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FOCUS 2011 OVERVIEW

Over 600 people attended the HSCB Focus 2011 conference, held in Chantilly, Virginia on 8-10 February 2011. Nearly half of the 600 attendees came from industry, over a third from government, including the Department of Defense (covering 93 different organizations), national laboratories, and 19 other government agencies, and the remainder represented 44 different academic institutions. Attendees came from all corners of the United States, with more than half from outside the Washington, DC metropolitan area and representing 32 states. Focus 2011 participants represented nine countries in addition to the United States.

In this edition of the HSCB newsletter, we present a detailed overview of the conference, including summaries of the keynote addresses, a section highlighting many of the posters and exhibits, overviews of workshops, and individual summaries of the conference tracks, each of which highlight just a sampling of the many performers in this domain whose dedication and contributions to the HSCB Program allow us to advance in the field and help move the Program forward.

ISSUE Nº 9 SPRING 2011

Welcome to the ninth edition of the Human Social Culture Behavior Modeling Program newsletter. This edition focuses solely on the third annual Human Social Culture Behavior (HSCB) conference, Focus 2011, held on February 8-10 at the Westfields Marriott Hotel in Chantilly, Virginia. Over the duration of Focus 2011, attendees had the opportunity to hear from over 230 oral presenters, divided into twelve different tracks, each of which focused on a specific subject area such as modeling, cultural training, and analytical methods. Summaries of each of these tracks can be found beginning on page 12. These sessions brought together both the physical and social sciences and provided a setting for their collaboration. Focus 2011 showcased how collaboration between physical and social scientists on a joint effort can develop the tools necessary to help our warfighters win not only today's fight, but future conflicts as well.

In addition to the twelve tracks at Focus 2011, attendees also had the opportunity to view 36 posters and 25 exhibits, many of which showcased programs funded through the HSCB Program. A reception featuring the posters and exhibits provided an opportunity for attendees to meet one another and discover new ways to enhance their work in the field. Some of these posters and exhibits are further discussed on page 4.

This year's conference included a banquet on the second night, featuring a keynote address from Dr. Thomas P.M. Barnett, a New York Times-bestselling author and strategic planner who has worked in national security affairs and has operated his own consulting practice since 1998. He currently serves as Senior Managing Director of Enterra Solutions, LLC, a strategic advisory and technology firm. Dr. Barnett often works within government circles as a forecaster of conflict and is an expert on globalization. As the banquet's keynote speaker, he discussed his strategic vision for America's future.

Another popular event at this year's conference was the Young Professionals Networking Event. This event provided an opportunity for attendees to speak with representatives from government science and technology directorates and industry representatives to gain information about career development, career pathways, and career opportunities, including fellowships and internships. Over thirty young professionals in the HSCB domain attended this event and enjoyed interacting with those who have extensive experience in the domain. This event exemplified the best of the HSCB Modeling Program—not only is the Program gaining importance as a top priority within the Department of Defense, but it will only continue to grow and expand as a new generation seeks new ways to contribute to the hard work already underway.

A new addition to this year's conference was the Human Use/Human Subject Testing Workshop, for which over 200 participants registered. The workshop provided a platform for interested attendees to ask questions about the appropriate use of human subjects in science. The workshop featured briefings and discussions led by government representatives and expert panelists on the distinction between social science research and other analytical activities, as well as discussions on lessons learned by researchers currently working in this domain. A featured article on this can be found on page 3.

SNARC Team

Finally, I would like to once again congratulate the Social Network Analysis Reachback Capability (SNARC) team for their great research which has direct relevance to the HSCB community. I had the privilege to recognize the members of this team during the opening session of Focus 2011, while MG Michael Flynn presented awardees with plaques honoring the individuals for their work. Awardees include: Dr. Alper Caglayan, Dr. Ian Davidson, Mr. Dashun Wang, (accepting for Dr. Albert-László Barabási), Dr. Ed MacKerrow, and Dr. Jennifer Mathieu.

I would like to thank everyone who attended and assisted with Focus 2011 for their significant contributions to the conference and Program as a whole. I look forward to seeing you next year at Focus 2012!

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Conference Attendees

Center, from left to right, Dr. Allison Abbe, Mr. Elmer Roman, and Mr. Scott Peth were recognized for their outstanding leadership and contributions in the HSCB field

Center, from left to right, Dr. Angela Trethewey, Dr. Steven Corman, and Dr. Michael Gabbay are presented with awards for their scientific achievements and contributions to the HSCB Program

Human Use Workshop

Workshop Chair: LCDR Joseph Cohn

The topic of human subject use in sociocultural research has become an important aspect of the HSCB Modeling Program's work. The issue of protecting those from whom information is gathered is of paramount concern to our community; in recognition of that importance, a full day of Focus 2011 was set aside for a parallel workshop on the topic. The relevance and timeliness of this workshop was demonstrated when, soon after the workshop was announced, registration was full, with an equally-sized waitlist of interested attendees. Ultimately, the workshop was moved to a new venue to accommodate the full set of interested attendees.

The protection of human subjects is a critical and sometimes misunderstood topic within the Department of Defense, particularly for those who are new to its complexities. Title 32, Code of Federal Regulations, part 219 establishes policy for all research involving human subjects that is conducted, supported or otherwise subject to regulation by any federal department or agency. This includes research conducted by federal civilian employees or military personnel as well as research conducted, supported, or otherwise subject to regulation by the federal government outside the United States. Additionally, each department or agency head may adopt procedural modifications as may be appropriate from an administrative standpoint.

The Human Use Workshop was co-chaired by Dr. Laura Bosch (Director, Office of Research Protections, U.S. Army Medical Command) and LCDR Joseph Cohn (Military Deputy for the Office of Naval Research's Human and Bioengineered Systems Division). The workshop included briefings delivered by those with expertise in the domain, discussions and clarifications of policy, and first-hand accounts of experiences with the Department's human use policies within the sociocultural domain. The workshop was structured along three main lines: understanding OSD Policy on human subject research; learning more about Service-specific approaches to regulating human subject research; and hearing from several HSCB performers about their lessons learned as they navigated human subjects research regulations while simultaneously ensuring their research was of the highest caliber. By all accounts, the workshop was a success, with audience members, speakers and panelists all engaging in lively discussion throughout the course of the day.

Posters and Exhibits

Exhibit: Mining Afghan Lessons from the Soviet Era (MALSE)

This exhibit described the premise of the MALSE project, which is to access Russian-language documents written by top-level Soviet government decision-makers about the Soviet Union's involvement in Afghanistan, including military conflict from 1979-1989. The Soviets dealt with some of the same insurgents as well as many of the same sociocultural and strategic challenges now facing the United States and Coalition forces. The exhibit depicted the project's efforts to assist the ongoing mission in Afghanistan by drawing on the Soviet experience, reflected in primary sources retrieved from Stanford University's Hoover Archives. The group finds, retrieves, translates, and analyzes formerly classified Soviet records either of high strategic value or that offer military, political, economic and diplomatic lessons. The project is currently focused on the lead-up and aftermath of the Soviet withdrawal, including the successful transition followed by the Afghan government's eventual collapse and the Taliban's rise to power. In particular, the project seeks ways to prevent a recurrence of such outcomes by gleaning insights into security, governance, development and transition. This project is funded by the HSCB Modeling Program with funding executed by the Office of Naval Research. The empirical study's objective is to gain a clearer picture of past conflicts from contemporary documentary evidence in order to inform present-day military and policy leaders. Already, the data have been used to inform the International Security Assistance Force and Department of Defense decision-makers.

Poster: Making Social Media Work for Humanitarian Assistance and Disaster Relief

This poster highlighted a social-media-based system called ACT, which stands for ASU (Arizona State University) Coordination Tracker. Members of the ASU Data Mining and Machine Learning Laboratory developed ACT to facilitate better collaboration and coordination during a crisis. Obtaining decision quality data from disaster scenes is a challenging and critical task. The poster described how timely and accurate data enables governmental and non-governmental organizations to respond appropriately. Although contemporary crowdsourcing and social media applications can provide valuable information about a crisis, these applications fall short in certain ways when supporting disaster relief efforts. As such, the ASU developers designed ACT to address these shortfalls, with the primary goal of providing relief organizations the means for better collaboration and coordination during a crisis. The developers also designed ACT to investigate approaches for enabling collaboration and for providing appropriate security to relief organizations and workers. The poster showed how, by supplementing crowdsourcing information available through social media, the relief organizations can contribute to a unified source of information customized for the group. Using information provided from the crowd and specific members of the group, a relief response can be coordinated efficiently via an open system like ACT.

Exhibit: Charles River Analytics

Charles River Analytics' exhibit provided information on its fourteen ongoing contracts with the HSCB Modeling Program. Its HSCB work includes models, technologies, visualization, human factors, and interactive data mining. Mr. Mike Farry of Charles River Analytics, praised the Focus 2011 conference for giving him and his coworkers who attended the ability to gain knowledge about the domain and how it is being used. Charles River Analytics builds enabling technologies, such as intelligence toolkits, causal reasoning tools, visualization toolkits, and graphic results of models. It has also worked on charting attitudes and beliefs on maps to provide key frames of reference beyond the geographic information systems aspect. The exhibit also described how the company provides training models and enabling technologies, both of which are general analysis tools.

Exhibits, Poster Session, and Reception

HSCB Program Strategic Vision and Conference Overview

CAPT Dylan Schmorrow

Human Performance, Training, and BioSystems

Deputy Director, Human Systems, Office of the Assistant Secretary of Defense for Research and Engineering (ASD(R&E)), Office of the Secretary of Defense (OSD)

The following is a full transcript of the HSCB Program Strategic Vision and Conference Overview.

Good morning everyone. First, thanks to all of you for joining us for these three days of Focus 2011. If it is even half as successful as Focus 2010, I will be very pleased indeed. With my time this morning, I want to provide my equivalent of the State of the Union address for the HSCB Modeling Program. At times and events like these, when we have so much of the sociocultural behavior research, development and engineering community gathered in one place, I think it is helpful to remind ourselves why we are here—doing what we are doing. And, just as important, to look well ahead to the vision of where we ultimately want to be. That, of course, begs all kinds of interesting questions about how we get from where we are now to where we want to be, and I'll spend a few minutes talking about the challenges—many, but not all of which, are technical in nature. Then, as appropriate for a State of the Union, I will share with you what the OSD HSCB Program has been up to. We've had some notable successes that I don't mind touting. But what I most want to do in talking about the Program is simply share with you both my excitement about the kinds of problems we are tackling, and my humility at the breadth and depth of those problems. Finally, a few words about where I see the Program going, in the broader context of all defense-related sociocultural behavior research and engineering—and where you come in.

The human dynamic in irregular warfare is a more prominent feature than in conventional warfare, and the social, cultural and cognitive dynamics of both the adversary and the population must be considered. So, the shift we have all observed in the operating environment from predominantly conventional warfare to predominantly irregular warfare requires a change in the knowledge, skills and abilities that forces need in order to be successful. In turn, those changes have major implications for doctrine, organization, training, material, leadership and education, personnel, and facilities. Altogether, this presents a kind of demand signal for programs like HSCB. We need to ensure that our forces: have the right data on indigenous populations and the training to move easily in those populations; can see the parameters of culture and society and integrate those with conventional mapping of the physical terrain; can detect and influence often complex and dynamic networks, where adversaries and civilian populations are intermingled; and have non-kinetic tools in their kit, along with the ability to anticipate both near-term and long-term impacts of applying those tools.

