Organizational Research Generator for Simulation in the Military (ORGSIM)

Dr. Raymond Levitt
Dr. John Chachere
Mr. Marc Ramsey

Working Paper #60

30 November 2009
NOTICES

When US Government drawings, specifications, or other data are used for any purpose other than a definitely related Government procurement operation, the Government thereby incurs no responsibility nor any obligation whatsoever, and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications or other data, is not to be regarded by implication or otherwise, as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Please do not request copies of this report from the Air Force Research Laboratory. Additional copies may be purchased from:

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

Federal Government agencies registered with the Defense Technical Information Center should direct requests for copies of this report to:

Defense Technical Information Center
8725 John J. Kingman Rd., Ste. 0944
Ft. Belvoir, Virginia 22060-6218

TECHNICAL REVIEW AND APPROVAL

AFRL-XXXX

This report has been reviewed by the Office of Public Affairs (PA) and is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nationals.

This technical report has been reviewed and is approved for publication.

FOR THE DIRECTOR

Air Force Research Laboratory
The Collaboratory for Research on Global Projects at Stanford University is a multidisciplinary center that supports research, education and industry outreach to improve the sustainability of large infrastructure investment projects that involve participants from multiple institutional backgrounds. Its studies have examined public-private partnerships, infrastructure investment funds, stakeholder mapping and engagement strategies, comparative forms of project governance, and social, political, and institutional risk management.

The Collaboratory, established in September 2002, also supports a global network of scholars and practitioners—based on five continents—with expertise in a broad range of academic disciplines and in the power, transportation, water, telecommunications and natural resource sectors.
About the Authors

**Dr. Raymond Levitt** is Professor of Civil & Environmental Engineering, Director of the Collaboratory for Research on Global Projects, and Senior Fellow in the Woods Institute for the Environment at Stanford University. Ray’s Virtual Design Team (VDT) research group has developed new organization theory and computer simulation tools to optimize the execution of complex, fast-track, projects and programs. Ray co-founded and was Associate Director/Director of Stanford’s Center for Integrated Facility Engineering from 1988-2001. He founded, and serves as Academic Director of the Stanford Advanced Project Management Executive Program (SAPM). SAPM has more than 2,500 alumni and is recognized internationally as the premier executive program for advanced project and portfolio management. Ray has supervised dozens of dissertations, written three books and more than 100 scholarly papers, launched two major research centers, and is recognized as an intellectual leader in the field of construction, engineering and management. He co-founded, and has served as a Director of, Vité Corporation, Design Power, Inc., and Visual Network Design, Inc.

**Dr. John Chachere** conducts research part-time as Consulting Assistant Professor at Stanford University’s Collaboratory for Research on Global Projects. Dr. Chachere also serves full-time as Senior Computer Scientist with SGT, Inc., a contractor for the NASA Ames Intelligent Systems Division. Dr. Chachere’s four graduate degrees from Stanford Engineering span computer science, decision and risk analysis, and engineering management. Dr. Chachere’s experiences managing organizations, processes, and analytical applications include human spaceflight operations, airline ticket pricing, consumer goods supply chains, 3D computer games, telemedicine, and green building design. Dr. Chachere has developed applications shipped to over one hundred companies, has published hundreds of pages online, and has designed collaborative engineering practices taught to hundreds of students and professionals.

**Marc Ramsey** is a Research Software Engineer with the Stanford University Center for Integrated Facility Engineering and the Collaboratory for Research on Global Projects. He specializes in the development of software tools and techniques to support the design and analysis of large scale engineering projects. Prior to joining Stanford, he developed organizational modeling and simulation software for Vité, and was a manager and software developer at Autodesk, Inc.
# TABLE OF CONTENTS

1.0 SUMMARY ................................................................................................................. 1

2.0 INTRODUCTION .................................................................................................... 1

  2.1 The POW-ER Model of Organizations and Processes ......................... 2

3.0 METHODS, ASSUMPTIONS, AND PROCEDURES ............................................ 3

  3.1 Process of Researching and Developing the POW-ID Model Enhancements ..... 3

  3.2 Cultural Differences ......................................................................................... 4

    3.2.1 Definition of Military Culture ................................................................. 4

    3.2.2 Types of Cultural Distinctions ................................................................. 4

    3.2.3 Service and Officer Distinctions .............................................................. 5

    3.2.4 Geographic Distinctions .......................................................................... 6

    3.2.5 Functional Distinctions ........................................................................... 6

    3.2.6 Rank, Tenure in Position, Tradition, Generation Distinctions ............. 6

  3.3 Cultural Distances ............................................................................................. 7

    3.3.1 Purpose for Modeling Cultural Distances ................................................. 7

    3.3.2 The Centrality and Challenges of Coordinating Across Cultural Distances ... 8

    3.3.3 Design of the Cultural Distance Model ................................................... 8

    3.3.4 Implementation of the Cultural Distance Model ..................................... 9

  3.4 Guidelines for Using the Cultural Distance Model ............................................. 10

    3.4.1 Using the Enhanced POW-ID Model to Assist Organizational Design .... 10

    3.4.2 Modeling the Alignment of Incentives ..................................................... 11

4.0 RESULTS AND DISCUSSION ............................................................................. 12

  Baseline ......................................................................................................................... 12

  Cultural Distance ........................................................................................................... 13

  Rank Difference ............................................................................................................ 15

  Culture and Duration .................................................................................................... 16

  Going Purple ................................................................................................................ 18

  Fusion Center ............................................................................................................... 19

5.0 CONCLUSIONS ..................................................................................................... 20

REFERENCES ............................................................................................................... 22
1.0 SUMMARY

The “Organizational Research Generator for Simulation in the Military (ORGSIM)” research task was sponsored by the Air Force Research Laboratory’s Sensemaking and Organizational Effectiveness Branch (711th HPW/RHXS) under the Technology for Agile Combat Support (TACS) contract (FA8650-D-6546, Delivery Order #10. The period of performance for this effort extended from 1 November 2007 to 30 November 2009.

This report details the results of research activities focused on enhancing an organizational simulation model called POW-ER. The enhanced model, called POW-ID, can assess organizational cultural differences between employees who have trained and worked in various branches of the U.S. Department of Defense. These organizations have different core cultures, training protocols, and operating environments.

Stanford University collaborated with Northrop Grumman Information Technology’s Enterprise Applications Group and the United States Air Force Research Laboratory in extending the modeling capabilities of POW-ER. POW-ER was developed for modeling and simulating non-routine, project based work in teams that might contain workers from different national cultures. The collaboration has developed POW-ER to form POW-ID by providing a set of extensions to POW-ER to allow users to model Command and Control workflows and organizations with greater fidelity.

