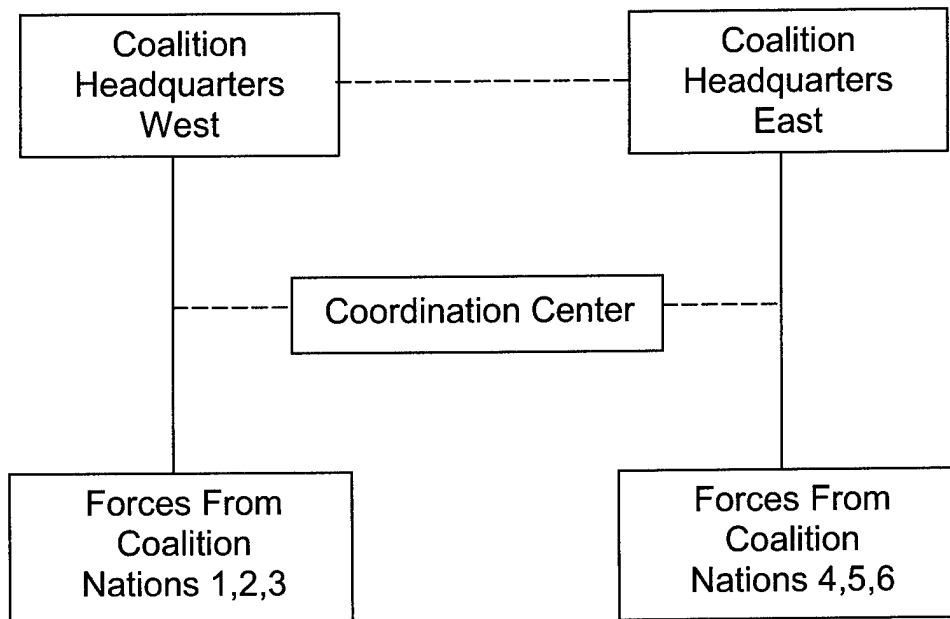


Coalition command structures follow one of three basic formats: lead nation, parallel, or a combination. The lead nation concept has been addressed previously. The lead nation concept has different dynamics in a coalition format. Member nations are reluctant to grant extensive control over their forces to a lead nation. Additionally, member nations are sensitive to actions that appear to be preferential to the lead nation interest. Several techniques are available to alleviate these concerns, including augmenting the lead nation staff with key representatives from member nations, such as designating deputy or assistant commanders, planners, and logisticians.¹⁶ A current example of this type of command structure is the Multinational Division North (MND-North) operating in Bosnia-Herzegovina. The United States operates as the lead nation with non-NATO alliance member Russia operating as a coalition member under MND-North control.¹⁷

The parallel command structure is a concept in which no single force commander is designated, and the coalition

leadership develops a means of coordination among the participants to attain unity of effort.¹⁸ This is normally accomplished through the use of a coordination center. This type of command structure is the most ambiguous and is normally avoided at all costs.

Figure 3
Coalition with Parallel Command Structure



The final command structure format is a combination in which lead nation and parallel command structures exist simultaneously in a coalition. This occurs when two or more member nations serve as lead nations for a mix of international forces. An example of this format was the command arrangement during the Persian Gulf War (1990-1991).

Now that the structure of multinational operations has been examined, the next step is to identify the inherent friction points that make these operations difficult. Six major historical friction points have been identified as common factors in most multinational operations.¹⁹ These six points are capabilities, training, equipment, doctrine, language, and military culture.

Capabilities of the various partners in an alliance or coalition are one of the most sensitive issues a multinational commander faces. This factor is a major determinant in mission assignment of the various members. The assignment of missions leads directly to the issue of burden sharing. Assigning less stressful, less dangerous missions to partners based on the limits of their capabilities can lead to an inequity of burden sharing. These feelings of inequity often lead to a fracturing of alliance or coalition political will and thus undermining the force. A most recent example of this situation involves the 1999 NATO air campaign over Kosovo, Operation Allied Force. Based on capabilities and force structure, the United States provided over 60% of the forces for the air campaign. Members of the United States Congress, who saw this as an inequitable share of burden the by American forces, expressed a strong opinion on this matter. These

feelings of inequity have resulted in serious questions concerning NATO's political stability.²⁰

Training levels within the various partners in a multinational operation represents another point of friction.²¹ Training levels have a direct correlation to capabilities and mission assignment. Units must be used within the limits of their training state.²² Again the burden of equity appears.

Equipment quality, quantity, and interoperability among partners are significant challenges for the multinational commander. Interoperability is the most pressing of these concerns and represents a significant point of friction for planners. As an example of the problems of mixing types of equipment, planners must ensure that former Soviet-equipped units do not operate adjacent to western-equipped units because of the fear of fratricide resulting from instinctive training.²³ Communications equipment interoperability is another significant problem facing a multinational commander. The ability to communicate in a common medium is essential to any type of operation. Such disparity may cause the multinational commander to employ a less than optimal scheme of maneuver in order to compensate.

Doctrine reflects the national character of a nation and determines force structures and procedures.²⁴ Multinational commanders are required to understand and

adjust for doctrinal differences. Again, this point of friction influences mission assignments among coalition partners.

Language problems have been a constant point of friction in multinational operations throughout history. The inability to commonly understand each other can lead to disastrous results in combat action. The problem of language compatibility is a deeper and complex issue. Simply employing linguists does not solve the problem.²⁵ Translation of military specific terms and concepts such as "commanders intent" require not only language but military training also. Finding such trained personnel who can speak the military dialects of their second language is a difficult process. It exacerbates language as a point of friction.²⁶

Military culture is the final point of friction common to multinational operations. Differences in military cultures lead nations to look at similar problems in a different light. This is especially true in planning during the mission analysis phase, where cultural differences can lead to a completely different analysis and recommended course of action concerning the same problem. These points of friction concerning multinational operations have been irritated by the changes in the strategic security environment in the first decade of the twenty-first century.

Key characteristics of the first decade of the twenty-first century strategic security environment amplify the points of friction common to multinational operations.²⁷ With the fall of the Soviet Union and the end of the Cold War, the United States is involved in more coalition (than alliance) operations. The temporary, and sometimes politically fragile, nature of coalition operations is much more susceptible to the points of friction of multinational operations. Alliances, by their very nature, are formal and long standing organizations. They can work out the points of friction over extended periods of time. For example, the North Atlantic Treaty Organization (NATO) has resolved a majority of the issues concerning the points of friction for over fifty years. In contrast, the coalition that formed to fight Desert Shield/Storm had only seven months. Ad hoc coalitions have time as a premium as they are usually sent into action soon after their formation. There is little time to work out incompatibilities brought on by the points of friction.