The Quadrennial Defense Review – or QDR – represents another kind of "demand signal" – not only for the HSCB Program, of course, but for the entire national defense establishment. For those of you who may not be familiar with the QDR, the core is the Key Mission Areas, which express the top level goals of the Department. Now as I look across these six Key Mission Areas, I'm hard pressed to find any that are not supported by the work you all are doing as part of the HSCB Program. However, I do want to focus in on number three, Building the Security Capacity of Partner States. The QDR concluded that Building the Security Capacity of Partner States will play a crucial role in how we organize and partner with other U.S. government agencies, international organizations, and partner nations to address the variety of threats and strategic challenges that the world faces now and in the long term.

The big question that follows is, "How well is the U.S. positioned to be successful in building the capacity of our partners?" To answer that question, a study was conducted to identify the core capabilities for building partner capacity and the most important enabling technologies for each capability. What I found fascinating—and gratifying—is how much the work we are doing through HSCB figures into the nation's capabilities in this Key Mission Area. HSCB research and engineering supports most of the top ten enabling technologies. And, in fact, I noted with great interest that hybrid modeling of human sociocultural behavior was number three on the list. So, this is one indicator that you all are doing high priority work.

So, in our wildest dreams, what would success look like? At the end of the day, what do we want reality to look like as our people engage with foreign populations—foe and friend alike? I encourage all of you to offer your own answers to that question—and here are some ideas to jump-start the conversation.

- The soldier as "cultural chameleon" would be able to adapt reliably and with agility to the sociocultural environment. This ideal means much more than being conversant in the native language; it includes cultural awareness and understanding and real-time access to essential sociocultural data.
- At this point, estimating even first-order effects is challenging, yet in order to have long-lasting impacts—especially with non-kinetic courses of action—we have to be able to anticipate second- and third-order effects with some reliability, and across a range of outcomes of interest.
- Similarly, we have some ability now to track and forecast the stability of a given region. But not very far out. And, as events in Tunisia and

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Egypt have shown—stability can shift much more rapidly than present capabilities allow us to anticipate.

- Tunisia and Egypt have also demonstrated—again—the potential power of social media. Facebook and other tools enable leaderless movements not only to emerge, but to have impacts that are largely unanticipated. Finding ways to better understand the dynamics of these media and to leverage them is imperative.

- Facebook and other tools are mechanisms for social networks to form and share information. Long term, we need to be able to better anticipate what kind of messaging will spread quickly, and in what ways it will spread. This requires not only an understanding of network dynamics, but of the social and cultural frameworks for communication, such as narrative.

- To maximize our resilience and agility, we need the ability to take in and process increasingly massive volumes of unstructured data, rapidly extract meaning and patterns, and make that processed data available on an appropriately wide scale to support agile decision-making.

Putting many of the foregoing capabilities together would enable something like a "social radar." Like radar or sonar, a social radar would enable advance warning and tracking of threats that are driven by sociocultural factors. In the ideal, such social radar would support persistent, global, real-time situation awareness.

As we move forward to realize a vision like the one I just laid out, it is important to maintain awareness of the many factors that may affect success. The landscape in which we are working is, first and foremost, highly dynamic. It's a given that the world is changing across a variety of dimensions—geopolitical, economic, cultural, and climatological. Part of that change is an increasingly dynamic threat space, with irregular, non-state forces and highly distributed challenges-in-waiting. And of course there is rapidly evolving technology, some of which may present great potential for disruption. So what? How should one respond to this reality? First, by working across the landscape of research and engineering stakeholders—federally funded, and the like. Second, by leveraging wherever possible, not simply for the sake of being efficient but because there are great ideas emerging in various places at any given time, and we need to adopt and adapt them when we can. Doing so will yield core technologies that build a solid base and support DoD capabilities.

We also have to track with certain imperatives, those of my office, the Assistant Secretary of Defense for Research and Engineering. Those of us who lead the HSCB Program keep these imperatives firmly in mind, and periodically check what we are doing—the Program's investments, the kinds of problems being addressed, the set of end users being supported, and more—against them. So there is a dynamic world and strategic imperatives that influence what needs to be done and how we can go about doing it. There is also the reality of the operating environment in which any resources or tools are to be used. Workflows and associated tools derive from doctrine. For some, like pilots, there are comprehensive standard operating procedures that guide their actions. Other areas may not be quite so rigorous but have clearly defined work flows and tasks. As the administration calls for a whole of government approach, Secretary Gates calls for an increased focus on strategic communication, and Secretary Clinton calls for Smart Power, it is critical that we step up to the challenge of helping define the methods, models, and tools for the domain and instantiate all of that into workflows. We need to easily point to the rigor and the data that supported our conclusions to take us beyond just opinion to informed, evidence-based decision-making. Especially when it comes to matters of sociocultural behavior, we tend to find a lot of reliance on subject matter experts, who may indeed add value to decision-making, but whose expertise is not necessarily rigorous, often not available where and when it is needed, and may be biased in a variety of ways. The lack of tools and compelling "evidence" causes opinions to be based on limited quantities of human readable content and the limits of unaided human cognition.

So, why modeling? In a word—complexity. Complexity of the situations faced and the responses needed have outpaced not only decision theoretic approaches, but have also outpaced the ability of even the best of experts to deal with the complexities involved. Sources of complexity are accelerating, along with the variety of events and entities that are connected and the density of the interactions, and the speed of interactions. Unaided, relating a cause to an effect is difficult at best; it's almost impossible to predict cascading effects. This driving challenge is part of what motivated the 2006 Strategic Planning Guidance study—out of which the HSCB Program grew. And as the Program has grown, it has attended to modeling priorities identified by the research community. Two studies in particular go a long way toward defining the sociocultural research challenge space. The National Research Council study, Behavioral Modeling and Simulation: From Individuals to Societies, reviewed the state of the practice in computational modeling and simulation as applied to national security challenges. The Defense Science Board Task Force on Understanding Human Dynamics issued a report that was based in part on a request for information across the DoD and services. Both reports identified multiple research gaps, most of which are being addressed by the OSD HSCB Modeling Program.

I think casual observers of what we are doing sometimes conclude that we see some magic in modeling and simulation, that if we can just get those damn algorithms right we'll have this violent extremism thing licked. Of course it isn't like that at all. Models are our best synthesis of causes and effects, but they are by definition incomplete. And they are marked by deep uncertainty.

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Point predictions simply aren't possible. The great value of models is that they can be used to explore and understand. They can help decision-makers process huge volumes of highly complex data, develop viable options for action, and make robust decisions –meaning, ones that will enable them to be successful across a broad range of possible futures.

There are certain broad kinds of challenges that make it hard to do the kind of work required to realize the vision I outlined earlier. I often give the example of how do we develop models that can answer this question: Do I help an NGO to establish village stability through infrastructure improvement – or do I establish martial law? In your conference packets you received a Magic 8 Ball key chain. Right now – our technology today could answer with the accuracy of what we get from the Magic 8 Ball. The HSCB Modeling Program is taking strides to address these hard problems.

When we narrow in just on computational modeling of human sociocultural behavior—for the purposes of meeting the needs of our forces engaging foreign populations and adversaries—we can see a number of more specific, enduring challenges:

1. The "data problem" -- Not necessarily that there is little of it, but that it has not been collected such that it can be readily shared and is not in a form that supports computational modeling.

2. Dynamics to be instantiated in models of the sociocultural space are highly complex across various dimensions. We need well-grounded and rigorous hybrid modeling to manage that kind of complexity. But determining how to validly integrate theory from multiple disciplines, different modeling modalities, and varying levels of data granularity is a major challenge.

3. As HSCB models transition to operational programs, an ever-broader range of prospective users will be using them and the tools you build to leverage them. Most of these new users will not be modelers. Prospective users need to understand enough about what is "under the hood" so they can grasp what the model is doing and translate how unexpected variations that occur in their real-world scenarios might be served by a given model or tool.

4. Methods for verifying and validating hard science models are reasonably well-established. The same cannot be said for the inherently complex models of sociocultural behavior. How can we "know" when a model "works"?

There is a difficult balance to be struck. On the one hand, there is a need for investment in research that will take time to mature enough for application and transition to Programs of Record. That is important for building a long-term, sustainable set of capabilities. On the other hand, we have a very clear demand signal from Combatant Commands and others for help with very near-term needs, where even an 80% solution will suffice. It is important to do what we can to meet those needs as well. A few slides from now, I will share examples of how the HSCB Program has been moving to address both types of need.

Compared to 2006, when The Strategic Planning Guidance study laid the foundation for the HSCB Program, there has been noticeable progress in sociocultural behavior R&D, including overall capability, data availability, modeling, and coordination. Overall, I think we can now see that there is a broad research community making substantial progress in applied research, advanced concept development, and advanced prototyping. Some highlights of that progress include:

- The Undersecretary of Defense for Intelligence is making a large investment in COCOM sociocultural analytics, with a principal focus on the incorporation of data and development of advanced analytic methods;

- The Training and Doctrine Command Analysis Center, Naval Postgraduate School, OSD Cost Assessment and Program Evaluation and others have a strong focus on applied computational social science and irregular warfare analytics;

- The commercial market continues to make investments with applicability, and we should always be looking for efficient ways to bring those investments to bear;

- Federally Funded Research and Development Centers and academia are increasing their engagement across the range of research, development, testing, and evaluation; and

- Large integrators are now getting involved with integrated research and development and direct funded projects, including HSCB.

Which brings us to the HSCB Modeling Program. I am going to use the next few minutes to provide a 30,000 foot view of the Program's objectives, highlight some of our major activities, talk about how we approach the tricky issue of assessment, and share some of our successes. I want to stress two concepts in the statement of the Program mission: innovation and transition. As I have already emphasized, the problems being addressed are tough ones, and they demand innovative thinking and approaches. We try to recognize and cultivate innovation. Ultimately, the goal is simple: get methods, models, and tools into the hands of those who need them. The Program is somewhat unusual in the degree to which it is vertically integrated, spanning multiple research and development levels, from applied research through advanced prototyping. And as I continue to talk about the Program, I hope you will notice these themes surfacing and resurfacing: we are tackling hard problems, with rigor, with the goal of transitioning useful resources to our people, and we are striving to provide leadership across the Department, while collaborating and coordinating not only within

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DoD, but across the interagency and internationally.

I have noted that the problems in this challenge space are hard, for a variety of reasons. Here is just a small sample of the kinds of problems that many of you are being supported to solve:

- What factors influence religious extremism and support for secular politics, gender equality, and national identity?
- How are decisions made in illicit cross-border supply chains?
- What narratives drive extremist behavior, and how can we better detect and track their use?
- How to leverage data mining to better predict insurgent activities?
- How to find and analyze mission-relevant sentiment in multiple languages?
- Can online gaming be used to study behavioral models?