This effort extends a technical activities and research work, including a compilation of research findings and artifacts, documented in an interim report [Ramsey et al 2009]. In summary, that initial phase provided an overview of organizational modeling theory and practice, provided software training, and provided technical support to a US Air Force team. As part of that project, a prototype simulation tool called POW-ID was developed. A POW-ID model provides representations for routine processing of information-driven task sub-networks, as well as non-routine, asynchronously triggered events or actions. This allows modeling and simulation of both schedule and event-driven tasks. POW-ID thus extends the POW-ER object model to better represent ongoing time critical knowledge-based work such as defense logistics.

2.0 INTRODUCTION

This research aided in the development of methodologies, frameworks, and metrics for evaluating and testing organizational simulation technology and application. It identified pertinent data and information needed to complete the development of a baseline organizational simulation model. The research leveraged information and artifacts from on-going domain and work analysis including interactions between personnel and organizations involved in this activity. The research identified constraints associated with the design and development of an extensible organizational simulation for Command and Control organizations of this type.

This research focused on Department of Defense unique behavioral and cultural factors that may influence model development. For example, the Air Force, Army, and Navy use different Doctrine, Organization, Training, Material, Personnel, Leader Development (DOTMPL) solutions for their respective organizations. This cultural difference is believed to have a significant impact on the day-to-day operations in a joint operations environment. In
particular, history has shown the success of joint operations to depend on communicating and interoperating well in spite of cultural differences, as Douglas and Strutton [2009] note: "[Operation Desert One, a failed 1979 joint military effort] suggested service rivalry was so deep and diversity was so predominate that individual services were fundamentally unable and unwilling to communicate and perform joint operations ... The now ingrained ability of military services to [operate jointly] has materially contributed to strategic and operational successes during the last 20 years." This research acts on the view that Cross-cultural coordination therefore should be accounted for in modeling efforts.

2.1 The POW-ER Model of Organizations and Processes

The models used for this project adopt the “information-processing and communication” view of work that goes back to the early work of March and Simon [1958] and Jay Galbraith [1977]. This approach views work abstractly as consisting of a quantity of information to be processed by humans and their supporting information technologies. This conception of work focuses directly on communication related to “exceptions”—non-routine situations in which a worker is lacking some information or authorization required to proceed with the task at hand and must seek input from a supervisor (generating supervision work) or a peer (generating coordination work).

In the information-processing view of work, both of these kinds of “hidden work” can be viewed simply as additional quantities of information to be processed by people and organizations imbued with finite information processing capacity. Previous VDT/SimVision™ organizational simulation approaches have shown that this abstraction can be very effectively employed to make predictions about exactly when and where information processing bottlenecks will arise in an organization, triggering resulting delays and attendant quality failures when supervision or coordination begin to break down. This prior work can be viewed as modeling the “information flow physics” of knowledge work and organizations that execute it [Levitt et al. 1999].

In addition to failures due to "information flow physics," failures due to “information flow chemistry” mismatches also occur. Specifically, the latter dynamic involves failures to communicate effectively when misunderstandings and conflicts arise between interdependent workers engaged in knowledge work. Previous POW-ER research has modeled national cultural differences as sources of “workflow chemistry mismatches” that can lead to additional delays and quality breakdowns. Some of the data and insights to do this have come from Hofstede’s [1991] well-known work on national cultural value differences and our own ethnographies of international joint ventures [e.g., Horii et al. 2005]. In the POW-ER and POW-ID information processing models, we represent and reason about cultural differences as resulting in different decision rules that workers and their managers at different levels use for communicating up, down and laterally in organizations, and in the kinds of structures they employ for project work. We embedded these decision rules for each culture in unique “behavior files” that the program references when it executes simulations. The decision rules in our default model's behavior file, which was based on observations of US organizations like Fluor Daniel and Lockheed Martin, are viewed as the “U.S. behavior file.” Prior work has created different behavior files for Japanese and Chinese workers. That work has not yet been validated to the level of previous, mono-cultural project workflow models (Horii 2005).
This research enhanced the POW-ID model's ability to assess organizations that require coordination between actors from multiple cultures (such as Navy, Air Force, and Army). The project demonstrates the enhancement and interprets the results to support an intuitive organizational design analysis.

3.0 METHODS, ASSUMPTIONS, AND PROCEDURES

Literature and interviews surveyed for this research support addressing several cultural distinctions using a single POW-ID model enhancement. This enhancement operationalizes the view that cultural distance directly reduces coordination quality, which can indirectly compromise typical project objectives, such as cost, duration, and risk. The enhanced POW-ID model complements existing tools for assessing cultural congruence as a requirement of joint operations. This section describes the mutually supportive theories, observations, and model enhancements that this project researched and developed.

3.1 Process of Researching and Developing the POW-ID Model Enhancements

This project researched and developed POW-ID model enhancements to represent interactions between differing organizational and occupational cultures. The differences in decision making and exception handling culture that exist between two distinct organizations from a single country are real (although perhaps more subtle than national differences between typical construction firms in the US vs. Japan). These differences can be observed, and measured, and therefore modeled.

The research team collaborated with experienced military personnel to investigate how several branches of the U.S. Department of Defense use different recruiting and training protocols and follow different decision rules from one another. This research developed structured interviews and surveys to be carried out (the Appendix provides this protocol). Unanticipated procedural setbacks prevented the team from accessing and interviewing military personnel formally at USTRANSCOM, though. Instead, researchers drew evidence to support the model primarily from a review of prior research, and secondarily from unstructured interviews with personal contacts from the broader population.

Ethnographic interviews of personnel with experience in the different branches of DoD uncovered key differences in actor micro-behaviors across branches of the US DoD. Making them explicit may prove valuable as a guide to future training and acculturation of personnel who will be engaged in joint forces operations. Making them explicit also may prove valuable in designing more robust and flexible joint forces exception handling work processes, and in designing tools to accommodate the different protocols of differing organization cultures (such as US Army, Air Force, Navy, Marines, Special Forces, and other units of DoD).

The team also encoded the obtained insights into a new version of POW-ID. This new version of POW-ID allows for different “behavior files” that can be attributed to actors in a joint forces organization who come from different branches of US DoD, and allows for modeling the perceived distance between cultures. The team conducted initial validation experiments to begin calibrating the assumptions about actor information processing micro-behaviors against the resulting macro-organizational outcomes. The results from these experiments provide initial indications that continued work in this direction is justified. However, fully developing,
calibrating, refining, and validating a model based on our prototype will require a substantial amount of additional work.