The inherent nature of multinational operations places great stress on the force commander to achieve unity of effort in planning and executing operations. This dynamic is increased by the rapid development of technology particularly in information and communication systems. Technology presents a two-fold challenge. First not all

member nations will have the same capabilities to gather, process, and transmit information. Second, and most important, this new technology will lead to the development of different operational concepts among member nations.²⁸ This is precisely the concern over the United States Army's digitalization of the battlefield (commonly referred to as Force XXI) and the effects this concept will have on multinational operations.

Understanding the structure and identifying the potential friction points of multinational operations is important to working in this environment. This understanding provides the foundation to developing solutions to overcome these friction points. That being understood, an examination of the United States Army's digitization effort is required in order to gain similar knowledge. Chapter 3 discusses the concept of digitization of the battlefield and the additional problems it adds to the multinational friction points.

Chapter 3

Challenges of Digitization on Multinational Operations

Shared situational awareness, coupled with the ability to conduct continuous operations, will allow information age armies to observe, decide, and act faster, more correctly, and precisely than their enemies.²⁹

The purpose of this chapter is to examine and understand the key components of digitization. This understanding allows for the extrapolation of the additional friction points digitization has on multinational operations.

Digitization, while offering the potential for a new type of warfare, also presents serious challenges for multinational operations. These challenges are most obviously represented by common doctrine, equipment compatibility and training issues. The ability to simply communicate among member nations has been a serious challenge throughout the history of coalition warfare. The rapid leap in technology today, represented by the U.S. Army's digitization process of Force XXI, *amplifies* this problem. The most significant challenge, however, rests neither with equipment nor training issues but with the development of an operational concept. It is important to understand the current capabilities of the U.S. Army when

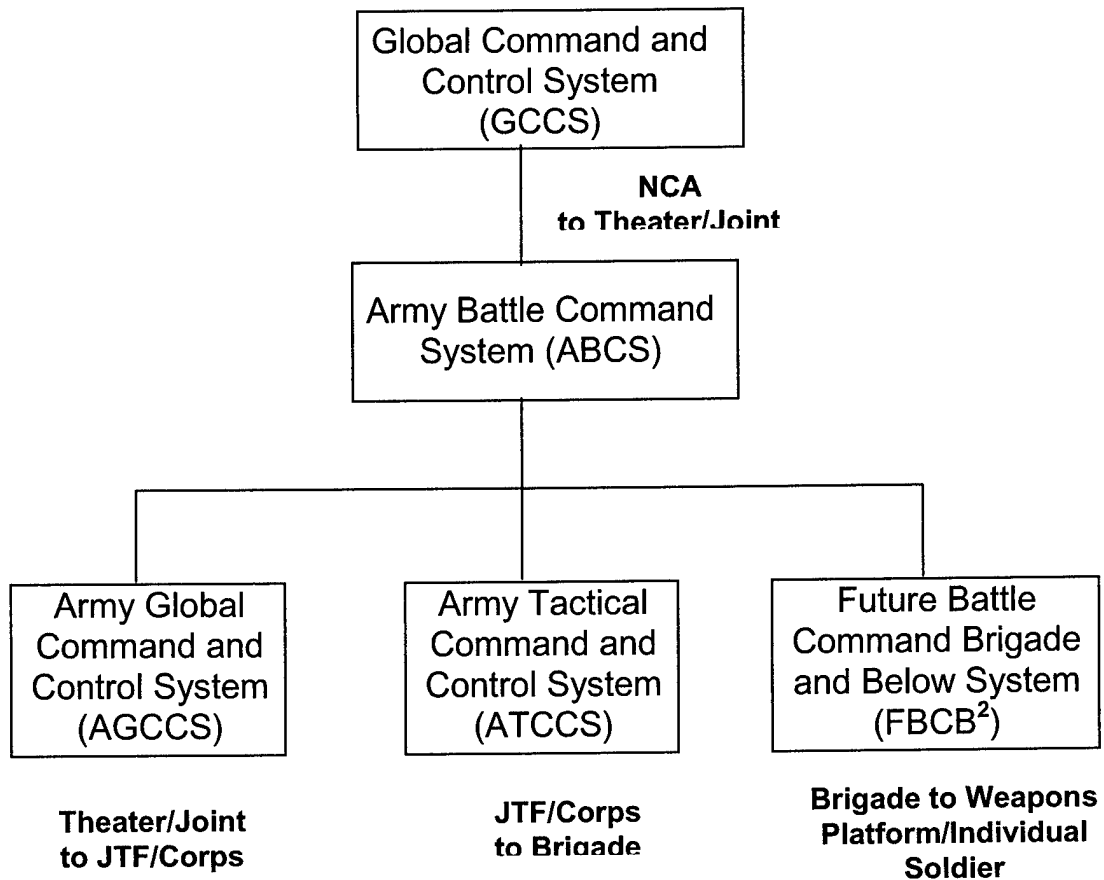
discussing the implications of digitization on multinational operations.³⁰

The Army is embracing a new era characterized by accelerating growth of information, information sources, and information dissemination capabilities, supported by information technologies. The Army's digitization concept is built on the premise that modern and emerging technologies, particularly information technologies, can lead to information superiority. Ultimately, information superiority will transform traditional ideas about maneuver, strike, force protection, and logistics into four new powerful operational concepts: dominant maneuver, precision engagement, full dimensional protection, and focused logistics.³¹ Taken together, these four new concepts will lead to full spectrum dominance-the ability to conduct dominant operations across the full range of possible missions.³² In short, information dominance allows for increased situational awareness which permits units and soldiers to see themselves, the enemy, and the terrain in a near real time clarity rarely (if ever) achieved before.³³ This allows the Army to become a more mobile, agile, and lethal force that can obtain decisive results faster with minimum casualties.

Information superiority as described in the above paragraphs is made possible through the combination of

several information systems. Those systems are found in the Army's Battle Command System (ABCS). ABCS is the Army's information system that incorporates a common command and control environment at all echelons.³⁴ ABCS is a component of the Global Command and Control System (GCCS) and encompasses the strategic through tactical levels of command and control. The following figure and paragraphs provide a brief description of the components of ABCS in order to understand their impact on future multinational operations.