The technical objectives of the Program span four areas – modeling, visualization, training, and data. We work hard to ensure that the objectives integrate vertically from applied research through component development and on to prototyping. I should note that the Program is not focused on funding the collection of data. However, it is supporting research and development of methods, tools, and systems to facilitate the collection, storage, and sharing of data—in particular, data that are structured for ingest to varying types of computational models. For each of these objectives, the Program has developed measures of effectiveness, and associated metrics to gauge technical progress toward the overall Program goals.

The vast majority of DoD sociocultural behavior projects are under the HSCB Program. And nearly all of that is executed through the Office of Naval Research, Code 30. However, there is a good deal of other work being done through other programs, particularly through ONR, and through the Small Business Innovation Research (SBIR) program. The OSD program is part of a larger, coherent, and well-coordinated whole that spans programs and RDT&E levels.

Here is a bit more detail on the SBIR program efforts. The purpose of the SBIR program is to harness the innovative talents of our nation's small technology companies for U.S. military and economic strength. The SBIR program funds early-stage R&D at small technology companies and is designed to stimulate technological innovation, increase private sector commercialization of federal R&D, increase small business participation in federally funded R&D, and foster participation by minority and disadvantaged firms in technological innovation. In my capacity as Deputy Director of the Human Performance, Training and BioSystems Research Directorate, it is a high priority for me to ensure appropriate and effective coordination between the many sociocultural behavior SBIRS and other HSCB-related work being done across the department.

The OSD HSCB Program hit the ground running in 2008/09, with a large and wide-ranging portfolio and awardees from big and small business, industry, academia, and government. A lot of work went into the early stages as we built the Program, engaged with users and developed transition partnerships. The HSCB Modeling Program has technology transition agreements with a number of Department organizations and programs. The Program has also been working very closely with all of the U.S. Combatant Commands to respond to near-term challenges with appropriate resources and tools. I think we can also point to our success in building and coordinating an interagency community of interest. This was illustrated by Focus 2010, which attracted more than six hundred individuals from across the government, academia, and industry, and is well illustrated this week, as we expect to have even more participants at Focus 2011.

I would say that we have made exciting progress understanding and building to the needs and requirements of warfighters and really all end users, building the social cultural science base, meeting the considerable challenges of instantiating complex behaviors in computational models, and playing a lead role in evolving the interagency and international research agenda for computational social science. Recall that I noted how hard the problems in this space are and the fact that solving them requires multiple disciplines working together. I'm proud of the fact that for us in the HSCB Program, that isn't just talk. Not surprisingly, for a program that exists to advance the computational modeling of behavior, computer scientists are the single largest discipline represented among HSCB Principal Investigators. However, well over half of our PIs have social and behavioral science backgrounds, and not just from one or two disciplines. We have anthropologists, sociologists, political scientists, economists, psychologists… really, we are tapping into the full range of social and behavioral sciences out there.

All around the DoD and in fact the whole of government, a big question these days concerns effects. How do we know that anything we are doing in the sociocultural domain is having an impact? Never mind whether it's having the impact we want. In the next couple of minutes, I'll talk about how we assess the performance and value of the work being done with HSCB Program support. Earlier I noted that anyone who wants to use models for point prediction in this challenge space is either trying to sell you something or doesn't fully understand what good sociocultural behavior modeling can and cannot do. Properly designed, supported and applied, these models can enhance both situation awareness and option awareness. They can help decision-makers to more completely perceive the sociocultural features of the landscape, estimate a set of possible futures, more completely and accurately compare/contrast the outcomes of various COAs, and discern

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the contributions of different sociocultural factors to a range of possible outcomes.

We have taken care in the Program to first select awardees using a careful process that stresses scientific rigor. Then, project by project, we have a set of assessment processes and events for tracking performance—not just against a given project plan, but against metrics that get to the operational value of a given tool. We have a very strong program team—led by the Army Geospatial Center and MITRE—developing metrics and executing these assessment events. This is a good place to note that not every project in the HSCB portfolio will produce a model, or even a prototype that must be integrated into a system to be successful. There is a variety of 6.2-level research that will help build theory, generate resources, and otherwise enhance understanding in critical ways. Some of those projects may be on a path such that they evolve into a tool of some kind—but that's not a given for everything that we are doing.

Of course, a very important means for assessing success is the use of HSCB-supported technologies by our people in the field. On that score, I think we can claim some significant successes. There are many more details than I have time to present here, but we have already provided—and are providing—support to just about all of the Combatant Commands and to other operational entities out there. Information Operations is a key mission area for the HSCB Program. One of the DoD Programs of Record is U.S. Special Operations Command's Psychological Analysis and Collaboration Environment. ASD R&E and USSOCOM have reached a technology transition agreement for the transition of HSCB model-based planning and analysis capabilities to include target audience analysis and geospatial technologies. HSCB is focused on providing behavioral modeling capabilities to support the Training and Doctrine Command Analysis Center's Irregular Warfare Campaign Plan and associated wargames. HSCB is providing forward deployed transition teams and reachback support to enable operational evaluation and transfer of HSCB capabilities to U.S. Special Operations Command, Pacific. The focus is on geospatial, social network analysis, and media monitoring capabilities. HSCB has supported strategic multilayer analysis, integrating results of multiple models to assist U.S. Africa Command in prioritizing courses of action.

Successful R&D in this area requires collaboration and coordination among the many elements that are involved. However, success in the sociocultural behavior domain is about much more than effective research and development. That R&D must be executed with careful engagement with the operational communities. Beyond that basic relationship, there are important advantages to be gained by coordinating across the U.S. interagency and even internationally.

As I hope you've figured out by now, at the end of the day, the success of this Program will be determined by the extent to which users out there have gotten what they need to be successful. With that in mind, we have stressed the importance of ongoing engagement with those users, through a variety of mechanisms. We continue to work directly with the Combatant Commands. For example, with U.S. European Command we have been supporting implementation of a Social Science Research and Analysis Cell. Earlier, I noted some of the successful transitions that show our engagement with various Combatant Commands. A handful of HSCB awardees have participated in the exercise COBRA GOLD, leveraging models for information propagation, developing a Semantic Answer Engine for the complex operations community, building a hybrid multi-modeling system for analysts and planners, and modeling the use of social media technologies during humanitarian assistance and stability or reconstruction operations. We recently held our first open house, a two-day event, showcasing posters and demonstrations of research and tools by 14 awardees, with over three dozen visitors, including user community representatives, congressional staffers and senior executives in DoD, and interagency guests. Program awardees and staff have been very active in national government and academic conferences. Through ASD R&E, I and other leaders of the HSCB Program participate in a variety of interagency and intergovernmental groups and activities. These help ensure that the Program will be informed by the activities of these other groups, and that we will coordinate most effectively with them.

I want to stress the importance of both interagency and international coordination. I take very seriously the need to leverage resources fully, which requires ongoing coordination across the interagency and with our allies. I also recognize that no one part of this or any other government has a monopoly on great ideas. We must always be looking for other ways that someone else has found to meet the same challenges we are confronting. To that end, I have worked through the HSCB Program and in other ways to identify collaboration opportunities with the Department of State and other elements of the U.S. government. And as National Representative to The Technical Cooperation Program, I have the good fortune to participate in research exchanges with our friends in Canada, the United Kingdom, Australia, and New Zealand—some of whom are in the room with us today. For Focus 2011, we have a technical track on the comprehensive approach to operations, which I encourage you all to explore.

Broadly speaking, I see the HSCB Program nearing the end of its second phase. In Phase One, we established the Program, built a wide ranging portfolio, engaged the user community, and contributed to building and coordinating the Research and Engineering community—including

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HSCB Program Strategic Vision and Conference Overview

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through events like this. In Phase Two, which I see extending through the end of this fiscal year, we have refined the portfolio to fill some gaps and ensure that the most rigorous efforts with greatest chance of success continue. We have done a good deal of project-level assessment and have started to see some successful transitions. Moving forward into the Program's third phase, I want the Program to: continue maturing Phase Two investments; emphasize new 6.4 investments; move technology developed at all levels of investment into acquisition; demonstrate an end-to-end application of HSCB modeling to intelligence analysis, operations planning, operations analysis, and training; and lead R&D coordination working closely with U.S. Department of Defense partners.

As many of you probably know already, the Office of Naval Research recently issued a Broad Agency Announcement, seeking proposals for HSCB research across four broad topics. This BAA will be a very, very important part of what the Program will be starting in FY12. The BAA is seeking both applied research and advanced technology development level proposals. There are a number of specific questions of interest. I'll mention just a handful here, including: Methods and tools for collecting sociocultural behavior data in austere environments; hybrid modeling of regional and sub-regional economic, political, and social stability; methods and/or tools for virtual training of cultural skills that go beyond meet-and-greet interactions; and understanding the discrete effects of non-kinetic COA.

To those of you who are already working with support of the Program, I want to say "thank you." As I hope everyone can tell from what I've just presented, the Program can lay claim to some noteworthy accomplishments, and that is due to the very hard and innovative work from many of you in the room today. Thanks as well to others in the room, for being with us, and I encourage you to engage the Program staff and awardees with your ideas and questions. In these relatively lean times, it is essential that the Department leverage its investments with care, using its resources with efficiency and to greatest effect. Making that happen requires ongoing engagement with the various stakeholder communities—most of whom are represented here today.

And to everyone, I want to issue a challenge, to consider the very difficult problems in this sociocultural behavior space—and to contribute however you can to resolving them. They are not just Department of Defense problems, nor even whole of government problems. Solving these kinds of problems requires working across cultures, languages, nations, sectors, domains, sciences, agencies, and programs.

Thank you, and enjoy the conference.

Welcome and Opening Remarks

Mr. Al Shaffer

Director of Plans and Programs, Office of the Assistant Secretary of Defense for Research and Engineering (ASD(R&E)), Office of the Secretary of Defense (OSD)

Following the welcome address from CAPT Schmorrow, Mr. Al Shaffer, Principal Deputy Director, Assistant Secretary of Defense for Research and Engineering addressed conference attendees, noting it was the third time the HSCB community has come together. Mr. Shaffer detailed why the Department of Defense cares about this Program. He highlighted the Efficiency Initiative created by Defense Secretary Gates in August 2010, noting that human social culture behavior is an important component of most areas of that Initiative. Mr. Shaffer noted the current instability in the Middle East, pointing out that the United States must understand the social culture there and that "modern tools for communication affect our culture." He thanked attendees for their important contributions to the Department and for helping the nation's warfighters understand and adjust to different societies. In summary, Mr. Shaffer noted there are tectonic shifts underway in both culture and technology and the HSCB Program helps the Department understand these forces and shape the future.

Operational Need

MG Michael Flynn

Chief, CJ2, International Security Assistance Force

Major General Michael Flynn, U.S. Army, provided the keynote address for the opening session of Focus 2011. Commissioned through the ROTC program in 1981, MG Flynn currently serves as the Chief, CJ2, International Security Assistance Force, with an additional appointment as the CJ2, U.S. Forces – Afghanistan. In his address, MG Flynn focused on the importance of relationships and trust as well as the need for 21st century warfare to include both information and intelligence. He concentrated on the need for mutual trust with other cultures, noting that when it comes to obtaining both information and intelligence, it is vital the United States be the leader. MG Flynn described an unfolding revolution that

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Operational Need

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not enough people are recognizing – and which the U.S. Department of Defense cannot handle, which includes the use of social media. The HSCB community needs to assist in making this revolutionary shift in our warfare tactics, and as MG Flynn noted, social media should be considered a tool that can be applied to understand an environment better.