3.2 Cultural Differences

This section describes cultural differences that can affect work modeled in POW-ID. Rather than focusing on specific cultural distinctions between actors, this research project generally focused on the fact and the degree of difference itself. In particular, the developed model enhancements (described in the next section) capture certain essential dynamics that occur when actors from different services coordinate, regardless of which services (Army vs. Navy) are represented. Still, determining the strength of effect to model using the enhancement requires knowing how actor cultures differ.

The theory and observations provided in this section support enhancements to the POW-ID organizational model that represent intercultural coordination challenges. Breslin [2000] and Nuciari [2006] review traditions and literature surrounding models and the quantitative/qualitative military sociology debate. This section only addresses social science literature directly supporting our research method and theoretical foundation. This section punctuates the discussion with related quotes from ethnographic interviews conducted for this research. The experience of interviewed personnel spans Navy, Air Force, Coast Guard, and civilian defense service from the 1950s to the 2000s. Their testimonies provide preliminary but significant observational evidence to support the research and model interpretations.

3.2.1 Definition of Military Culture

This research draws service, generation, rank, and other distinctions within the scope of military culture. "Institutions [such as the Army or Navy] are comprised of regulative, normative, and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning to social life" [Scott 2008 p. 48]. In particular, "organizational identity provides participants with a core set of normative elements around which to craft their narratives and sense-making activities" [p. 116]. Most relevant to this research, Murray [1999] provides the following definition: "Military culture comprises the ethos and professional attributes, derived from both experience and intellectual study, that contribute to military organizations' core, common understanding of the nature of war." Culture and operations are interdependent; Just as culture affects military operations, "How military operations are conducted affects the information environment by impacting perceptions, attitudes and beliefs" [Murphy 2008].

3.2.2 Types of Cultural Distinctions

Interviews conducted for this research revealed several cultural distinctions within USTRANSCOM and other military organizations. Table 1 identifies the most prominent distinctions, which this research evaluated as candidates to represent as enhancements to POW-ID. In principle, each distinction might reflect significant cultural differences that affect joint operations in significant, different ways. For each distinction, the research identified substantial work practice differences that could be considered aspects of culture. Each of these work practice differences reflects dynamics that POW-ID modelers could, in principle, use to prove
the concept of modeling intercultural conflict. The following subsections evaluate of distinctions in Table 1 as candidates for enhancing the POW-ID model.

Table 1: Illustrative Distinctions between Military Operations Actors

<table>
<thead>
<tr>
<th>Distinction</th>
<th>Example Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service</td>
<td>Navy, Army, Air Force, Marines, Civilian</td>
</tr>
<tr>
<td>Officer</td>
<td>Officer, Enlisted</td>
</tr>
<tr>
<td>Geography</td>
<td>East Cell, West Cell</td>
</tr>
<tr>
<td>Function</td>
<td>Technical, Management</td>
</tr>
<tr>
<td>Rank</td>
<td>Private, Corporal, Sergeant</td>
</tr>
<tr>
<td>Tenure in Position</td>
<td>Years of Service</td>
</tr>
<tr>
<td>Warfighting Tradition</td>
<td>Edge, Conventional</td>
</tr>
<tr>
<td>Generation</td>
<td>Vietnam, Gulf 1, Gulf 2</td>
</tr>
</tbody>
</table>

3.2.3 Service and Officer Distinctions

Compared with cultures from different nations or from different industries, cultures from different military services are quite similar. For example, consider Hofstede's five principal dimensions of culture [Hofstede 1991]. Those five dimensions were introduced to measure cultural differences between nations, and have formed the basis for previous POW-ER models of culture [Horii 2005]. Hofstede's dimensions measure all military services as generally paternal (intuitively, militaristic), uncertainty avoiding (disciplined), collectivist (sacrificing), long-term (investing in foreign wars), and high in power distance (authoritarian). A view of the military's distinctive occupational culture, a view that looks between the scales of organizational and national cultures [Soeters 2006], can be used to view the distinctive features of service representatives in a joint forces organization.

Actors from different services face distinctive communications challenges during joint operations [Douglas 2009]. For example, the Army is often criticized for being direct, and the Air Force for relying on technology that can become divorced from military needs [Haynes 1998]. Furthermore, our interviews revealed that differences within services are often as large as differences between services. For example, one key dimension of cultural difference (according to Hofstede) is short- vs. long-term orientation, which distinguishes how decisions consider immediate rewards vs. posterity. Air force pilots rely on a short-term orientation to survive dogfights, yet the air force procurement process requires a long-term orientation to ensure technological dominance (a feature that is critical for establishing air supremacy).

There are similar cultural distinctions between military and civilian, and between officers and enlisted personnel. Breslin [2000] provides survey data and interpretation regarding Army culture for War College Students and Junior Officers. Breslin concludes that there is agreement on mission but dissatisfaction about compensation and ability to perform as required. Breslin finds that differences between students and officers show a disconnect also, especially as regards
Military Operations Other Than War (MOOTW). Breslin identifies these disconnects as potentially harmful given the Army's efforts to 'do more with less.'

POW-ID is able to capture many of these distinctions using enhancements developed previously (Horii et al 2005, Ramsey et al 2009). For example, POW-ID is able to model different actors having different tendencies to conduct rework, to attend meetings, and to refer problems to supervisors. This research used these (currently adequate) features of POW-ID, rather than building new features to represent military, service, or officer distinctions.

3.2.4 Geographic Distinctions

The interviews conducted for this research revealed significant differences in behavior between teams managing logistics for different geographies. In particular, the activities in cells that support current warfighting operations (including wars in Iraq and Afghanistan) were qualitatively more boisterous from others. However, these differences were identified as stemming from work climate – temporary conditions – rather than work culture. POW-ID is already built to model the emergence of important climatic differences (such as backlog and chronically ignored exceptions) resulting from lower-level conditions (such as task work volume and complexity). Modeling the identified features of the geographic distinction thus required no enhancement to the existing POW-ID model.

3.2.5 Functional Distinctions

The interviews conducted for this research identified cultural differences between management and technical personnel. POW-ID currently models actors as having roles, termed Subteam, Subteam Lead, or Project Manager. POW-ID currently includes many features that distinguish behavior between these roles, such as the tendency to conduct rework vs. ignore requests to conduct rework. None of the evidence collected for this research indicated that the current POW-ID model required enhancements to capture functional role differences in military joint operations.