**Figure 4
Army Battle Command System**



The Global Command and Control System (GCCS) is the primary national warfighting command and control (C2) information system. GCCS establishes interoperability among forces with a focus on providing a common operational picture to support situation awareness of the joint warfighter.³⁵ GCCS is a modern communication system that

provides support to the commander using client/server architecture with a combination of both commercial off-the-shelf and government software applications.³⁶

While GCCS is designed as a U.S. only system, it has an impact on multinational operation planning and execution. While the impact of GCCS is minimal on the tactical level, it plays heavily in the transportation and deployment modes of any operation. GCCS provides the communications architecture for the Joint Force Commander in transportation planning. This process involves using automated data bases established by United States Transportation Command (USTRANSCOM) that allow for an assessment and analysis of deployment options.³⁷ The Joint Flow and Analysis System for Transportation (JFAST) is the enabler of United States power projection capability, and it has huge implications for multinational operations.

The strength of the JFAST system is its ability to quickly assimilate and correlate information from an existing database to determine the feasibility of a plan. If the operation involves deployment of multinational forces this complicates the matter, because current JFAST databases cover U.S. forces only. The system is of limited utility to the Joint/Multinational Force Commander in deployment planning concerning non-U.S. forces.

An example of this situation occurred in December 1995 with the deployment of the North Atlantic Treaty Organization (NATO) Implementation Force (IFOR) into Bosnia-Herzegovina. The deployment presented a huge challenge to the IFOR Commander as troops and equipment flowed into theater from numerous countries in Europe and the United States. There was no automated planning system available to collect and analyze all the data concerning all the movement schemes. The result was an inefficient deployment operation characterized by bottlenecks, delays, and lack of in-transit visibility for both personnel and equipment.³⁸ The effects of the deployment planning and execution of IFOR are even more disturbing considering it was largely a NATO operation. Fifty years of Alliance cooperation and maintenance during peacetime still resulted in a stressful deployment operation. This problem is likely to be agitated by a ad hoc coalition that does not have the benefit of the stability and level of cooperation offered by NATO.³⁹

The Army Battle Command System (ABCS) provides the communications linkage for the U.S. Army at all levels of war. The Army Global Command and Control System (AGCCS) supports the upper echelon of ABCS. AGCCS interfaces directly with GCCS. Although still in its preliminary fielding stages, this system, once fully implemented, provides the link between Corps and the theater and joint

levels of command. The Army Tactical Command and Control System (ATCCS) is linked directly from AGCCS providing the framework of seamless connectivity from Corps to Brigade.⁴⁰ The key function of ATCCS is its ability to integrate traditional stove-piped functions into a coherent, seamless infrastructure that binds the Battlefield Operating Systems (BOS) together.⁴¹

The systems described above represent the link between the National Command Authority (NCA) and the warfighters in the field. They represent an evolutionary approach to command and control by grafting new and emerging technologies onto established operational concepts. The method of passing information between the NCA in Washington and a warfighting Theater Commander has not changed much since the days of the Second World War. Information is still passed in a stove-piped format from the decision-makers in Washington and the Theater Commander in the field, and vice versa. The systems used to transmit the information have certainly changed with technological developments over the years, but the methods have remained relatively constant. Information technology is not leveraged to its fullest extent. Information is simply passed back and forth at a faster rate, a higher resolution, and in more detail. The Future Battle Command Brigade and Below (FBCB2) is designed as a revolutionary concept in

command and control, and breaks the paradigm of stove-piped information systems.

The FBCB2 system is designed to allow commanders to control, maintain, accelerate, and moderate as necessary the pace of battlefield events.⁴² The Force XXI operational concept is built on the premise that force coherence is achieved through shared knowledge.⁴³ In simplified terms, all units have a common relevant picture (CRP) of themselves, the enemy, and the terrain, and thus are able to generate combat power at a much more efficient rate. The development of this common relevant picture (CRP) allows for the execution of an operational tempo that no potential enemy can match. The FBCB2 system is the enabler of the Army's Force XXI operational concept.

Figure 5 Traditional vs Digitization Operational Concept

Traditional

Make Contact With The Enemy
Develop the Situation
Maneuver the Force for Decisive Action

Digital

Understand the Situation
Maneuver the Force
Decisive Action

The Army's Force XXI Operational concept is based on a fundamentally different approach to warfighting. The

traditional warfighting approach is based on a situation where little knowledge of the enemy and/or terrain is known beforehand. Under this concept, commanders maneuver a small force to make contact with the enemy, develop the situation, make a decision, then maneuver the remainder of his force for decisive action. In simplistic terms this type of operational concept requires a large force in order to "find" the enemy before initiating a decisive maneuver. The command and control systems and organizational structures of the majority of the armed forces in the first decade of the twenty-first century are designed to support this traditional operational concept.

The Force XXI operational concept turns the traditional equation on its head. The premise of this operational concept is that armed with information dominance, a commander understands the situation, maneuvers his force, and then conducts a decisive action. The time required looking for the enemy and developing the situation is drastically reduced. Overall, a much smaller force is required to achieve similar results because there is no need to "look" for the enemy in order to make contact. Thus, command and control systems and organizational structures can be adjusted accordingly. This new operational concept allows commanders to dictate and control the operational tempo of engagements through information superiority.

The Force XXI objective of controlling operational tempo has traditionally been a tenant of land operations. The previous doctrinal frameworks of the Army illustrate this point. In the 1970s, when facing a quantitative and technically superior force in the Warsaw Pact, the Army developed Active Defense doctrine. The concept of Active Defense sought to control the tempo of operations. It accomplished this by integrating the emerging technologies (anti-tank guided missiles - ATGMs, man portable surface to air missile systems-MANPADS, etc.) combined with a tailored maneuver that took advantage of the terrain in Central Europe into a battlefield framework designed to neutralize the enemy's qualitative and quantitative advantages.⁴⁴ While Active Defense sought to control operations tempo through an application of lethal technologies, tailored maneuver, and terrain appreciation, Airland Battle focused on a different scheme to achieve the same objective. No longer technologically inferior, but still outnumbered, Airland Battle was designed to incorporate and take advantage of these new technologies.

Airland Battle controlled operational tempo by attacking the enemy throughout the depths of his formations. Again, focused on the Soviet threat in Central Europe and the Middle East, Airland Battle delineated the battlefield into a close, deep, and rear framework that emphasized the

close cooperation and synchronization of air and ground force.⁴⁵ Similar to Active Defense, Airland Battle focused on the lethality aspects of technology to achieve a coherent force application. This focus of technology has changed dramatically in the development of Force XXI operations.