MG Flynn spent most of his allotted time answering questions from meeting participants. During this question and answer phase, he highlighted the need to enable analysts to use HSCB tools. He also noted that doctrine during war is different from times of peace and highlighted, once again, that the Defense Department must use social networking to be more efficient. He challenged attendees to discover ways to quickly enable tools to get into the user's hands, citing cell phones as an example. In addition, he emphasized the need to learn the native languages of the locations our troops are deployed in, noting, in reference to Afghanistan, there is no excuse ten years into a war for people not to know the language. In addition, warfighters must also understand the external environment around them. MG Flynn also outlined his vision of quality leadership, specifically for leaders in the field to ask better questions in order to gain better answers. He ended his briefing by stating that the United States needs to take more risks and to have a deeper understanding of foreign cultures. This is a job for the HSCB community – a community he hopes to see become more involved during future conflict.

HSCB Science and Technology Investments

Dr. Mark Maybury

Chief Scientist, U.S. Air Force

Dr. Mark Maybury, Chief Scientist of the U.S. Air Force, provided the scientific keynote address for Focus 2011. Dr. Maybury discussed the need to help build foreign infrastructure and broaden America's diplomacy. Dr. Maybury discussed national security alignment with the HSCB Program, how it supports government needs, and how it also supports the current Administration's goals, which among other things are to help achieve prosperity and freedom, peace and dignity, and greater cooperation and understanding between nations. As in MG Flynn's keynote address, Dr. Maybury emphasized the importance of learning foreign languages. He also described the vision for a social radar capability, including its importance for development, diplomacy, and defense. There is a large landscape of HSCB activity within the Department of Defense, which will remain a continuous challenge.

The Technical Cooperation Program (TTCP), which Dr. Maybury next focused on, is an international program focused on the Comprehensive Approach, for which CAPT Dylan Schmorrow is the United States delegate and which engages the international community. Dr. Maybury also outlined science and technology areas of opportunity, specifically highlighting areas such as tools, methods and techniques to support force synchronization, and models and other tools for determining optimal multi-agency capabilities. He also discussed challenges in modeling, including but not limited to, a more complete basic research foundation grounded in inter-disciplinary social science, and transparency in models and tools, policies, procedures, information systems, and requisite training to sustain HSCB modeling usage. In describing these challenges, he noted that "working with the warfighter provides clarity and specificity to these challenges." Other challenges of note in the modeling community include: interdisciplinary science, dynamics to be instantiated across hybrid models, transparency in models and tools, better methods for validating models and a need to focus more on data.

Dr. Maybury also highlighted Air Force contributions to the HSCB domain as well as sociocultural modeling trends at the Air Force Research Laboratory. He concluded his address by reminding attendees that our nation's warfighters require human domain insight along with rich data and valid models and "social radar" that can exploit sentiment analysis and human terrain visualization, which can provide an integrating metaphor for enhanced situation awareness and decision support.

ONR Investment in the HSCB Sciences

Mr. George Solhan

Deputy Chief of Naval Research, Expeditionary Maneuver Warfare and Combating Terrorism Science and Technology, Office of Naval Research

The last speaker of the Focus 2011 general session was Mr. George Solhan, Deputy Chief of Naval Research for Expeditionary Maneuver Warfare and Combating Terrorism, Code 30, at the Office of Naval Research. Mr. Solhan opened by discussing the need to understand the military environment and the range of military operations. He also discussed power influence and noted that the HSCB community needs to move theory into science. There is a need to define a hypothesis, build trials to track progress with a goal to increase the body of knowledge and then the body of understanding. He pointed out that it will be a winding road ahead, but in the long run, this will serve to enhance the security of our nation and to enhance the overall human condition.

Analytic Methods Science and Technology

Track Chair: Frank Stech

This track addressed scientifically-based analytic methodologies for using qualitative and quantitative data on HSCB factors for decision support, including uncovering and understanding human networks and determining behavioral, social, and cultural effects on courses of action.

Several papers described methods for assessing sentiment and intent in various social media, while other papers described hybrid analysis methodologies or methods for analyses of networks. Still other papers outlined methods for assessing complex data and situations. Several papers described methods offering promising application to today's operational communities; these are highlighted below. The track comprised twelve presentations, which grouped informally into three sets.

The first set of presentations focused on social media and social networks. Richard Colbaugh (Sandia National Laboratories) described Early Warning Analysis for Social Diffusion Events, using quantitative counts of inter-group social network links as precursor indicators of social diffusion. Aram Galstyan (USC Information Sciences Institute) described Modeling and Predicting with Dynamic Networks, using social networking sites, on-line discussion forums, chat rooms, and blogs to model dynamical processes on networks, and to use these dynamics for different inferences, such as quantitatively characterizing the structure of information cascades on networks and prediction tasks. Steve Minton (Fetch Technologies) discussed "Augmenting Social Networks by Uncovering Social-Cultural Data within OSINT Sources," namely by enriching Web-based social network information for sociocultural analysis. Finally, Edward McKerrow (Los Alamos National Laboratory) presented "Who Made the News Today? Social and Mass Media Effects of Events in Afghanistan," and described how the interplay between events, mass media reporting, social media and public attention influence how news is made.

The second set of presentations focused on rhetoric and sentiment analyses. Michael Gabbay (University of Washington) described Rhetoric-Based Modeling of Insurgent Cooperation and Competition, which integrates insurgent conflict frames, targeting claims, and relationship networks among insurgent groups to construct visual depictions of insurgency factional structure, called factional maps. Anne Russell (SAIC) presented "Cultural Context and Negotiations: Towards a Methodology for Applying Expert Knowledge to Cross-Cultural Negotiations and Decision Making," a negotiation theory- and cultural context-based knowledge reasoning framework using narratives and knowledge reasoning systems. Antonio Sanfilippo (Pacific Northwest National Laboratory) described "Modeling Radical Rhetoric to Identify Violent Intent," a computational approach that leverages co-expression of rhetoric and action features in discourse to identify violent intent. Edward McKerrow briefed the work of his colleague, Kristin Glass (New Mexico Institute of Mining and Technology), on "Estimating Sentiment in Social Media for Intelligence Monitoring and Analysis,"

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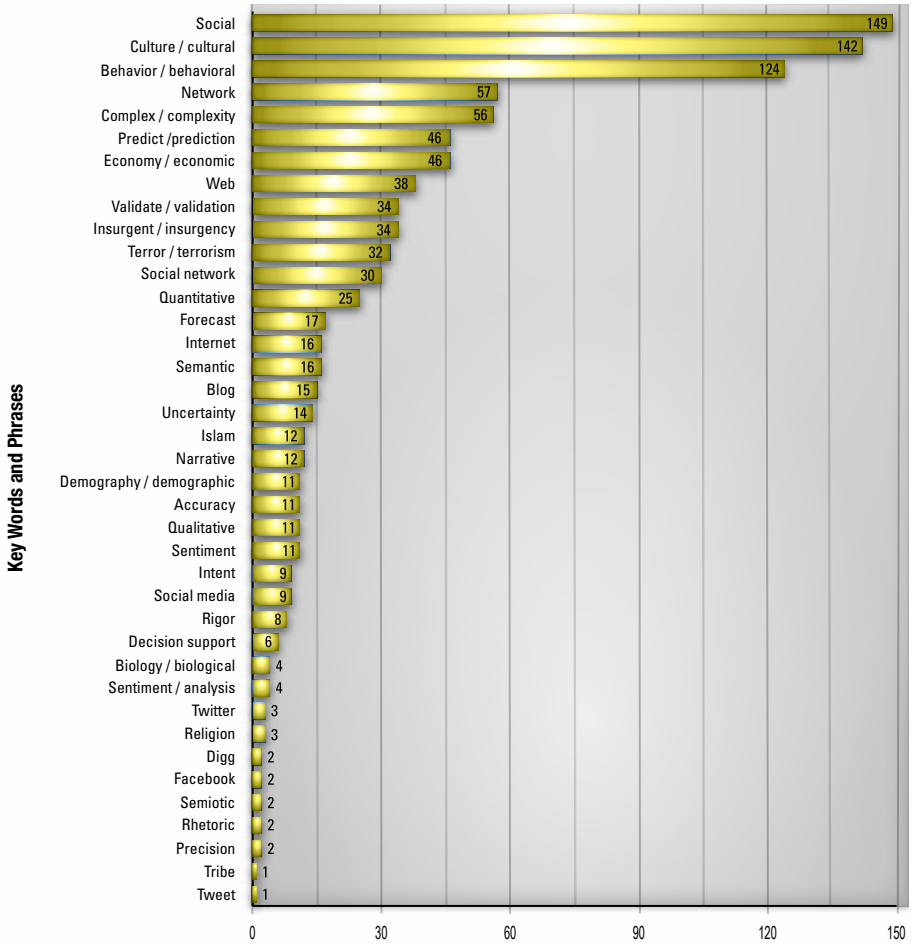

Figure 1. Key Words and Phrases

Analytic Methods Science and Technology

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a computational modeling approach to infer the sentiment of social media content though text.

The third set of presentations focused on analytic approaches. David Meyer (University of California, San Diego) presented "Long Range Dependence in Violent Events Timeseries," which uses conflict data from Indonesia and Iraq to show how timeseries have long-range auto- and cross-correlations. H. Van Dyke Parunak (Jacobs Technology) described "Modeling and Detecting Behavioral Threats" by a combination of hierarchical task networks, biometrics sensor data indicating conformity to (or deviation from) a task pattern, and swarming poly-agents to compute the probability that the sensor evidence matches the task pattern. Ed Waltz (BAE Systems) presented "Representing Socio-Cultural Systems in Hybrid Models: Applying Empirical Data and Theoretical Models to Operational Problems," an analysis and modeling-synthesis process that entails decomposing a situation into key elements (or systems) and their interactions, analyzing the empirical data that describe the structure and dynamics before hypothesizing the underlying causes, and then composing models that represent the situation by these elements and their interactions. Paul Davis (RAND Corporation) presented "Factor Trees in Conceptual Modeling of Complex Operations." Factor trees are currently used to model and analyze complex, operationally relevant problems.

Several presentations appeared to have potential operational application in today's warfighters' operational areas of analysis and influence. Overall, the key topics (i.e. key words and phrases) addressed in the Analytic Methods Science & Technology Track (and across the 228 abstracts accepted for the HSCB Focus 2011 Conference) reflected the HSCB program as a whole, and the presentations showed the operational traction provided by scientifically developed analytical methods for HSCB problems (see Figure 1. Key Words and Phrases on page 12).