3.2.6 Rank, Tenure in Position, Tradition, Generation Distinctions

This research investigated modeling rank, (e.g., Private vs. Sergeant), the amount of time in position (e.g., years in service), warfighting tradition (e.g., trained in conventional vs. network-centric warfare), and generation (e.g., experienced in Korean, Vietnam, Desert Storm, or Afghanistan wars). Richard B. Myers, Air Force General and Chairman of the United States Joint Chiefs of Staff, underscored the importance of these distinctions: "The way the military has trained and educated leaders is a hurdle that must be overcome … [current leadership was] brought up primarily in the Cold War. That's where they were educated, that's how they were trained, by those precepts, and that's what they are living with … We have to create a new generation of leaders who are not constrained by what the doctrine says" [Garamone 2004].

In theory, these four distinctions have different influences on actor behavior. In practice, though, these distinctions are highly correlated in the population. For example, actors with just one decade of defense experience surely did not serve in the Korean War, and actors who served in the Korean War surely spent their formative years training within the conventional (rather than the network-centric) warfighting paradigm. This research therefore considers a single measure,
years of defense experience, as the initial indicator of rank, tenure in position, military tradition, and generation of warfighting paradigm.

3.3 Cultural Distances

This research follows a method of modeling intercultural interaction that is exemplified by Horii [2005]. That research demonstrated the POW-ER model's ability to assess organizations that contain actors of different cultures. This research goes further to model how cultural distance – the amount of difference between the cultures of interacting actors – can cause coordination failures.

This section motivates and formally specifies an enhancement to POW-ID that represents cultural differences leading to coordination difficulties. These difficulties occur in proportion to measures of difference between interacting actor cultures. These difficulties' direct results are to increase the chance of failing to attend to coordination needs. POW-ID simulates these interactions to assess emergent (downstream) effects on higher-level project measures, such as project cost and duration.

3.3.1 Purpose for Modeling Cultural Distances

The model enhancements developed for this project emphasize the amount, rather than the type, of cultural difference. Models, like theories, necessarily are simplified versions of reality. Models rely on conceptual parsimony for their value. From focusing attention on just two measures of the amount of difference, yet addressing many cultural distinctions, the model enhancements derive elegance – meaning, their explanatory power far exceeds their complexity.

This research defines cultural distance as a measure of the amount of difference between actors' work practices. Cultural distance abstracts potentially important details of culture and intercultural conflict out of the model. These details remain amenable to further study and complementary modeling enhancements. Until those details are captured, however, model users must bear this simplification in mind when interpreting the model's input and output. Now, though, the cultural distance measure can provide insights that are relevant to the distinctions from Table 1 and to the many combinations of those distinctions.

The cultural distance measure also reflects actor preconceptions of other services, rather than conceptions based on actual work practices. For example, the use of different uniforms between services (and of different insignia between ranks) highlights the presence, but not the nature, of difference. The Air Force recruiting slogans "No one Comes Close" and "Above All" are consistent with an attitude of superiority to other service personnel - an attitude that several informants indicated was widespread. One interviewee explained that Coast Guard training seemed to instill seemingly arbitrary biases against other services: "Biases among military services manifests informally, such as in the chants folks chant while marching: 'I don't know but I've been told, Air Force brats …'."

The effects of actor service and generation can interact. For example, consider the prospect that alienation from other services becomes entrenched by hazing, when new recruits must rationalize their choice to join a particular service (and their choice to serve as military vs. civilian). An informant for this research indicated that military academy trainers often lamented their inability to haze as forcefully as they had been hazed themselves. This prospect suggests
the rigidity of actor beliefs about their services' superiority could ease over the decades as hazing practices become less intense. Further research might consider this possible link between hazing and effectiveness in joint operations. As a first-order model, though, this research considered the effects of service and generation to interact only through the dynamics of simulated joint operations.

3.3.2 The Centrality and Challenges of Coordinating Across Cultural Distances

POW-ID previously addressed some, but not all of the features that researchers consider necessary for effective joint operations. From a review and synthesis of the literature, Douglas and Strutton [2009] conclude "Four ubiquitous concepts collectively characterize jointness. These concepts are: functional competence, reciprocal understanding, cross-functional communication, and trust" (emphasis added). The first two concepts have been fundamental to POW-ER since its origin [Christiansen 1993]; functional competence corresponds to 'actor skill', and reciprocal understanding corresponds to 'actor experience' and 'team experience'. Trust was introduced to the POW-ER research program separately [Zolin 2002]. Cross-functional communication is the element of POW-ER that this research uses to assess the effects of cultural distance explicitly.

Focusing attention on designing organizations for effective communications also parallels the thinking of current U.S. military leadership. Chairman of the United States Joint Chiefs of Staff, Air Force General Richard B. Myers, stated authoritatively that leaders across the services "are more willing to … create different organizations to meet the problem at hand." Yet, "it's tough to turn the ship in the direction it needs to go" [Garamone 2004]. Murphy [2008] expressed that "Key to success is an organizational unit culture that values, understands, and thus considers strategic communication means as important capabilities to be integrated within established planning processes … [Moreover,] it is less important to have a school-trained information staff section than to have the command understand the value and importance of information effects and incorporate strategic communication means to achieve those effects into the existing planning process."

The current research extended POW-ER to consider communications challenges resulting from cultural distance – a measure of the degree of substantive difference between two cultures. In particular, this research explored the implications of cultural distance reducing the chances of communication being effective. To operate jointly, "Functions must be able to communicate with each other in timely and effective ways" [Douglas and Strutton 2009]. The challenge of communicating across cultural boundaries is broadly observed in practice. For example, according to Navy Cmdr. Gregory Sleppy, "Each organization and department has their own rules on how they share things and those rules are not always the same. We are trying to figure out what those things are that impede the progress and flow of information … it is difficult to make good decisions without all the information" [Parker 2009].

3.3.3 Design of the Cultural Distance Model

In POW-ID, the probabilities of generating and of attending to coordination needs (such as information exchanges and exceptions) depend on several modeling parameters, such as the degree of task uncertainty, the degree of organizational formalization, the emergent distribution of other work items competing for the recipient's attention, and calibration constants. The POW-
ID model of coordination can represent certain forms of cultural differences (see Horii 2005], but requires an enhancement to represent cultural distance.

In the enhanced POW-ID model, the probability that a recipient actually attends to a coordination item is a function of the distance between originator and recipient cultures. Specifically, the probability of actually performing the requested work is lower if the originator and recipient are in different services. A second intervention models compliance with communication requests based on the difference in rank between the communication's originator and recipient. The purpose of this feature is to reflect misaligned incentives and inconsistent communication protocols affecting the probability of successful interoperation.