Force XXI operations seek to leverage the information aspects (vice the lethality of technology). The emphasis is on the close cooperation and synchronization of combat power through shared knowledge, rather than the effects of lethality. The Army's Digitization Master Plan describes this effort:

Digitizing the battlefield is the application of technologies to acquire, exchange, and employ timely digital information throughout the battlespace, tailored to the needs of each decider (commander), shooter, and supporter. Digitization allows each soldier to maintain a clear and accurate vision of the battlespace necessary to support planning and execution.⁴⁶

Incorporating these new information technologies into a functional operational concept requires the Army to embark on a course of change. This process is defined in terms of research and development, equipment acquisition, leader training, doctrinal development, and recruitment and retention of quality personnel. The dynamics of these changes are undoubtedly going to add to the friction already inherent in multinational operations. ***The pillars of standardization and interoperability, critical to***

multinational operations, are greatly affected by these changes.

The decision of the United States Army to adopt digitization and the Force XXI Operational Concept has a *significant impact on multinational operations.* Multinational alliance or coalition partners are going to require a digital capability to operate effectively with the digital U.S. Army. This posit is based on the assumption that the digitization "upgrade" of multinational military partners is politically and financially possible. Without this assumption holding true, digitization severely handicaps a multinational commander trying to synchronize and integrate operations.

Digitization and the Force XXI Operational Concept present an increased set of challenges to multinational operations. These challenges add to the inherent friction of non-digital multinational operations. The friction points of digitization in multinational operations are standard operational concept, equipment compatibility, funding, force structure and doctrine, security and corporate licensing issues. Each of these friction points represents a particular challenge to the multinational commander.

A standard concept of warfighting is critical to achieving the operational effects of synergy on the

battlefield. The differences in the Traditional versus Digital Operational concept as explained in Figure 5 represents the most significant point of friction the digitization process has on multinational operations. How a digital force communicates with a non-digital force is a complex problem. The problem goes beyond simple communications compatibility, although that is a component. It really boils down to a question of "how to fight." A digital force seeks information dominance in order to gain a position of advantage over the enemy, through both precision fires and dominant maneuver. Information has replaced mass and firepower as premiums on the battlefield. A traditional, non-digital force is not capable of gaining information dominance. This type of force seeks to gain an advantage over the enemy by application of mass in both firepower and maneuver. This situation represents a significant challenge to the multinational commander. Digitization imposes other friction points that challenge the multinational commander.

Equipment compatibility is the most obvious friction point in this process. Simply put, all forces must be able to physically communicate with each other. Attaining technological interoperability is difficult for coalitions in any case.⁴⁷ Major General Robert H. Scales argues that in most coalition operations, military units need substantial assistance to communicate with coalition partners.⁴⁸ Scales

illustrates the difficulty of this point by using an example from Operation Desert Shield/Storm. The support required for an average brigade from the Middle Eastern Nations totaled approximately seventy soldiers, twenty seven tons of equipment, and eighty days of training and coordination to create communication interoperability.⁴⁹ The Desert Shield/Storm example illuminates the magnitude of this problem. This is particularly acute due to the increase in coalitions vice alliances for multinational operations. The sheer number of potential coalition partners and the cost of acquiring common or interoperable equipment may make it impossible to guarantee interoperability in similarly constituted coalitions over the next five to 10 years.⁵⁰

The high costs of acquiring common or interoperable equipment represents a significant challenge to defense budgeting for all nations within an alliance or coalition. Defense analyst Lonnie D. Henley, writing in the United States Army War College journal *Parameters*, highlights this fact:

The networking of tanks, aircraft, supply ships, and everything else in the force requires a major effort in procurement and systems engineering, accompanied by an equally large effort to develop doctrine, tactics, techniques, and procedures to exploit these new capabilities. With the cost of U.S. procurement and R&D both exceeding any other country's entire defense budget, even our most advanced allies have little hope of keeping pace with the digitization of the American force.⁵¹

Henley's point is that the very nature of defense budgeting alone (in purely fiscal terms) is enough to prevent the effective integration of digitization for a multinational force. This situation is particularly acute when the politics of defense budgeting are added to the equation.

The politics of defense budgeting require consideration of the "domestic interests" of each member nation. This manifests itself in the form of defense contractors. Many nations maintain a technology and industrial base of industries dedicated primarily to defense related purposes. In many nations, these industries represent a significant portion of the economy. Additionally, buying equipment from domestic defense industries is a political necessity. The geo-strategic security situation, combined with the rapid technological advancement of defense equipment (based on digitization) has altered this situation. The level of cooperation between the United States and its Allies (primarily NATO, Japan, and Korea) developed during the last four decades in the areas of R&D, production, procurement, and fielding of defense related materials is ending.⁵² Trevor Taylor, an associate fellow at the Royal Institute for International Affairs, further illuminates this point in a series of essays aimed at establishing a common European Defense Policy. Taylor argues that instead of one common

defense policy, Europe really has five (represented by Britain, France, Germany, Italy, and the Netherlands). This complication of national issues, with their domestic political agendas, further complicates this issue.⁵³ Simply put, with less demand, the defense industry is getting extremely competitive.⁵⁴

The competitive nature of defense industries, combined with the rapid development of new and emerging technologies, complicates the compatibility and interoperability points of friction in multinational operations. The United States is clearly the lead nation in the digitization process. As new technologies are developed and procured as part of the Digitization program, these technologies are naturally copyrighted and protected. These technologies can be sold to foreign defense firms for licensing rights of production but at a high cost. Defense analysts Gordon Boezer, Ivars Gutmanis, and Joseph E. Muckerman, writing in *Parameters*, highlight this fact:

...European defense material ventures will compete directly with American firms for sales in NATO, the rest of Europe, and third world countries. Defense technology transfers from the United States will provide advantages to these potential competitors and will be detrimental to U.S. defense contractors.⁵⁵

American defense contractors are going to be unwilling to relinquish the lead already obtained in the digitization of the battlefield race. This fact relegates other nations' defense industries into a supporting role. This is a role

they are unlikely to take considering the security situation in the first decade in the twenty first century.

Control of certain key technologies is considered critical to the National Security of the United States. The aspects of control in this context are not only from a corporate and legal viewpoint, but from a security point of view as well. Elements of digitization represent some of the most sophisticated and sensitive technologies available today. The nature of the technology itself is not the issue; rather, it is its application and significance across all of the elements of National Power (Diplomatic, Information, Military, and Economic). Allowing coalition member nations to gain access to these technologies represents a potential national security issue.⁵⁶ This issue represents a seemingly intractable problem that requires a long-term, comprehensive solution. This is particularly true of the ad hoc nature of coalitions and the sometimes-strange bedfellows they make. Examples of such "strange bedfellows" exist in both Operation Desert Shield/Storm (Syrian 9th Armored Division) and Operation Joint Endeavor (Russian Federation Airborne Brigade). In each of these cases, security issues were raised concerning a coalition partner in a multinational operation. How much "technology" was to be "given" in each of these scenarios based on long term security reasons:⁵⁷ coalition partners

today, but potential adversaries tomorrow. As these ad hoc coalitions represent the most likely composition of a multinational force in the future, there is a need for a common doctrine and organization structure in order to enhance compatibility and interoperability.