Applications of Social Cultural Methods, Models, and Tools (MMT)

Track Chair: Brian Tivnan

This track focused on the use of various methods, models, and tools as applied to training, intelligence analysis, influence operations, operational planning, and experimentation. The track was divided into sessions covering each of these domains. The intent was to encourage an active dialog between the operational and development communities regarding requirements as well as the current use of sociocultural methods, models and tools.

Training

Methods of training personnel in the sociocultural and behavioral landscape of an operational environment provide individuals with the ability to quickly assess and identify the societal norms, behaviors, and social structures within different social or cultural groups. Although there is significant research and development underway across the Department of Defense focused on enhancing the effectiveness of language and cultural training for specific regions and cultures, it is currently time consuming and expensive. Virtual training environments show particular promise in addressing these issues. An exemplar for the training domain was the research presented by Ed Sims (VCom3D), who detailed his team's "plug and play cultural avatars for training," which uses a computational framework as a basis for interactive characters that exhibit cultural behavior.

Intelligence Analysis

Intelligence analysts utilize various methods, models and tools to understand human terrain and better anticipate and affect adversarial activities, as well as to make more informed decisions. Human networks that carry out insurgent or terrorist acts cannot be understood or predicted without an understanding of human behavior, motivations, environment and the resources available to the network. Relevant briefings provided a good overview of the social network analysis tools and other methods that evaluate individual and group activities. Representatives from industry and government presented during this session. Will Brintzenhoff (Social Science Automation), described an interactive, dynamic, web-based tool being developed for Monitoring of Leaders' Information Environments (MOLIE). MOLIE is a media analysis tool that uses natural language processing software to analyze millions of Arabic language media documents to assist analysts in understanding how Arabic media portrays leaders and ideas.

Influence Operations

Models and tools are important in Influence Operations for understanding the dynamics of human, social and cultural influences on behavior and attitudes. Presentations in this session addressed improved understanding of the dynamics of human, social, and cultural influences on behavior; modeling these influences; and understanding their impact on human behavior at the individual and network levels of analysis, as well as on the perceptions and public opinion of the populations with which the warfighter is engaged. Steve Corman (Arizona State University), who was recognized at the conference for his outstanding scientific achievements to the HSCB Program, presented his current effort, "Identifying Terrorist Narratives and Counter-Narratives." The project, which is a systematic effort to collect, analyze,

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Applications of Social Cultural Methods, Models, and Tools (MMT)

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and track extremists' use of stories, has improved our ability to understand the threat posed by terrorist narratives among contested populations and provides the models and tools that allow for the development of effective counter-measures.

Operational Planning

Military plans for conflict and post conflict operations require a good understanding of the operational environment, including, but not limited to: cultural geography; communication and economic links to other regions; and external financial, moral, and or logistical support of an insurgency. The presentations in this session highlighted how HSCB models, methods, and tools can provide the warfighter with the capability to assess trends in order to better plan operations in a specific cultural environment and develop socioculturally aware courses of action designed to support the commander's objectives. Ian Davidson (University of California, Davis) described his team's effort to identify and characterize a potential "social and cultural signature" in operational areas of high adversarial activity, which could then be used to support operational planning. Alper Caglayan (Milcord) described work to forecast domestic political violence using predictive societal indicators of radicalism, which aims to provide combatant commanders with the capacity to plan for instances of increased domestic political violence, with implications for resource allocation and intelligence asset assignment.

Experimentation

Military experiments provide an environment of testing, evaluation, and learning for the Marine warfighter and combatant commanders. Experiments often seek to create a realistic setting that includes exceedingly complex situations, adaptive adversaries, and human behavior under extreme stress. HSCB computational models can introduce realistic scenarios and provide culturally valid adversarial responses during the course of an experiment. Presentations in this session detailed efforts that enabled evaluation, learning, and understanding through experimentation/exercises. Exercises and "serious games" were presented that modeled realistic settings and scenarios; complex situations, adaptive adversaries, and difficult alliances; human, group, and social behavior under extreme stress; and culturally valid allied and adversarial responses. Dixon Dykman (Army Training and Doctrine Command Analysis Center (TRAC) White Sands) presented TRAC's development of a tactical level irregular warfare (IW) analytical capability, an IW Wargame, which is focused on counter-insurgency and based on a Task-Event-Outcome framework.

The quantity and quality of presentations as well as the high degree of interest in this track spoke to the importance of the operational use of sociocultural methods, models, and tools. Each of the specific domains was well represented with cutting edge efforts to support operations, suggesting a tremendous opportunity for further growth and research.

Commercial Research and Applications of Social-Cultural Science

Track Chair: Ted Stump

There is a significant body of sociocultural research, related technologies, and methods that has evolved over the years which has been primarily focused on commercial or non-defense related applications. The objective of the Commercial Research and Applications of Social-Cultural Science track was to introduce and discuss areas where social science research and methods have been developed for non-military applications and examine where those activities have relevance to the Department of Defense. These social science domains include:

- Consumer psychology and behavior: The study of consumers helps firms and organizations improve their marketing strategies by understanding issues such as:
  - The psychology of how consumers think, feel, reason, and select between different alternatives (e.g., brands, products, and retailers)
  - The psychology of how the consumer is influenced by his or her environment (e.g., culture, family, signs, media)
  - How marketers can adapt and improve their marketing campaigns and marketing strategies to more effectively reach the consumer (e.g., brands, the associations that people make with a product name are formed through each and every interaction people have with a product line and those who stand behind it)
- Public relations media strategies: This includes communications primarily directed toward gaining public understanding and acceptance and usually deals with issues rather than products or services, and is used to build goodwill. In today's global media environment, messages are spread to audiences broader than originally intended, with potentially negative consequences. Culturally-based perceptions can compound these negative effects as audiences perceive messages and actions in unintended ways.

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Commercial Research and Applications of Social-Cultural Science

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- Financial markets models: Financial markets invest significant money in emerging markets (i.e. developing countries) and need to understand the risks associated with those investments. Not unlike the Department of Defense and intelligence community, investment banks employ state stability models to improve their analysis and decrease the risk to their investment portfolios. Social-behavioral models are also employed domestically to anticipate market swings and predict broader macroeconomic trends.

- Healthcare – Epidemiology: Public health officials faced with recent natural and man-made threats, such as Hurricane Katrina, the events of 9/11, or the recent H1N1 pandemic influenza outbreak, understand the critical role the public's emergency preparedness and response behaviors play in the successful management and response to a disaster. Models incorporating social behavioral sciences provide the capability to evaluate multiple notional communication strategies and select those that will have the greatest impact on disease spread.

- Gaming Industry: Societal games (SimCITY, Civilization) and first person games (Call of Duty, Medal of Honor) employ behavioral models within the game environment. These models can be relatively simple artificial intelligence behavioral models as well as more sophisticated agent based models of social behavior and governance.

The Commercial Research and Applications of Social-Cultural Science track had eight presentations representing a variety of applications of social-behavioral science methods. Dr. Todd Helmus (RAND Corporation), began the session by presenting an overview of his renowned paper, *Enlisting Madison Avenue,* which makes a strong case for how business marketing practices can be adapted to U.S. military efforts. He emphasized how business marketing practices provide a useful framework for improving U.S. military efforts to shape the attitudes and behaviors of local populations in a theater of operations as well as those of a broader international audience. Foremost among these lessons are the concepts of branding, customer satisfaction, and segmentation of the target audience, all of which serve to maximize the impact and improve the outcome of U.S. shaping efforts.

Paolo Gaudiano (Icosystem Corporation) and Robert Bechtel (SoarTech) both presented applications of agent-based models that assist commercial businesses in evaluating the potential impacts of investment decisions. Icosystem developed CRIMSON for the purpose of evaluating the impact of different types of communications for Stability, Security, Transition, and Reconstruction (SSTR) missions within areas of operations. It is powered by a sophisticated social network model (built upon word-of-mouth communications and mutual trust) that has also been used to evaluate the effect of strategic communications in commercial markets. Mr. Bechtel presented how the Power Structure Tool Kit (PSTK), an agent-based, goal-driven modeling and simulation system originally developed as a part of the DARPA COMPOEX program, has been used to support exploration of strategic alternatives for a Fortune 500 company in a globally competitive marketplace for capital-intensive, long-life industrial equipment.

Brian Tivnan (MITRE Corporation) provided an overview of the efforts undertaken by a team of researchers to characterize the nonlinear dynamics of financial markets and then to recreate these dynamics in an agent based simulation that represents trades as anthropologically plausible traders. In addition to recreating two of the leading market models, he addressed a limitation of most current market models.

Jill Egeth and Jennifer Mathieu (MITRE Corporation) closed the session by presenting how social and behavioral sciences could be employed to model and evaluate the effectiveness of various communication strategies in an emergency preparedness and response (EP&R) application. Using the H1N1 outbreak as a proof-of-concept case, the work applied a verified, H1N1-validated hybrid agent-based, discrete-event disease spread model, in combination with social and behavioral science theory and data, to understand how a population's attitudes and beliefs affect their EP&R behaviors. Using the hybrid model, they demonstrated how public health communications, tailored to modify specific maladaptive vaccine and H1N1-related cognitions, could impact the public's EP&R cognitions and behaviors.

Comprehensive Approach to Operations

Track Chair: John Boiney

In the current global security environment, operations are increasingly complex, with objectives focused on impacting civilian, non-combatant populations, and often involve facilitating the post-conflict recovery, reconstruction, and transition of a region. Success depends on leveraging all instruments of national and international power in a coherent fashion. Such a "comprehensive approach to operations" (CA) involves coordinated and coherent action by multiple operational entities that may include national/international government agencies, militaries, non-governmental

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Comprehensive Approach to Operations

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organizations, corporations, and other actors. The Comprehensive Approach to Operations track featured presentations on leading technical challenges, and the role and value of modeling as well as other technologies to address those challenges.

The track comprised twelve presentations, which grouped informally into three sets. One set provided overviews of CA challenges and approaches to meeting those challenges. John Boiney (MITRE Corporation) kicked off the track with a review of the history of the CA and related concepts, a summary of core technical challenges, and a discussion of ways that computational modeling may be leveraged to address those challenges. Elizabeth Lyon (U.S. Army Geospatial Center) presented on the potential for extending both micro- and macro-level theories in order to apply them to meso-level challenges—the space with the most promise for advancing knowledge and grounding applications in CA operations. Mark Clemente (Boeing) described how military analysis, modeling and experimentation will need to evolve more descriptive and qualitative methods and tools to better address the complexities of multi-national Civil-Military Operations. He emphasized the potential value of complexity theory, which focuses not on solving challenges, but on coping with and bounding problems and solutions to a limited set of more likely responses. A final presentation in this overview set came from Elmer Roman, who led the recent Defense Planning and Programming Guidance technology area study on Building the Security Capacity of Partner States. Mr. Roman summarized the recommendations of the study, which included the ten technologies where research investment has the greatest potential to support the development of the capacity and capability of partner nation security forces and their sustaining institutions.

Figure 2. A screen shot from the Complex Operations Wiki as presented by Dr. Alper Caglayan

Another set of presentations summarized, and in some cases demonstrated, emerging tools that could support effective execution of the Comprehensive Approach. Alper Caglayan shared work that his company, Milcord, has been doing to develop a Semantic Wiki for Complex Operations (www.complexoperations.org). The wiki has over 3,600 pages of content relevant for the complex operations community (see Figure 2).