The strength of this intercultural effect is a readily edited modeling parameter. In particular, within the traditional POW-ER interface, experimenters are able to calibrate their projects to go from cultural barriers having a dominant effect to having no effect on compliance. The purpose of allowing modelers to freely edit the strength of this feature is to enable readily evaluating the effects of aligning incentives, such as by introducing 360-degree reviews. Additional experiments that are amenable to assessment include establishing formal request/reply protocols and implementing communications technologies believed to transcend cultural boundaries (see Downes-Martin 1992 and Parker 2009).

3.3.4 Implementation of the Cultural Distance Model

This subsection provides a technical definition of the model enhancements the project developed. The cultural distance model provides the following three new model variables:

"Rank," a property on positions, is an integer ranging from 0 (default) to 10
"Coord Rank Wt," a property on projects, is a real number from 0.0 (default) to 1.0
"Coord Culture Wt," a property on projects, is a real number from 0.0 (default) to 1.0

POW-ID uses Rank to calculate a particular type of cultural distance between coordinating sender and recipient positions. Rank can represent the traditional title in military or civilian service, or can be a proxy for generation, warfighting tradition, or tenure (years) in position (as explained in Cultural Differences, above). The model enhancement that uses Rank applies an adjustment to the probability of attending to each incoming coordination message (communication, meeting, noise, exception, or decision). The effect of this adjustment is to decrease the probability of attending to coordination items from lower-ranked positions, and to increase the probability for items from higher-ranked positions. POW-ID calculates the Rank adjustment using a formula that resembles the following:

\[ 1.0 + \text{CoordRankWt} \times \frac{\text{sender.rank} - \text{recipient.rank}}{10} \]

POW-ID uses Culture, a pre-existing POW-ID property on positions, to calculate a different type of cultural distance between coordinating sender and recipient positions. The model enhancement that uses Culture, like the one using Rank, applies an adjustment to the probability of attending to each incoming coordination message (communication, meeting, noise, exception, or decision). POW-ID calculates "CulturalDistance(sender, recipient)" from Cultural Distance Weight, a variable provided at the end of each cultural behavior file. CulturalDistance(sender, recipient) is the weight applied to culturally related parameters. For two actors coming from the same culture, the weight is 0.0; for two from maximally distant
cultures, the weight is 1.0. The effect of this adjustment is to decrease the probability of attending to coordination items from positions from other cultures. POW-ID calculates the Culture adjustment using a formula that resembles the following:

\[ 1.0 - \text{CoordCultureWt} \times \text{CulturalDistance}(\text{sender, recipient}) \]

In summary, the enhanced version of POW-ID derives the new probability of attending to a coordination request (P') based on the original probability (P) using the weights above in a formula that resembles the following:

\[ P' = P \times \left[ 1.0 + \text{CoordRankWt} \times (\text{sender.rank} - \text{recipient.rank}) / 10 \right] \times \left[ 1.0 - \text{CoordCultureWt} \times \text{CulturalDistance}(\text{sender, recipient}) \right] \]

Because P' is a probability, it is capped at 1.0.

3.4 Guidelines for Using the Cultural Distance Model

This section provides basic guidelines for using the enhanced POW-ID model in practice. The enhanced POW-ID model is notably complementary to ongoing efforts at assessing joint military operations, and the model is particularly amenable to evaluating the alignment of incentives in a long-term, joint collaboration (such as USTRANSCOM). The guidelines in this section are meant to complement – but not substitute for – the considerable guidance that existing literature offers to organizational designers who use computational models (see, for example, Lave and March 1975, Burton and Obel 1995, Carley 1996, Levitt et al 1999, Lomi and Larsen 2001, and Horii 2005).

3.4.1 Using the Enhanced POW-ID Model to Assist Organizational Design

The current Secretary of Defense, Robert M. Gates, writes that cultural change is an important goal of the contemporary military, but one that requires moderation [Gates 2009, p.7]. Indeed, organizational design requires balancing positive and negative aspects of cultural integration that sometimes extend beyond the POW-ID model's broad but finite scope. For instance, some research indicates that cross-cultural teams help develop common (and possibly improved) understanding of joint operations and doctrine (such as AirLand battle, which requires traditionally-divided Air Force and Army participants – see Haynes 1998). Yet, fusing teams with different cultures can foment role ambiguity, which has been statistically linked to lower job commitment [Cho and Lee 2001]. Douglas and Strutton [2009] highlight the latter dynamic, pointing out that "Training and logistical requirements associated with forced inter-service or interfunctional jointness can injure morale and efficiency," and concluding that "Modern U.S. military leaders must struggle to find the golden mean that exists between pursuing too much or too little jointness."

The United States joint forces are expending significant effort to help communications penetrate organizational barriers effectively. As an example of such an effort, the U.S. Joint Forces Command's Joint Concept Development and Experimentation Capabilities Solutions Group conducted an experiment that introduced new communications technologies to an organization containing military and civilian teams. Navy Capt. Timothy Spratto, lead, said of the exercise: "All the agencies who participated … saw an immediate improvement in their ability to share and receive information and build better situational awareness [across
organizational boundaries] ... We will determine if what we have accomplished is an improvement on existing information sharing architectures, methodologies, policies and processes ... If there is something we can deliver directly to present operators now to put into use immediately, we will look to move that into theater" [Parker 2009]. That effort clearly situates experimentation in the process of designing joint operations.

Countless important questions can be addressed by cross-validating the results of POW-ID simulation, the claims of theory, and observations of large-scale, human experimentation (such as that described in Parker 2009). The enhanced POW-ID model can provide economical, preliminary assessments to guide large-scale experiments, to help explain their results, and to independently assess possible enhancements before interventions enter the field. The POW-ID model is intended to assess how intercultural conflict's effect of reducing communications completion rates could lead to a syndrome of effects that are important to organizational designers, such as increases in schedule, cost, and risk. As Nuciari [2006] states, "Some variables [that describe military culture] are internally linked and condition each other. ... Other variables are not necessarily linked." For research, the model of intercultural communication provides a micro-theory-founded linkage between certain macro-level organizational behaviors. For practice, experimenting with the model draws attention to the degrees and types of linkages that emerge in the simulation of a given project.