The collapse of the Soviet Empire, symbolized for many by the fall of the Berlin Wall in 1989, produced a wide-ranging strategic reappraisal in the West.⁵⁸ Large conscript armies designed to fight the Soviet threat are no longer required. The elimination of the Soviet threat, coupled with the emergence of information age technologies, has brought about a need for a new doctrine and corresponding force structure of the armed forces.

The United States clearly is the lead nation in this area with its Force XXI and digitization concepts currently under development. The essence of multinational operations is further strained as the restructured American forces interact with coalition or alliance forces that are still structured to fight the Soviet Cold War threat. Restructuring of a nation's armed force is a difficult, costly, and politically charged decision. Frederic Drion, the French Army Liaison Officer assigned to Training and Doctrine Command (TRADOC) highlights this fact:

French history texts of the next century will record 22 February 1996 as the beginning of fundamental changes in the nation's armed forces. On that date Jacques Chirac, President of the French Republic and Chief of

the Armed Forces, announced his intent to end France's tradition of conscription, and to reshape by 2002 the armed forces around volunteers. Additionally, M. Chirac decided to reduce the size of French Military forces by 30 percent from current levels. His goal is to have a new structure settled, equipment fielded, and France's defense industrial base restructured by 2015.⁵⁹

Drion's point is clear. The restructuring of the French Armed Forces is planned as a long, comprehensive process. The French example is similar to most nations in NATO and Europe in the first years of the twenty-first century.⁶⁰ This process of restructuring adds to the friction and complexity of multinational operations.⁶¹

Digitization of the battlefield adds to the already complex issue of multinational operations. As the United States continues to move along with the process of digitizing its entire force structure, solutions to these complex issues must be found. Almost every major military conflict the United States has participated in during the twentieth century has been in the form of a coalition or alliance. It is in the national security interests of the United States to mitigate or eliminate the friction points of digitization on multinational operations. Two obvious solutions initially come to mind: either provide coalition forces with American equipment in order to fight digitally, or establish a system of robust liaison teams that can pass on information. Each of these options has its strengths and weaknesses, and they will be analyzed in the next chapter.

Chapter 4

Integrating Digitization in Multinational Operations

Although our Armed Forces will maintain decisive unilateral strength, we expect to work in concert with allied and coalition forces in nearly all of our future operations.⁶²

This chapter analyzes two methods of sharing information on a digital battlefield in multinational operations: establishment of liaison teams and technology transfers. Four criteria for comparison have been established: acceptability, compatibility, standardization, and security. These criteria are used to assist in answering the primary research question.

The essence of the issue is how does an information-based force communicate with a non-information-based force? Specifically, in order to achieve the benefits of information dominance, information must be shared with all members of the force. How to overcome these problems represents the heart of the argument for this monograph. Liaison teams and technology transfers are two solutions to this problem. The analysis of each solution as compared to the evaluation criteria is discussed below.

Liaison teams offer the most practical and short term solution to the problem, but it falls short as feasible when compared to the evaluation criteria. The practice of using

liaison officers as "directed telescopes" to facilitate command and control is almost as old as war itself.⁶³ History is full of examples that underline this point. Current U.S. Army doctrine emphasizes the role of liaison teams as the accepted method for overcoming the difficulties in multinational operations.⁶⁴ While liaison teams offer a practical solution to the majority of problems facing a multinational force commander during coalition operations, they fail to address the most challenging issue: standardization of an operational concept.

Liaison teams meet the evaluation criteria of acceptability, compatibility, and security. The liaison team approach offers the best method to ensure that budgetary, legal, and security policy issues concerning sensitive technology transfers and military assistance to potential coalition partners are complied with. From an acceptability standpoint (focused on funding and legal), suites of liaison teams outfitted with personnel and equipment are included as part of the U.S. force structure design and budgetary process. These teams are assigned to U.S. alliance members in NATO and CFC or employed as necessary to meet requirements of a ad hoc coalition force. The issue of compatibility is solved because the liaison teams bring the correct equipment to establish connectivity with its U.S. counterpart. From a security standpoint, the

"sensitive technology" issue is resolved because it remains under U.S. control.

Liaison teams fail in the category of standardization, particularly standardization of an operational concept among member nations. Without a standardized operational concept, the complexities of a multinational operation are increased exponentially. This is *amplified* in a digital environment. The operations concept of a digitized force calls for a system that allows information to flow freely across the battlefield and to harness the power this information provides into a powerful dynamic force.

The effects of this are acute at the tactical end of the spectrum of conflict. The U.S. Army's FB2C2 system is designed to link the Brigade headquarters with the individual soldier/weapons platform. This allows a digital force to interact in a dynamic fashion and create total potential combat power of the force that is greater than the sum of its parts. In order to gain these desired effects, a multinational force must have the ability to interact among itself and other coalition partners. Liaison teams partially solve this problem, but do not address the issue of establishing connectivity from Brigade headquarters to individual weapon system and/or soldier.

Liaison teams can only be posted at a limited number of locations. Normal practice is to post liaison teams at

headquarters elements of each coalition partner. The level of headquarters depends on the situation and type of operation involved. Liaison teams are normally posted from battalion through the multinational/joint force commander level.⁶⁵ In this function, liaison teams serve primarily as a conduit of information between one force and another. Even when these teams are equipped with a complete digital communications package that allows for complete compatibility, their utility is limited.

Liaison teams can only share information and provide the common relevant picture (CRP) to the headquarters they are working in. This information still must be passed by "traditional" methods to all the subordinate units of that headquarters.⁶⁶ This does not allow for employment of two of the five trends of the digital operations environment: greater dispersion among units and the increasing ability of smaller units to create decisive results. This is the shortcoming of liaison teams in supporting digital and non-digital coalition partners.

Liaison teams do not overcome the friction points of force structure and doctrine. While liaison teams can assist in overcoming many of the asymmetries in coalition operations, force structure and doctrine remain core problems. Force Structure and doctrine are a reflection of a nation's history, culture, political, economic, and

security situations. Liaison teams do not influence those factors.