Mark Yager demonstrated a suite of tools that eCrossCulture is developing to help the U.S. government coordinate more effectively with non-governmental organizations in conflict and disaster areas. The toolkit is designed to facilitate knowledge management, identification and sharing of best practices, and measurement of effects of coordinated operations. Peter Picucci (Institute for Defense Analysis) described some of the critical challenges in developing a usable human socio-cultural behavior capability for the U.S. military and introduced a notional toolkit that might help meet those challenges. The kit tools were developed based on the MALO framework, that is, to be responsive to Mission, Area of Operation, Level of Operation, and Operator Expertise.

John Sokolowski, Executive Director of Old Dominion University's Virginia Modeling, Analysis & Simulation Center (VMASC), described a conceptual model for stability and reconstruction. The model allows investigation of various policies or course of action investigations to take place in a controlled and scientific manner to gauge the impact of contemplated changes on the overall stability of a nation. The model is not only useful for analysis purposes but for training purposes as well. U.S. Navy LT Johnny Quilenderino presented ongoing research being conducted by a team of students at the Naval Postgraduate School. The project, centered on the Gulf of Guinea region in Africa, will begin development of a systems architecture for understanding human behavior. The architecture may set the framework for ongoing HSCB modeling.

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Comprehensive Approach to Operations

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A final grouping of presentations looked more closely at the human dimensions of the CA. Megan Thompson, Defence Scientist at Defence Research and Development Canada (DRDC), reviewed two recent efforts to foster research that will optimize collaboration within the context of CA - the 2010 NATO HFM Workshop 204: Collaboration in Comprehensive Missions, and The Technical Cooperation Program's Action Group 26, which will start work in May on international collaborative research to advance the CA. Janet Sutton (U.S. Air Force Research Laboratory) shared findings and observations regarding barriers to effective teamwork across organizational cultures. The presentation, which leveraged her years of field research, included recommendations for enhancing collaboration between teams when taking a Comprehensive Approach to Operations. The final presentation in this set was from Nick Dowling (IDS International), who argued that current training practices, though improved, do not adequately prepare military and civilians to engage immediately and effectively in theater.

The presenters noted a variety of ongoing challenges that characterize applied research and development in this area, perhaps most importantly the defining fact that the topic demands work across so many different domains—including governments, cultures, disciplines, and languages. The Comprehensive Approach to Operations is characterized by both technology-relevant challenges and people-oriented challenges. Finding valid and operationally meaningful ways to address both sets of challenges is important.

Cultural Training

Track Chair: Allison Abbe

The Cultural Training track included 22 presentations on methods, media, and conceptual foundations for cultural training and education for military personnel. Focusing on what should be trained, several presenters addressed the identification of appropriate learning domains, objectives, or content for cultural training. Louise Rasmussen (Applied Research Associates) discussed the cognitive processes of cultural sensemaking and perspective taking as revealed in critical incidents from experienced military personnel. Joan Johnston (Naval Air Warfare Center-Training Systems Division) distinguished core cultural competencies from enabling characteristics and recommended a training and education focus in support of two competency areas: thinking and connecting. In a related vein, James Crutchfield (Lockheed Martin Global Training and Logistics) took an interpersonal approach to the problem space, defining intercultural competence in terms of interaction and leadership skills.

In contrast, Asma Abuzaakouk (Capella University) and David Matsumoto (Humintell) both emphasized the role of emotion in intercultural adjustment and performance. Jerry Glover (vCom3D) and Wendy Ashby (Defense Language Institute-Foreign Language Center) both discussed the utility of using cultural values dimensions in cultural training, such as Hofstede's or Trompenaars' frameworks. Mike McCloskey (361 Interactive) discussed research findings that revealed a broad range of intercultural competence levels among soldiers, suggesting that individual differences in the training audience may be an important consideration.

Focusing on how to train, other presentations provided complementary or contrasting methods of achieving related learning goals. Mark Yager (eCrossCulture) presented a culture-general curriculum to train soldiers in how to decode nonverbal cues across cultures, such as reading micro expressions, assessing credibility, and detecting imminent aggression. Ajay Divakaran (Sarnoff Corporation) presented training tools for the enactment of nonverbal gestures that provides feedback to a trainee interacting with a virtual role player. Communications training was another focus area, with Kevin Saunders (Alelo) and Doug Nelson (Kinection) presenting tools to teach mission-oriented language skills using differing degrees of fidelity.

Several presenters discussed the development of training using cultural dilemmas or critical incidents. This scenario-based approach was applied to training for military advisors (Andi O'Connor, eCrossCulture), infantry (Bill Ross, Cognitive Performance Group), and leader development training (Paul Cummings, ICF International). Brad Rosenberg (Charles River Analytics) presented authoring tools that would allow instructors to generate or modify scenarios easily. Examples of tools that engage the learner in scenario-based training via game play were John Burwell (Adayana Government Group) and Lewis Johnson (Alelo).

Other notable contributions were presentations that highlighted new directions for intercultural training or pointed out areas needing further investment or attention. Some presenters discussed other methods that may enhance cultural training, such as the use of neurophysiological assessments (Todd Griffith, Discovery Machine; Lewis Johnson, Alelo) and geographically distributed multicultural teams (Sharon Glazer, Center for Advanced Study of Language, University of Maryland). Denise Nicholson (DSCI) pointed out the need for metrics to conduct cost-benefit analysis of cultural training and comparisons between media and methods, including live simulation and computer-based training. Finally, as at previous HSCB events, much of the training focus was on tactical-level, interpersonal interactions in a foreign culture, and Shoaib Popal (IDS International) noted a neglect of operational and strategic perspectives in cultural training.

HSCB Science and Technology Government Programs

Track Chair: Ivy Estabrooke

The Government Programs track consisted of presentations that addressed research and development efforts in the sociocultural sciences across the United States government, with the aim being to increase the level of awareness of ongoing efforts in the HSCB domain. The government briefings represented a broad spectrum of projects ranging from basic research to more mature programs at various stages of development. Erin Fitzgerald (Office of the Secretary of Defense, Basic Research Office) provided an overview and detailed future directions of the Minerva Initiative, a DoD-sponsored, university-based social science research program initiated by Secretary Gates in 2008 to engage scholarship in the social sciences in an effort to address DoD needs.

Briefings from the intelligence community highlighted more mature tools and models, focusing on the requirements and advanced development of HSCB data and tools. Scott Peth (Office of the Undersecretary of Defense for Intelligence) discussed the structure and purpose of the Socio-Cultural Analysis (SCA) Program. He highlighted the need for commanders, staff, troops, and forces to have access to sociocultural information in addition to their other sources. This type of information allows users to develop the type of complete environmental understanding they need to plan and execute effective military operations.

The track included presentations which highlighted ongoing research within each of the Services. Air Force Research Laboratory (AFRL) directorates have taken on a common initiative entitled "Understanding Behaviors." During AFRL's presentation by John Salerno, two sub-areas of this research initiative were described in terms of its past, present, and future in regards to tool development and theories: Understanding the Operational Environment, and Understanding the Adversary. The Army is performing collaborative sociocultural research and analysis, investigating cross-cultural competency, decision support tools, and mission planning and analysis tools. Allison Abbe described work being done at the Army Research Institute (ARI) for the Behavioral and Social Sciences including a new program of research on measures and methods to enhance cultural capability for stability, security, reconstruction, and transition missions (Learning and Operating in Culturally Unfamiliar Settings (LOCUS)). The goal of this program is to identify, assess, and develop the knowledge, skills, and abilities that enable soldiers to perform their missions in diverse sociocultural settings.

Ivy Estabrooke, of the Office of Naval Research (ONR), provided an overview of current research in the social and behavioral sciences in Code 30 (Expeditionary Maneuver Warfare & Combating Terrorism) and Code 34 (Warfighter Performance) branches of the Office of Naval Research. ONR research in the social and behavioral sciences includes a portfolio of basic and applied research as well as advanced development. Key research and technology investment areas include: theory and understanding; data generation; analytics and modeling; and sociocultural training and education. Program funding comes from the OSD HSCB Modeling Program, the Sciences Addressing Asymmetric Explosive Threats (SAAET) program, as well as ONR Basic Research funds. Dr. Estabrooke also discussed the vision of the ONR HSCB Program as well as its objectives and detailed the upcoming Broad Agency Announcement to fund new projects in FY12.

Several independent DoD Agencies (Joint Improvised Explosive Device Defeat Organization (JIEDDO) and Defense Threat Reduction Agency (DTRA) provided briefings as well. Programs in these agencies are mission-specific, focusing on networks associated with improvised explosive devices (IEDs), disease spread, and weapons of mass destruction. Christopher Kiley indicated that DTRA is investigating high-resolution disease propagation modeling, taking social and behavioral factors into account. Jennifer Perry, also with DTRA, reported that the agency is developing social science-based research and analyses to support the anticipation and reduction of weapons of mass destruction. To characterize IED actors and networks of actors, JIEDDO is also concerned with social dynamics data.

David Adesnik (OSD Cost Assessment and Program Evaluation (CAPE)) provided an overview of the gaps in knowledge, data, and tools needed to address major irregular warfare-related activities in the Department of Defense, covering a full range of military activities with an emphasis on planning, analysis, training, and acquisition. The broad range of presentations during the course of this track detailed ongoing and upcoming government programs and provided a wealth of information to meeting attendees who participated in the session.

Several presentations were provided by government organizations outside of the Department of Defense. From the perspectives of the Department of State and the U.S. Agency for International Development (USAID), HSCB data and modeling are critical. Alex Dehgan (USAID Science and Technology) discussed the roles and impacts of global climatic disruption on sociocultural factors and their relationship with national security, economics, and diplomacy. Richard Legault discussed the recognition by the Department of Homeland Security of the importance of both theories and empirical evaluation in modeling efforts for the development of reliable, generalizable models that can be operationally useful in the face of uncertainty and intelligent adversaries.

Hybrid Models

Track Chair: Jennifer Mathieu

Hybrid modeling can mean: (1) using a combination of modeling paradigms (e.g., Systems Dynamics, Game Theory, Agent Based Modeling), (2) using multiple levels of model granularity to capture the dynamic of interest, or, (3) using data processing methods (e.g., aggregation) to match the data to the model's granularity. The hybrid integration of approaches can be during runtime or in an output-input fashion. Multi-disciplinary research is especially needed to develop new models that integrate across disciplines to produce a more holistic model or a hybrid model that facilitates rapid adaptation to a new culture. "Hybrid Modeling Challenges for HSCB Applications" was presented by Peter Brooks, where he outlined how the Institute for Defense Analyses (IDA) is undertaking a study by conducting workshops with experts in hybrid modeling to determine the implications for hybrid modeling drawn from practical user needs, and the principal challenge areas for hybrid modeling.