3.4.2 Modeling the Alignment of Incentives

Joint operations are matrix organizations [Galbraith 1977, Kates and Galbraith 2007], meaning that each actor is responsible simultaneously to a project (e.g., USTRANSCOM) and to a function (e.g., U.S. Navy) – fundamentally, though sometimes implicitly. A principal impediment to any matrix organization achieving project (joint) goals is conflict between actors due to incentives that differ by function. For example, some actors are partly beholden to the Navy, others to the Air Force. An important goal is to better align the incentives of joint operations participants, such as by basing career advancement and other rewards on reviews from actors in other services.

Aligning incentives to support information sharing is a critical, ongoing effort in the U.S. military. According to Douglas and Strutton [2009], "Not so long ago, functions in the United States military (i.e., the Army, Navy, Air Force, and Marines) were rewarded only when they met their own, rather than organizational, objectives ... [Yet,] when personnel across functions are able to share information and resources effectively in the pursuit of common objectives, the prospects for jointness are enhanced. ... [So,] management should ensure that individual functions are rewarded for organization-wide outcomes." Some research indicates that transformational leadership is ineffective unless properly-aligned incentives are already in place [Bass 1997]. Current military leadership recognizes the connections between incentives, communications, and effective joint operations, as evidenced by current Defense Secretary Robert Gates' statement: "The military capabilities we need cannot be separated from the cultural traits and reward structure of the institutions we have. ... Never neglect the psychological, cultural, political, and human dimensions of warfare" [Gates 2009].

Aligning incentives is difficult to achieve in practice, and difficult to achieve in realistic natural experiments, but easy to achieve in POW-ID. In particular, aligning incentives in a joint operation has one direct result: actors become as willing to attend to coordination with actors of
different cultures as they are to attend coordination with actors of the same culture. In the POW-ID enhancement this research provides, aligning incentives simply requires reducing the input distance between actors. Comparing the output of POW-ID models with high vs. low cultural distance is an economical method of assessing the indirect results of incentive alignment on schedule, cost, risk, and other measures of interest for a particular project.

In summary, using POW-ID to assess the effects of reducing cultural distance by aligning incentives has practical value because the potential value of aligning incentives is high, and the cost of alternative assessment methods (such as those described in Parker 2009) is also high, but the cost of model-based assessment is low.

4.0 RESULTS AND DISCUSSION

This section discusses the results of five experiments using the cultural distance and rank difference POW-ID enhancements. Table 2 introduces the experiments' models. The first four experiments use a generic, simple project model to aid intuition on organizational dynamics. The simple model results are easy to compare with theory and conventional wisdom. Those same results are difficult to compare against real project performance, though, since the latter includes many interacting, different components. The fifth experiment involves a model of Fusion Center operations. Although the Fusion Center results are too complex to compare with theory in this study, they demonstrate the practice of project management assistance using organizational models.

<table>
<thead>
<tr>
<th>Experiment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0. Baseline Model</td>
<td>Provides control behavior at default values.</td>
</tr>
<tr>
<td>1. Cultural Distance</td>
<td>Mono-Cultural through Multi-Cultural Organization.</td>
</tr>
<tr>
<td>2. Rank Difference</td>
<td>Single-Rank through Multiple-Rank Organization.</td>
</tr>
<tr>
<td>3. Culture and Duration</td>
<td>Changes to Cultural Effects due to Long/Short Projects.</td>
</tr>
<tr>
<td>4. 'Going Purple'</td>
<td>Multi-cultural vs. forced mono-cultural project.</td>
</tr>
<tr>
<td>5. Fusion Center</td>
<td>Demonstrates a Model Based on Real, Complex Project.</td>
</tr>
</tbody>
</table>

Baseline

The 'Baseline' is a simple POW-ID project model that illustrates the cultural distance and rank difference enhancements. Figure 1 details the Baseline's structure. The Baseline has three positions: 'Team 1', 'Team 2', and 'Manager'. The Baseline has three corresponding tasks: 'Task 1', 'Task 2', and 'Management Task'. All three tasks are fully connected by communications and rework dependencies. The Baseline's positions and tasks have nominal (default) attributes described in Levitt et al [1999].

The results of these experiments have varying levels of consistency with theory and conventional wisdom. The subsections below introduce POW-ID cases that differ from the
baseline. Each case operationalizes a project management challenge in a POW-ID model. Each model produces simulation results that can be compared against theory, conventional wisdom, and doctrine.

Figure 1: Baseline POW-ID Model Structure

Cultural Distance

The Cultural Distance experiment investigates POW-ID model assessments of the effects of cultural distance on project performance. The experiment considers two independent changes to the Baseline model. In one change, teams have a large cultural distance. In models with this change, Team 2 has a different culture from Team 1. In the other change, management has a large cultural distance from the teams. In models with this change, Team 2 has a different culture from the Manager. These two independent changes give rise to the four cases that Figure 2 illustrates.
Figure 3 details the Culture Distance model results. In summary, the experiments found that culturally diverse projects have the shortest duration and the lowest cost. These results are consistent with the reduced volume of attention that culturally different agents pay to coordination items. The experiments also found that the culturally diverse cases produced the lowest functional risk. This result contrasts with the intuition that breakdowns in intercultural coordination result in defective work. However, the result is consistent with the interpretation that coordination can take away from immediate decision making, and coordination failure – induced risks affect tasks over a long period. This interpretation motivated the Culture and Duration model explored below.
Rank Difference

The Rank Difference experiment explores POW-ID model assessments of the effects of rank difference on project performance. The experiment considers two alternatives to the Baseline model. In one alternative, the supervisor is considered to be higher rank than both subordinates. In that model, the Manager position has Rank 10, whereas Team 1 and Team 2 have Rank 1. In the other alternative, the supervisor and one subordinate have the same rank, but one subordinate has lower rank. In that model, the Manager and Team 2 have Rank 10, whereas Team 1 remains at Rank 1. This experiment did not consider alternatives in which the manager has lower rank than subordinates. That case might provide valuable insights, but was not prominent in the literature review and surveys we conducted.

The Rank Distance model reflects a placement of priorities among agents that is independent of the reporting hierarchy. The existing POW-ID model of reporting hierarchy indicates the directions that information flows when exceptions occur. Exception handling in POW-ID reflects that model's calibration against numerous real-world projects. By contrast, the
rank distance model adds to these dynamics a tendency to pay different amounts of attention to coordination items based on sender rank. That model operates independently of the items' contents or the sender's organizational position.

Figure 4 presents the effects of rank distance on functional risk. The results are that lower-ranked subordinates develop higher functional risk in their work tasks. More specifically, the functional risk of each task varies according to the number of collaborators of higher rank minus the number with lower rank. Although the direction of these effects matches intuition, they have low magnitude. This could indicate that the effects may require a longer project to fully manifest, or that the model enhancements might require additional calibration.