A second solution to overcoming multinational friction points is technology sharing. Technology transfers represent a more concrete, or long term approach to the problems associated with technology asymmetry in coalition operations.⁶⁷ Technology transfers meet the evaluation criteria of compatibility and standardization.

Alliance/coalition partners who have the equipment capable of establishing connectivity with a U.S. digital force are capable of supporting the Force XXI digital operations concept. *This fact alone establishes technology transfers as a feasible solution to the problem.* However, technology transfers are of limited utility without proper training, doctrine, and force structure required to properly employ them.

Assistance in integrating digitization in a multinational environment is best represented in the form of a CINC's Theater Engagement Plan (TEP). A recommendation would be for the CINCs to include technology asymmetry of potential future coalition partners as a part of their regional assessment. Once technological asymmetries have been identified, resources in the form of the CINC's TEP are dedicated to the problem. These resources take the form of foreign military sales (equipment), international military

education and training (IMET), military to military exchange programs, and joint/combined training exercises. This type of program provides a broad-based approach that eases the friction points of integrating new technologies and concepts.

Technology transferring does not solve all problems of coalition asymmetry. Time is the critical factor to consider. New technology given to a coalition partner shortly before an operation is to commence can do more harm than good. Technology is simply one part of a synergistic system that includes research, development, training, doctrine, support systems, concepts, attitudes, and leadership.⁶⁸ Given this, transferring technology with potential coalition partners will not help unless other components of the system can also be exported and absorbed by the recipient.⁶⁹

Technology transfers are not a stand-alone optimal solution. This method falls short in meeting the evaluation criteria of acceptability and security. This is particularly true of coalition partners who do not share the long-term security interests of the United States. Based on that fact, not all coalition partners should be granted technology-transfer privileges. This requires the multinational commander to either accept sub-optimal employment options for specific coalition partners who are

not granted these privileges, or to use liaison teams to bridge the gap⁷⁰.

The two proposed methods, liaison teams and technology transfers, both offer potential solutions to the friction points of coalition technology asymmetry. Each has its own peculiar strengths and weaknesses while neither offers a panacea to the problem. *A combination of technology transfers and liaison teams, however, offers the most feasible long-term solution to the problem.* Technological asymmetry among coalition forces is a complex and dynamic problem that is influenced by numerous factors. Each situation is unique based on the history, culture, traditions, economy, and political situation of the member nations involved. One assumption concerning this problem remains clear. The United States is now (and for the foreseeable future) the leader of most multinational coalition operations. The United States is also the implementer of the tactical digitization process. Therefore, it is in the best interests of the United States to develop a set of solutions to the problem of technology asymmetry.

Chapter 5

Conclusions and Recommendations

The evidence surfaced in this monograph is clear:

technology transfers supplemented by liaison teams is the best solution to the problem posed by the research question.

Analysis of the evidence concerning this topic leads to several general conclusions. First, the United States will be the technologically dominant partner in all coalitions it participates in the near future.⁷¹ The United States currently is years ahead of most NATO partners and all other nations in technological developments concerning digitization of the battlefield. Most NATO nations have some form of digital systems, but with much less capability, and they are years behind in their development.⁷² This leads to a situation where in most cases the United States is going to have to provide the majority of the digital capability for its coalition partners.

The second conclusion is that neither liaison teams nor technology transfers alone will solve the coalition asymmetry problem. ***A combination of each is required.*** Each situation is as unique as the potential coalition member nations are. A "cookie cutter" solution is not going to be effective in these circumstances. The best way to address

this problem is from both a long-term and short-term points of view.

The long-term point of view involves technology transfers. This clearly represents the best solution to the problem, but it has its shortfalls. The United States is inevitably moving towards a complete digitized force structure. This includes an operational concept that best leverages information dominance brought about by digitization. *In order to apply this operational concept in a coalition environment, coalition partners are going to require the same capability.* If not, the United States is committing to unilateral operations, or American forces are going to fight in a situation where technological advantages are degraded. *Neither of these situations is acceptable.*

There are three immediate shortfalls to this solution: corporate copyright and security concerns, as well as training issues. Copyright concerns are the simplest to overcome. Potential coalition members are identified as part of the CINC's TEP. These nations are then approved in accordance with the foreign military sales defense and appropriations acts for equipment purchases. The particulars of corporate copyright protection are then worked out as they are for all military sales.⁷³ Security of technology transfers is a much larger problem. This will have to be handled on a case by case basis. Temporary and

somewhat dubious coalition partners today may end up as potential enemies tomorrow.⁷⁴ The final shortfall is training. It is of limited utility to simply transfer technology without also providing the training and assistance to best employ them. This is best handled through the CINC's Theater Engagement Plans (TEP), with programs such as military to military exchanges, joint/combined training exercises, and new equipment training (NET) assistance.

Liaison teams offer the short-term perspective to this problem. While liaison teams do not solve the problem in their own right, they supplement the effort of technology transfers. They are particularly effective in supporting training exercises and initial operational fielding of new equipment. Liaison teams have been a part of coalition warfare throughout history. Their role is still required despite technology transfers. Additionally, liaison teams can help mitigate the security issue concerning a particular coalition partner. A large liaison effort can offset the lack of technology transfer to a particular partner nation. This approach allows for a limited capability combined with a maximum-security effort.

The challenges of multinational operations in a digital environment are both complex and dynamic. Each situation is unique and a simple "cookie cutter" solution is not

feasible. *It is in the best interest of the United States to develop a long-range approach, which is centered on technology transfer and is supplemented by a liaison team effort.*

Endnotes

¹ Skillet, Wayne A., "Alliance and Coalition Warfare," *Parameters*, Volume 23, number 2 (Summer 1993), 74.

² "A National Security Strategy for a New Century," The White House, October 1998, 2.

³ Scales, Robert H., "Trust, Not Technology, Sustains Coalitions," *Parameters*, Volume 28, number 4, (Winter 1998-1999), 4.

⁴ Scales, 4.

⁵ Metz, Stephen. "The Effects of Technological Asymmetry on Coalition operations," *Strategic Studies Institute*, (February 1, 1998), 56.

⁶ Metz, 56.

⁷ Eisenhower, Dwight, D., *Crusade in Europe* (New York: Doubleday, 1948), 4.

⁸ Mayfield, Thomas D., *Digitization of the Battlefield: Operational Implications for the U.S. Army in Multinational Operations*. United States Army Command and General Staff College School of Advanced Military Studies, Fort Leavenworth, Kansas, 1996, 1.