Developing theories that support hybrid, generalizable models across the spectrum from tactical to operational to strategic applications is a high priority for the HSCB Modeling Program. Lora Weiss (Georgia Tech Research Institute) addressed this in her talk on "Cultural and Behavioral Model Docking Research." She described research on identifying the types of interactions that exist between multiple scales of human behavior, and specifically addresses modeling interactions of micro-, meso-, and macro-scale behavior. Figure 3 shows an example of information flowing among multiple scales of representation of the recruitment of an American youth into an extremist group. A preliminary prototype was presented that consisted of a combination of case-based, system dynamics, and agent-based modeling.

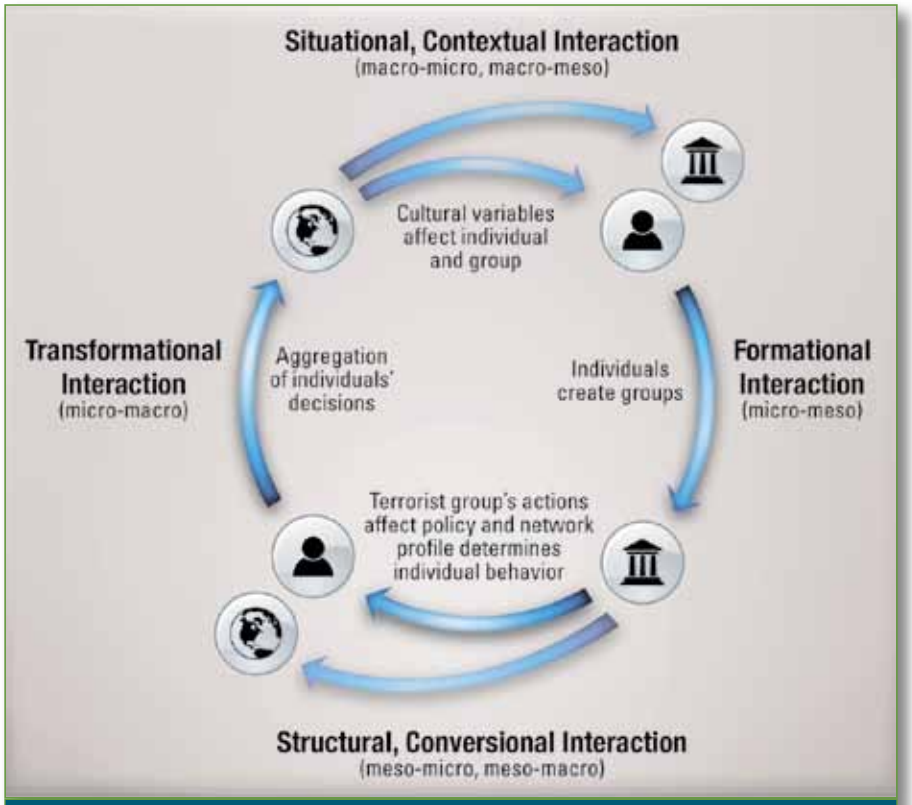

Figure 3

"Using Hybrid Methods to Model across Scale: The ERIS Example" was presented by Michael Salwen of NSI. The Ethnic Conflict, Repression, Insurgency, and Social Strife (ERIS) system is a multi-paradigm model of interethnic conflict at multiple levels of analysis and implementation. ERIS aims to model the complexity of population, locality and macro-level (state or national) interactions within a society and provide insight into the range of possible social outcomes given varying sets of initial conditions. "Integrating Agent-Based Simulation and Social Network Analysis" was presented by Michael Matessa of Alion Science and Technology. There is a complementary relationship between simulation-based approaches which provide principled, generative mechanisms for producing agent behaviors and social network analysis which reveals the structures induced by those behaviors. The modeling framework provides the means for tracing behavior across multiple levels of granularity.

Four architectures or frameworks were presented that facilitate joining heterogeneous collections of data and models, including the integration of models to form a hybrid model. "Specifying Workflows in SORASCS to Automate and Share Common HSCB Processes" by David Garlan (Carnegie Mellon University), provides a service-oriented-plus architecture that supports HSCB users in data processing, analysis, simulation, and reporting. Creating, testing, sharing, and modifying SORASCS workflows supports model re-use, rapid assessment, and improved tracking to support validation. "Hybrid Modeling with eXtensible Behavioral Modeling (XBM)" by David Makovoz (Impact Computing Corporation) provides the architectural foundation necessary for building hybrid models, based on (a) its composite tool paradigm, (b) its semantic mediation service enhanced by

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Hybrid Models

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the use of probabilistic ontologies, and (c) its sensitivity and stochastic analysis service. This architecture supports using uncertainty analysis for exploratory modeling, which is a priority for the HSCB Modeling Program.

"HI²NT—A Hybrid Federation Approach to the Operational Environment Training Paradigm" was presented by Joe Gonzalez of Texas A&M University. The federation, Hybrid IW/IED Network-defeat Toolkit (HI²NT), is currently composed of three models. These include a first-person cultural trainer, a ground maneuver model, and a non-combatant group effects model. The goal is a holistic and synchronized training environment that encompasses simulation models of kinetic and non-kinetic events, interactions with groups and individuals, and multiple levels of fidelity based on training needs, all integrated to train individuals and teams. "A Self-Auditing Data Typology for Decoupling the PRISM Models Library and Data Repository," was presented by Michael Salwen of NSI. The Principal Scaleable Modeling System (PRISM) provides a science-based tool that comprises a diverse range of model forms and data schemas. PRISM demonstrates an interface layer that manages the hybrid linkages between models and data.

Operational Use and Requirements with Social-Cultural Science: COCOMS

Track Chair: John (Jack) Crowley

The Operational Use and Requirements with Social-Cultural Science track focused on the application of sociocultural tools and methodology to the specific requirements from each of the combatant commands (COCOMs). The track included discussion of current operational use of sociocultural tools as well as how COCOM missions can be further supported by sociocultural applications. COCOMs are either regional (e.g., EUCOM, CENTCOM) or functional (e.g., SOCOM, TRANSCOM, CYBERCOM), and may have differing sociocultural needs for operational use. Functional COCOMs may need sociocultural tools for use in training and experimentation, whereas regional COCOMs may demonstrate a need for sociocultural tools in operational planning and influence operations. Within the regional COCOMs, sociocultural requirements for operational use often differ, based upon their missions. Some COCOMs are Force Providers (SOCOM, STRATCOM), which have very specific sociocultural tool needs. Other COCOMs provide "joint capability areas" and vary in their need for sociocultural support. This track successfully examined the path forward in efficiently and effectively adapting sociocultural tools to address specific COCOM requirements.

In her presentation on the project "Mining Afghan Lessons from the Soviet Era (MALSE)", Katya Drozdova (ESOC and Seattle Pacific University) detailed the capabilities provided through analysis of Soviet-era historical HSCB data for use by U.S. military leadership in operational planning in Afghanistan. MALSE uses original Russian-language documents from top-level Soviet government decision-makers about the Soviet Union's long involvement in Afghanistan to provide relevant analysis and forecasting to today's military decision-makers in Afghanistan.

To obtain sociocultural data for use in the operational setting, newspolling is often performed. Bryan Edward Rich (GlobalNI) discussed a technique in development which uses newspolling to measure the influence and sentiment dynamics of populations. GNI designed this technique to mine and exploit billions of dollars of open source information and to convert it into actionable intelligence. Using this technique, intelligence is received as a feed from the news, and is then used to deconstruct complex events, map influence of events, and track changes in sentiment. The technique uses analytic engines to then provide instant digital information for DoD to use in critical databases.

Opinion data is another frequent source of HSCB data used by COCOMs. Adam Pechter (Pechter Middle East Polls) described a method to elicit, analyze, and geo-map using quality opinion data from the Arab world on Iran and its nuclear program, for COCOM use in Influence Operations. During his presentation, Mr. Pechter showed Egyptian opinion data obtained during the uprising,and described how polling data is used in the operational setting, by COCOMs. He noted that good, valid data is easily adapted to operational requirements.

EUCOM, a regional COCOM, fully engages social scientists to provide actionable insight, with a goal of creating a master narrative that explains what is taking place in theater. John Bauer (EUCOM J2) described EUCOM's operational and strategic application of behavioral theories, methods, and models for sociocultural discovery and analysis. The sociocultural environment is critical to the development of EUCOM strategy, and often defines it- by providing situation awareness, knowledge of risk, and suggestions of where and how to engage.

The International Security Assistance Force (ISAF) Joint Command supports governance by analyzing criminal patronage networks using open source data, which is often difficult to obtain. Jennifer Mathieu (MITRE Corporation) presented Social Network Analysis Reachback Capability (SNARC). She described how ISAF is currently demonstrating how available HSCB tools can assist in reachback, and current frameworks which are being developed to perform more robust studies which integrate the frequently sparse and incomplete data that is often collected in operations.

Social-Cultural Data

Track Chair: Jeff Morrison

Presentations in the Social-Cultural Data track explored issues related to the collection and management of the broad array of sociocultural data across the HSCB community. With 36 papers addressing methods and tools for the collection and generation of sociocultural data, extensive amounts of information were exchanged among participants. Information associated with the domains of human, social, cultural, and behavioral systems requires a wide array of techniques to collect, manage and analyze data.

Topics explored in this track involved in-depth analyses and examinations of the challenges associated with handling sociocultural data. These topics included data collection from field studies, field experiments, and crowd sourcing as the basis for supporting sociocultural modeling and analysis; availability of, and innovative uses for open source data; and tools and techniques to support rapid data collection.

To highlight one project, Seyed Rizi (George Mason University) presented "Merging Remote Sensing Data, Population Surveys and Qualitative Information into Large, Empirical Multiagent Models." In order to calibrate and calculate exploratory analyses in multi-agent models, disparate data sets are necessary. Mr. Rizi highlighted some of the unique challenges with merging very different and sometimes divergent data sets. He demonstrated how this variety of data sets was necessary for inclusion within his example model.

Presenters from the U.S. Census Bureau, the U.S. Department of State, the U.S. Army Corps of Engineers, and the Department of Defense's Training and Doctrine Command (TRADOC) discussed some of the agency specific challenges to organizing, collecting, exchanging and sharing information. The U.S. Department of State's Humanitarian Information Unit is currently undertaking a substantial initiative to provide mapping and data collection support to African nations. The U.S. Census Bureau extended many participants' knowledge of traditional census data collection with a discussion on the "Use of Satellite Imagery and Census Data to Produce High-Resolution Online Demographic Maps." The U.S. Army Corps of Engineers discussed the creation of conceptual models built off of military doctrine to provide baseline understandings of sociocultural information to military practitioners. The conceptual models provide a reference for traditionally stove-piped military domains and for the first time puts an integrated framework into one space, with entities binned into accepted doctrinal categories.

Papers examining ways to determine the validity of cross-cultural competency were also presented. A large number of papers addressed the automated development of meta-data and sociocultural taxonomies. There were several papers addressing approaches and methods to overcoming challenges in data (e.g. collection in denied environments, addressing validity/bias of open source data, data inconsistencies and missing data, integration of data from various sources), affirming that this is an on-going issue in using open source sociocultural data sets. Finally, several presenters discussed their studies of deriving fundamental assumptions and detecting changes in trends for similar culture specific baseline data and identifying the most critical/salient driving factors for different cultures.