Figure 4: Functional Risk Results from the Rank Difference Experiment

The Culture and Duration study investigates how project duration modulates cultural distance effects. The experiment represents two extremes of cultural diversity. The monocultural extreme is the Baseline model, in which all positions have the same culture. The multicultural extreme is the Baseline with high management culture distance and team culture distance. Those two cultural extremes were simulated with short, medium, and long duration tasks. In particular, the Short, Medium, and Long cases have tasks that contain 5, 27.5, and 50 nominal days of direct work.
The Culture and Duration study assesses the prospect that organizational adaptations for short and long projects differ. The Cultural Difference experiment's results suggested that failing to attend to coordination by agents from other cultures may benefit a short project. In real-world projects, though, developing a divergent world-view by failing to coordinate adequately can increase risk substantially over the long term. This difference suggests organizations adapting to short-term intercultural interactions could make themselves worse – not better – at long-term intercultural relationships. Figure 5 shows the experiment's results, which found no interaction between cultural difference and duration. Still, the formal analysis is responsible for revealing the prospect of interaction, which merits further (possibly independent) study. Also, the formal analysis in Figure 6 indicates that longer-term projects tended to build-up larger backlog. That backlog could reflect feelings of stress that interviewees associated with multi-cultural projects.

Figure 5: Cost Breakdown Results from the Culture and Duration Experiment
The Going Purple study investigates how forced cultural homogeneity might compare against the preservation of diversity. This study was inspired by a Douglas and Strutton [2009] review and synthesis of literature. That paper indicates that multicultural projects face a dilemma. Preserving cultural diversity retains adaptations to task work. For example, Air Force pilots survival depends on making fast decisions, but Air Force acquisition officers rely on making careful decisions (according to interviews for this study). Forcing pilots and acquisition officers to decide similarly might improve their coordination effectiveness, but it likely would compromise their direct work. Going purple – adjusting to a single, shared culture – presents a dilemma.

The Going Purple experiment represents three cases. The mono-cultural extreme is the Baseline model, in which all positions have the same culture. The multi-cultural extreme is the Baseline with high management culture distance and team culture distance. The third (Purple) case is like the multi-cultural extreme, but with one exception: the tasks have High complexity. The mono-cultural and multi-cultural cases, like all other cases produced for this research, have Medium complexity. Figure 7 provides results from the Going Purple experiment. The High complexity of tasks caused the Purple case to perform significantly worse than the Baseline model.
Fusion Center

The Fusion Center study exercises a complex model that is based on a real-world organization. Figure 8 illustrates the POW-ID model's thirty four tasks, nineteen positions, and nine meetings. These objects represent real-world entities from multiple armed services that now operate across cultural boundaries. This study exercised the Fusion Center model, as provided by the AFRL, using the enhanced POW-ID software. This study also derived alternative Fusion Center cases with high cultural distance, high rank difference, and both conditions.

The Fusion Center study's results seem consistent with those from previous experiments on simpler models (described above). A particularly interesting result of the study was that the case with high-rank managers minimized communication risk. That result suggests that ignoring lower-ranked positions' coordination requests keeps the managers free to attend to higher-priority items. That adaptation could, ironically, result in higher long-term success even for the ignored subordinates. A detailed study of the Fusion Center model is beyond the scope of this study. Still, this research's results suggest that such a detailed study is now possible.
5.0 CONCLUSIONS

This study reviewed literature and interviews related to intercultural conflict in military project organizations. Intercultural conflict is a source of diverse and complex problems that now hinder critical military operations. The research produced an interview protocol for investigating these conflicts (provided in Appendix A), but was unable to conduct interviews using the protocol during a field study. Without a detailed field study as guide, the research categorized several relevant cultural distinctions (distinguishing, for example, military vs.
Based on these distinctions, the study focused on two measures. The first measure – cultural distance – is a rough, aggregate measure of the total difference between two actor cultures. The second measure – rank difference – indicates the amount of seniority that one actor has over another.

This study formulated and implemented POW-ID model enhancements to reflect cultural distance and rank difference. The cultural difference enhancement causes positions to be less likely to attend to coordination items when the sender has different culture. The rank difference enhancement causes positions to be more (less) likely to attend to coordination items when the sender has higher (lower) rank. These basic model enhancements can trigger complex model dynamics, just as simple cultural differences produce complex dynamics in real projects.

This study conducted several experiments based on a simplified model and a more complex model based on a real world project. Many of the results from modeling intercultural interaction agree with theory and conventional wisdom. Results that do not agree draw attention to opportunities to extend the corresponding theory or model. Additional studies would be required to refine the model for more realistic, practical analysis. The model already serves a practical purpose, though, by providing structure to the creative exploration and analysis of multicultural project dynamics.
REFERENCES


Douglas, Matthew, and David Strutton (2009) "Going ‘purple’: Can military jointness principles provide a key to more successful integration at the marketing-manufacturing interface?" Business Horizons.


APPENDIX A

STANFORD ORGSIM/CRGP INTERVIEW PROTOCOL

Developed for TACS Task Order #10

Organizational Research Generator for Simulation in the Military (ORGSIM)

Each interview will include Parts 1, 2, and 3, plus either 4A, 4B, or 4C if time allows.

Questions in italics indicate options to pursue if time allows.

<table>
<thead>
<tr>
<th>Part 1 – Interviewer Identification and Introduction (2 minutes):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hello, my name is John Chachere. I work for the Collaboratory</td>
</tr>
<tr>
<td>for Research on Global Projects at Stanford University. I am</td>
</tr>
<tr>
<td>here in hopes of gaining an understanding of the current</td>
</tr>
<tr>
<td>operations of the Fusion Center as well as any barriers you</td>
</tr>
<tr>
<td>and others may be facing while continuing to mature Fusion</td>
</tr>
<tr>
<td>Center processes. We are here as honest brokers to find the</td>
</tr>
<tr>
<td>right solutions in making the Fusion Center a success. We</td>
</tr>
<tr>
<td>expect the interview to last 45 minutes to an hour.</td>
</tr>
</tbody>
</table>

We have been conducting interviews with people like you to learn about processes and activities people perform throughout the day. We are particularly interested in how multiple service members and civilians work together. My team and I are using the information we gather to develop an organizational model of the Fusion Center processes. From this research, you may benefit from a greater understanding of the activities that transpire at work, and your participation will support research that may contribute to knowledge on the subject of project performance. If you provide contact information, we will offer you access to the results of this research as soon as they are available.