⁹ The Joint Staff, *Joint Publication 3-16 (2nd Final Coordination)*, (Washington, 23 March 1999), 1-1.

¹⁰ Joint Publication 3-16, 1-1.

¹¹ Advantages are defined in this sense as technical military efficiency not political efficiency as defined by freedom of action.

¹² Joint Publication 3-16, II-8.

¹³ Joint Publication 3-16, II-8.

¹⁴ Joint Publication 3-16, II-11.

¹⁵ A point of clarification is required here. United States Joint Terminology does not always 100% translate into NATO terms. Using the example of the ARRC, NATO refers to this command structure as a framework while the United States calls it a lead nation. Even the terminology can cause friction points in multinational operations.

¹⁶ Joint Publication 3-16, II-12.

¹⁷ Sensitive to Russian concern that Russian forces not fall under the tutelage of NATO, a special command relationship placed the Russian brigade under tactical control of an American division (1st Armored Division, while operational control remained within the Russian national chain of command. See Foreign Military Studies Office (FMSO) Special Study No, 99-4, *Lessons and Conclusions on the Execution of IFOR Operations and Prospects for Future Combined Security Systems: The Peace and Stability of Europe after IFOR*. (Fort Leavenworth, Kansas: Joint US/Russian Research Project, March 1999), 42.

¹⁸ Joint Publication 3-16, II-12.

¹⁹ Marshall, Thomas J., Kaiser, Phillip, and Kessmeire, Jon, "Problems and Solutions in Future Coalition Operations," *Strategic Studies Institute*, (February 1, 1998), 2. Examples are taken primarily from the wars of the Twentieth Century. The intent is to allow readers to understand the numerous friction points in multinational operations.

²⁰ Office of the Secretary of Defense Report to Congress, *Kosovo/Operation Allied Force After Action Report*, 31 January 2000. See OSD's AAR on the Kosovo Air Campaign for a more detailed look at NATO inequities and burden sharing.

²¹ Marshall, Kaiser, and Kessmeire, 3.

²² Marshall, Kaiser, and Kessmeire, 4.

²³ Marshall, Kaiser, and Kessmeire, 4. Partners in a coalition who have trained against the former Soviet Union as their enemy are particularly effected by this problem. Instinctive training is defined as an immediate action (without the benefit of a decision making process) against a particular Que. from the enemy. In most cases, western armies have been trained to open fire immediately upon sighting former-Soviet type equipment. Old training habits are hard to break. This was a great concern to planners during the Persian Gulf War (1990-1991) and the Syrian 9th Armored Division, which was equipped with former-Soviet equipment. Great pains were taken to place this unit in a position where it would not be adjacent to western-armies for fear of fratricide. This was especially painful in light

of the fact that the Iraqi enemy was equipped with similar systems as the Syrians.

²⁴ Marshall, Kaiser, and Kessmeire, 5.

²⁵ The Joint Staff, *Joint Task Force Commander's Handbook for Peace Operations*. (Fort Monroe, Virginia: Joint Warfighting Center, 16 June 1997), VII-7. The requirement for linguists and interpreters is further accentuated by the following quote from CPT John H. Campbell, KSARNG Target Acquisition Officer on duty during Operation Joint Endeavor: "Multinational lines of communication. Complicated lines of communication intensify any confusion that exists which is further exasperated by the lack of a common language... Translators were not always available; occasionally, an allied soldier spoke some English, but in most instances neither party could communicate effectively." CPT Campbell's experience highlight the friction point of language capability.

²⁶ This is a commonly misunderstood point. To the casual observer having someone proficient in the technical skills of speaking, comprehending, and writing in a second language are sufficient to conduct military operations. Nothing is further from the truth. Without the proper military education a linguist is of limited value in assisting military operations. Thus linguist are not required, rather military officers with linguistic skills.

²⁷ Metz, Stephen. "The Effects of Technological Asymmetry on Coalition Operations," *Strategic Studies Institute*, (February 1, 1998), 56.

²⁸ See Schake, Kori, Bloch-Laine, Amaya, and Grant, Charles, "Building a European Defense Capability," *Survival*, Volume 41, number 1, (Spring 1999), 28. This article argues that the challenge of maintaining operational compatibility is growing within the NATO integrated command structure. This is especially true in the coming decades as U.S. forces incorporate the latest information technologies into equipment and doctrine. Without grounding in common standards and routine training, U.S. and European forces would lack the operational compatibility that has been taken for granted in Bosnia and the Persian Gulf.

²⁹ General (ret) Gordon R. Sullivan and Major General James M. Dubik, as quoted in the U.S. Army, *Army Digitization Master Plan*. (Washington: Army Digitization Office, 1995), 1.

³⁰ Mayfield, 14.

³¹ United States Army, *Army Digitization Master Plan*, (Army Digitization Office: Washington, 1996), 2-12.

³² Walker, Robert M. & Reimer, Dennis J., *A Statement on the Posture of the United States Army Fiscal Year 1999*. Report to Congress, (Washington: February 1998), 23.

³³ Department of the Army, TRADOC PUBLICATION 525-5, *Force XXI Operations*. (Fort Monroe, Virginia: United States Army Training and Doctrine Command, 1 August 1994), 4-5.

³⁴ Department of the Army, Field Manual 100-6, *Information Operations*. (Washington: August 1996), 2-8.

³⁵ The Joint Staff, *Joint Publication 6-0, Doctrine for Command, Control, Communications, and Computer (C4) Systems Support to Joint Operations*. (Washington, 30 May 1995), xiii.

³⁶ Joint Publication 6-0, VI-4.

³⁷ Joint Flow and Analysis System for Transportation (JFAST) is the automated planning tool used by transportation planners in both deliberate and crisis action planning.

³⁸ Center Army Lessons Learned (CALL), Initial Impressions Report, *Operation Joint Endeavor: Task Force Eagle Initial Operations*. FT Leavenworth, Kansas: United States Army Training and Doctrine Command, May 1996, 6. See Army Issue I: Project the Force pages 1-21 for a more detailed description of the multinational deployment issues facing Task Force Eagle during the Winter of 1995-1996.

³⁹ The NATO Alliance, although it has existed for over fifty years, was never designed to deploy "out of area" defined as the Central Region of Europe. However, this highlights the challenges of digitization on multinational operations. If an alliance with fifty years of working together and stability has challenges in this realm, then any ad hoc coalition is going to be challenged worse.

⁴⁰ Field Manual 100-6, 5-3.