There are no reasonably foreseeable risks or discomforts involved to you. Your identity will be kept in total confidence, and responses will not be associated with your name, in any disclosure of the study's results. You may contact me anytime using the information on my business card (provided) if you have any questions about the study or your rights.

Your participation in this study is entirely voluntary. You may refuse to participate or to complete the interview with no penalty or loss of benefits to which you are otherwise entitled.

Do you have any questions before we get started?

<table>
<thead>
<tr>
<th>Part 2 – Interviewee Identification (3 minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How many years of full-time military service</td>
</tr>
<tr>
<td>have you completed?</td>
</tr>
</tbody>
</table>

2. What is your current job title?

3. Briefly summarize your current professional duties.
Part 3 – Intercultural Effects on Hidden Work (40 minutes)

These questions are about times when you **requested a supervisor to make decisions.**

1. To whom do you escalate problems?
2. When and how do you escalate problems for a supervisor to decide on?
3. How do groups differ regarding how often to escalate problems?
4. How do groups differ regarding how high to escalate problems?
5. Tell me about a time when escalating problems was complicated by service differences.
6. Tell me about a time when escalating problems was complicated by military/civilian differences.

(for managers) These questions are about times when **subordinates requested you to make decisions.**

7. Who escalating problems to you?
8. When and how do subordinates escalate problems for you to decide on?
9. Tell me about a time when escalating problems was complicated by service differences.
10. Tell me about a time when escalating problems was complicated by military/civilian differences.

These questions are about times during when you **held formal meetings.**

11. With whom do you hold meetings?
12. When and how do you hold meetings?
13. How do groups differ regarding how much information to share?
14. How do groups differ regarding formal vs. informal information sharing?
15. Tell me about a time when a meeting was complicated by service differences.
16. Tell me about a time when a meeting was complicated by military/civilian differences.

These questions are about times when you **shared information informally.**

17. From whom do you collect information?
18. To whom do you disseminate information?
19. When and how do you share information?
20. Tell me about a time when requesting information was complicated by service differences.
21. Tell me about a time when requesting information was complicated by military/civilian differences.
These questions are about the effects of having multiple groups in the Fusion Center.

22. How does having multiple service members:
   
   a. Affect the pace of work's completion?
   b. Affect the development of skills and understanding?
   c. Affect team spirit, stress, and hostility?
   d. Affect risk?
   e. Affect innovation?
   f. Affect work otherwise?

23. What would make it easier to work with people from different military services?

24. Does having people from military and civilian organizations:

   a. Affect the pace of work's completion?
   b. Affect the development of understanding?
   c. Affect team spirit, stress, and hostility?
   d. Affect risk?
   e. Affect innovation?
   f. Affect work otherwise?

25. What would make it easier to work with people from military and civilian organizations?

Thank you very much for your help!

If you would like a copy of the research results, please provide an email address.

What questions do you have?

A-3
Part 4 Option A – Perception of Multicultural Workplace (15 minutes)

These questions are to summarize how work practices differ.

1. What differences do you perceive between different services' work practices?

2. What differences do you perceive between military and civilian work practices?

3. What traditions, values, rules, and norms lead to misunderstandings between services?

4. What traditions, values, rules, and norms lead to misunderstandings between military and civilians?

These questions are to summarize the effects of having different work practices.

5. If you have worked with a supervisor from a different service, how did coming from different services affect your work?

6. If you have worked with a subordinate from a different service, how did coming from different services affect your work?

7. If you have worked with a (military/civilian) supervisor, how did having a (military/civilian) supervisor affect your work?

8. If you have worked with a (military/civilian) subordinate, how did having a (military/civilian) supervisor affect your work?

Thank you very much for your help!

If you would like a copy of the research results, please provide an email address.

What questions do you have?
Part 4 Option B – Work Goals (15 minutes)

For this part I will ask your view of factors that affect work quality. Please indicate how important those factors are for you. Indicate 0 if the factor is never important. Indicate 10 if the factor is always of paramount importance. Indicate a number between 0 and 10 if the factor is sometimes important but sometimes traded off against other measures.

1. Agility – decide and act quickly.
2. Situational Awareness – share information quickly.
4. Team Coherence – maintain a cross-functional sense of community.
5. Leadership – communicate consistently between supervisors and subordinates.
7. Decision Latency – time from requesting supervisor judgment to receiving response.
8. Communication Latency – time between peer communication request and receipt.
10. Coordination Completion – never losing contact with peers.
11. Decision Completion – never losing contact with supervisors and subordinates.
12. Backlog – minimize the amount of work left to do at the end of a typical shift.

13. What other factors do you feel are important?

14. To what extent have you observed people to agree or disagree about these priorities?

   These questions are about times when you **re-evaluated work goals**.

15. Tell me about a time when you re-evaluated work goals that were complicated by service differences.

16. Tell me about a time when you re-evaluated work goals that were complicated by military/civilian differences.

**Thank you very much for your help!**

If you would like a copy of the research results, please provide an email address.

What questions do you have?
Part 4 Option C – Work Methods (15 minutes)

Please estimate these factors for a typical work week.

1. How long after you were asked a question did you answer – on average, and in the worst case?
2. How long after you were asked to do something did you respond (refuse, comply, or otherwise resolve) – on average, and in the worst case?

On a typical day, to what extent do you agree with each of the statements below?

<table>
<thead>
<tr>
<th></th>
<th>Firmly Agree</th>
<th>Slightly Agree</th>
<th>Unsure / Varied</th>
<th>Slightly Disagree</th>
<th>Firmly Disagree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Team members could readily meet in small groups to resolve problems.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>The team’s goals were clear to all.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>All tasks’ requisite knowledge, procedures, options, and authority were immediately available.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Designers were respectful and egalitarian toward one another.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Participants only aspired to the group's success.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>The team used modeling applications to work more productively.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>The team shared common data automatically.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Tasks were arranged so that everyone could work at the same time.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Communication and visualization tools were rich and precise.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Few layers of management were involved.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>The team understood what procedures it should follow.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Decision support tools were available to speed up critical path activities.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Everyone focused exclusively on project work.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

These questions are about times when you re-evaluated work methods.

16. Tell me about a time when you re-evaluated work methods that were complicated by service differences.

17. Tell me about a time when you re-evaluated work methods that were complicated by military/civilian differences.

Thank you very much for your help!

If you would like a copy of the research results, please provide an email address.

What questions do you have?