⁴¹ This is a significant change in Army Command, Control, and Communications procedures. This seamless integration replaces the more traditional hierarchical

approach to information management on the tactical battlefield. Instead of information flowing only in one channel (i.e. maneuver, fire support, intelligence, logistics, etc.) to a specific BOS, it now flows in an open system that allows all BOS elements to have access to it.

⁴² United States Army, TRADOC PAM 525-5, *Force XXI Operations: A Concept for the Evolution of Full-Dimensional Operations for the Strategic Army of the Early Twenty First Century*, (Army Training and Doctrine Command, Fort Monroe, Virginia, 1 August 1994), 3-20.

⁴³ TRADOC PAM 525-5, 3-17.

⁴⁴ Romjue, John L., *From Active Defense to Airland Battle: The Development of Army Doctrine 1973-1982*. (Historical Office, United States Army Training and Doctrine Command, Fort Monroe, Virginia, June 1984), 6. See Chapter 1 for a detailed description of factors concerning the development of the Active Defense operational concept.

⁴⁵ TRADOC PAM 5-25, 3-17.

⁴⁶ United States Army, *Army Digitization Master Plan*, (Army Digitization Office: Washington, 1996), 2-12.

⁴⁷ Scales, Robert H., "Trust, Not Technology, Sustains Coalitions," *Parameters*, Volume 28, Number 4, (Winter 1998-1999), 193.

⁴⁸ Scales, 193.

⁴⁹ Scales, Robert H., Chairman's Peace Operations Seminar, Carlisle Barracks, Pennsylvania: United States Army War College, 11 June 1998, unpublished manuscript.

⁵⁰ Scales, Robert H., "Trust, Not Technology, Sustains Coalitions," *Parameters*, Volume 28, Number 4, (Winter 1998-1999), 193.

⁵¹ Henley, Lonnie D., "The RMA After Next," *Parameters*, Volume 29, Number 4, (Winter 1999-2000), 57.

⁵² Boezer, Gordon, Gutmanis, Ivars, and Mukerman, Joseph. E. II., "The Defense Technology and Industrial Base: Key Components of National Power," *Parameters*, Volume 26, Number 2, (Summer 1997), 43.

⁵³ Taylor, Trevor (ed.), "Reshaping European Defense," *Royal Institute of International Affairs*, (1994), 1-3.

⁵⁴ In accordance with the natural business cycle this situation has led to increased mergers, purchases, and joint ventures among defense related industries. This is particularly true in Europe. The Europeans are considered to be one step behind the major American defense industries that went through this process in the early 1990s. European defense industries are now going through a similar process. Additionally, the emergence of the European Union as a major economic and commercial trading block has led to a natural competition with American defense industries. The once accepted idea of American leadership in defense industries is no longer valid. This further complicates multinational operations.

⁵⁵ Boezer, Gutmanis, and Mukerman, 48.

⁵⁶ National security is heightened over these emerging technologies. Information technologies associated with digitization and traditional "military use only" have different impacts on the elements of national power. Information systems associated with digitization are fully integrated with the other elements of national power. Allowing these technologies to fall into the hands of a potential adversary presents more than just a military challenge.

⁵⁷ Kipp, Jacop W. (ed), "Lessons and Conclusions on the Execution of IFOR Operations and Prospects for a Future Combined Security System: The Peace and Stability of Europe after IFOR," (United States Army Combined Arms Center, Fort Leavenworth, Kansas: Foreign Military Studies Office, Number 99-4, March 1999), 75.

⁵⁸ Drion, Frederic, "France: New Defense for a New Millennium," *Parameters*, Volume 26, Number 4, (Winter 1996-1997), 100.

⁵⁹ Drion, 99.

⁶⁰ See Trevor Taylor (ed), *Reshaping European Defense*. Taylor has gathered together 5 articles that discuss the defense policies France, Germany, Netherlands, Italy, and Britain and the difficulties in maintaining coherent defense policies and avoiding the "renationalization" of defense in these circumstances. These articles support the arguments

made by Frederic Drion concerning French military reorganization.

⁶¹ Although the end state product of a restructured-armed force is designed to reduce multinational friction the interim state is a different story. The French example is planned on a 20-year cycle. Multinational friction is increased as the French Armed Forces transition from a conscripted army into a professional force. The same can be said for other nation's armed forces as they move through this transition phase. Additionally, see Trevor Taylor, *Reshaping European Defense* for similar arguments concerning Germany, Britain, Italy, and the Netherlands.

⁶² Shalikashvili, John M., *Joint Vision 2010*, (Washington: Joint Chiefs of Staff, 1996), 6.

⁶³ Scales, Robert H., *Trust, Not Technology, Sustains Coalitions*, 193.

⁶⁴ From the literature review it appears the Army (and DOD in general) have decided on liaison teams as the approved method of reducing the friction between coalition partners. Field Manuals 100-8 (The Army in Multinational Operations), 100-7 (Decisive Force: The Army in Theater Operations), 100-6 (Information Operations), and TRADOC PAM 525-5 (Force XXI Operations) all stress liaison teams as the best solution to overcoming the difficulties of multinational operations.

⁶⁵ This norm of liaison teams has been modified in the past few years based on the needs of the situation. During Desert Shield/Storm United States Special Forces Teams were assigned as liaisons down to the company /team level. Similar situations existed in Bosnia-Herzegovina as liaison teams were established with all OPCON/TACON elements of the US led Multinational Division North (MND-N). These included the Russian Airborne Brigade, Nordic-Polish Brigade, and the Turkish Brigade.

⁶⁶ The methods of passing information depend on the situation and the forces involved. It is safe to say that the impact of information dominance is not being utilized by this technique.

⁶⁷ Metz, Stephen, 61.

⁶⁸ Metz, 61.

⁶⁹ Metz, 61.

⁷⁰ Political considerations of including a particular nation as a coalition partner may outweigh practical military considerations on the ground. In this case, that becomes an accepted constraint on the multinational force commander and he develops techniques to overcome it like any other factor that is derived from his mission analysis.

⁷¹ Mayfield, 42.

⁷² Mayfield, 43.

⁷³ This is not to make light of this issue. The United States has been selling sophisticated technologies for years to our allies. The corporate copyright protection issue can be worked out in numerous ways. These normally include buying from U.S. defense contractors directly and allowing foreign defense contractors to manufacture the equipment under a licensing agreement. The same methods can apply to digital technologies. See Joint Task Force Commander's Handbook for peace Operations, page VI-12 for a more detailed discussion on the legal aspects of technology transfers.

⁷⁴ Ruhl, Lothar, "The Way Ahead: Partnership or Competition?" *Royal United Service Institute for Defense Studies*, (25 July 1997), 48.

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