Understanding and Modeling Human Behavior

Track Chair: Gary L. Klein

Computational social science is an emergent field at the intersection of the social sciences, mathematical models, quantitative analysis techniques, and computer programming. The focus of this track was on social science and theory which are amenable to such computational development. There was a mind-boggling array of excellent presentations from many perspectives.

The first session of the track started with descriptive models of the human, social, cultural and behavioral factors that influence human behavior, particularly the motivations and influences underlying terrorist and insurgent behavior. Examples from these presentations include Jerrold Post's (Political Psychology Associates, Ltd.) presentation on the psychosocial foundations of contemporary terrorism, in which he presented findings that terrorists are not psychologically abnormal or psychopathological. Instead, factors such as an individual's relationship with their parents can interact with their parent's relationship to the ruling regime. He and the following presenter John Horgan (Penn State University), who presented his findings on Irish Republican Army bomb making, both concluded that terrorism is too often socialized as part of a culture.

The focus then shifted to the use of a variety of computational models, often corroborated by empirical data from real people. Some of these dealt with factors that influence individuals, groups, and organizations to commit (or not commit) terrorist or violent acts. One such presentation was by Ido Erev (Technion) on how authorities can better achieve their desired ends from consistent gentle rule enforcement. He used agent-based models and real-world experiments to make two reasonable real-world assumptions: that the rule enforcement unit has limited resources, and that the probability of punishment goes down with the proportion of violators. They found that the effectiveness of gentle continuous punishment policies is highly sensitive to the probability of detection of each violation.

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Understanding and Modeling Human Behavior

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Other presentations looked at the roles and/or structures in societies which define power relationships, governing structures, and formal and informal organizations, and the influence of these roles/structures on individual and group behavior. For example, Steven Hall (Lockheed Martin) modeled interactions between intelligent adversaries capable of mutually adapting. Using adversarial intelligent agent-based models, the results show that co-evolution of adversarial organizations generates a mutual enhancement in their capacity to cope with unexpected and unfamiliar situations. In another study, Bill Kennedy (George Mason University) built an agent-based model of individual family units and their associated herds in a specific region near the juncture of Kenya, Somalia, and Ethiopia. Their model is data-driven, based on available literature. They found that most often a single clan of herders gained dominance in an area. However, the introduction of farmers provided something of a barrier between the clans of herders, reducing the previous trend toward dominance and almost doubling the carrying capacity of the land.

Another theme in the track concerned decision-making frameworks informed by sociocultural research, and how these frameworks can be used to model influences on decision-making at individual, group and societal levels. As illustrated in the accompanying figure, Glenn Taylor (SoarTech) presented a computational architecture for cultural behavior modeling. The architecture has a number of interesting implications for computational cultural modeling. First, a model of an individual's cultural behavior must include underlying mechanisms of cognition (or "mind") such as perception, decision-making, memory, appraisal, and emotion. These mechanisms are common across people.

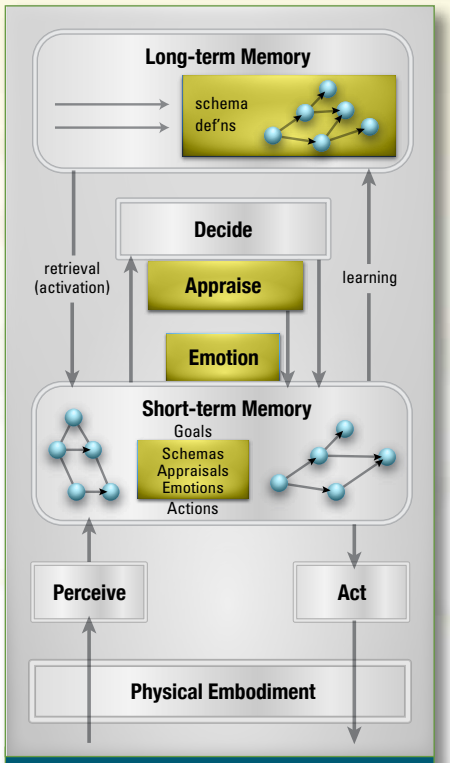

Figure 4. A Computational Architecture for Cultural Behavior Modeling

Second, cultural knowledge can usefully be described as a kind of knowledge that is processed by those underlying cognitive mechanisms. Taken together, this lets us build knowledge-based models of culture and cognition.

Finally, Gregory Berns (Emory University) presented an actual neurological picture of where the brain deals with sacred values, such as those associated with religious or ethnic identity, which underlie many important individual and group decisions in life. Individuals typically resist attempts to trade-off their sacred values in exchange for material benefits. His research utilized an experimental paradigm that paid real money to induce individuals to "sell their personal values." Using functional magnetic resonance imaging (fMRI), they found that values that people refused to sell (sacred values) were associated with increased activity in the left temporoparietal junction and ventrolateral prefrontal cortex, regions previously associated with semantic rule retrieval. This suggests that sacred values affect behavior through the retrieval and processing of rules of moral obligation.

Valid Model Use and Validation

Track Chair: Matt Koehler

Realizing that validation within a sociocultural context presents unique challenges, the Valid Model Use and Validation track took a broad perspective. The valid use of these models, given their inherent deep uncertainty is complementary to validating the models themselves.

Submissions to the track were welcomed in the following areas:

- Determining valid uses of a model (how to determine the valid areas of input parameter space, the ways of using output data, and determining the valid range of applications)
- Exposing the "black box," how to find and expose areas of deep uncertainty within these models (areas where the theoretic underpinning is unknown or ill-defined, areas where data is unknown, or areas where many factors coincide to produce behavior that is difficult to predict with causal structures that are difficult to unpack)
- Tools to support policy analysis and decision support with sociocultural models (How to take a model filled with deep uncertainty and make it useful for decision-makers and how to choose the right model to apply)
- The definition of validity in a sociocultural domain: is there a single definition or must it be idiosyncratic to each model/effort? Is there a theory of validity for these types of models?

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Valid Model Use and Validation

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- Applications and case studies of sociocultural model validation
- Tools and techniques for determining model validity

The track received more submissions than could be fit into its twenty slots. Moreover, abstracts came in from all sectors of the HSCB community: academia, not-for-profit companies, for-profit companies, government agencies, federally funded research and development centers, and national laboratories.

Of particular interest is the rather significant shift that has occurred within the community regarding attitudes towards validation (Did you build the correct model?) and verification (Did you build the model correctly?). Not too many years ago there was great resistance to validation and verification (V&V) within the HSCB community. V&V was seen as a draconian wall used to keep new ideas and new individuals out of the Department of Defense (DoD) analytic communities. Furthermore, V&V was perceived as a holdover from simulations that were physics-based. Some even went so far as to say that HSCB models were not "V&V-able."

At Focus 2011 none of these concepts made an appearance. Rather, there was a virtual consensus within the track that V&V was here to stay, that it is not only necessary, but completely possible within the HSCB context. The discussion over the course of this track focused on how to do V&V well, case studies, frameworks, and tools to aid in V&V. Of particular note was the idea that came up on numerous occasions, that V&V should be a "cradle to grave" effort. In fact, this is even more important in the HSCB context than in the "traditional" physics-based domains as the subject being modeled may change its behavior over time, whereas the laws of physics tend not to change. A number of speakers presented frameworks and tools designed to aid in this endeavor.

Of course, V&V within the HSCB context continues to present a number of challenges including, *inter alia*, lack of referent data sets, an inability to experiment with the system in question, and astronomical degrees of freedom. However, given the perspective of the community, the direction of the research, and the development of a new set of tools, V&V should only become easier, more accessible, and more useful within the HSCB context.

Visualization for Computational Social Science

Track Chair: Joseph Watts

Visualization is the way consumers ingest complex information produced by computational social science models. Even the best models lack utility without a mode to communicate their findings to users. Figure 5 below (developed by HSCB performer, APERTURE), highlights the complexity and multi-dimensionality in the visualization output.

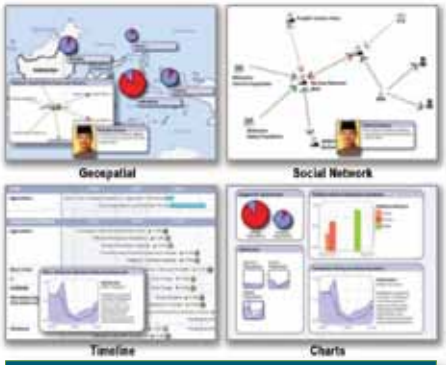

Figure 5

The Visualization for Computational Social Science track of the HSCB Focus 2011 conference focused on presentations that covered a variety of visualization related topics critical to the operational user of social science data including:

- Visualization capabilities for translating sociocultural behavior model outputs into military decision-making processes
- Spatio-temporal visualization methods to display sociocultural model outputs within temporal/spatial contexts
- Identification and evaluation of common visualization methods that can be applied to sociocultural modeling
- Data requirements to improve the usability and utility of sociocultural model outputs
- Perceptual and cognitive processing methods to improve the usability and utility of sociocultural model outputs
- Imagery (including static images, video, animation and interactive applications) that leads to better analysis and enhanced sociocultural understanding

Eight researchers presented their findings in the Visualization track of the HSCB Focus 2011 conference. Dipak Gupta (San Diego State University) presented "Mapping Cyberspace to Realspace: Tracking the Spread of Extremist Ideas." This project aims at understanding the process by which the impact of a single event or idea disperses throughout the world over time and space. By mapping and analyzing such ripples, new insights will be provided into the role of new media in biasing, accelerating, impeding, or otherwise influencing personal, social, and political uses of such information.

David Jonker (Oculus Info Inc.) presented "Empirical Guidelines for Visualizing Social Cultural Model Results." He presented a broad outline of challenges facing the visualization community given the open, interactive, and rich hybrid modeling systems used to address social science problems. The effort is working to provide guidelines for visualizing sociocultural model results, including suggestions for

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Visualization for Computational Social Science

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large data sets, uncertainty, diverse users, usability and utility.

Peter Tikuisis (Defence Research & Development Canada–Toronto) presented on "Incorporating Human and Social Sciences into NATO Operational Planning and Analysis: A Visual Reasoning Tool." His work was performed as part of a NATO study panel and emphasized the use of concept maps to depict challenging intelligence analysis workflows.

Michael Farry (Charles River Analytics, Inc.) presented "Designing Visualizations of HSCB Models to Foster Appropriate Trust." In his paper, Mr. Farry presented a list of potential trust-related factors, their relationship to cognitive tasks, and techniques to represent those factors visually to users. Trust-relevant factors include meta-information about a model's previous performance and accuracy under different conditions, and traces of a model's operation to provide insight and observability about the model.

Jason Dalton (GeoEye Analytics) presented "StoNA: Structure to Network Activity." GeoEye has developed a suite of analytical tools, StoNA, that enables the warfighter to construct and analyze complex dynamic networks. Specifically, StoNA provides tools to identify multiple layers of structure hidden within the networks and detect changes in the structure as the networks evolve through time.

Charles Barba (CHI Systems, Inc.) presented on "The Visual Correlation of HSCB Data in Tactical Warfighter Information Systems." Their CultureMap tool provides cultural intelligence preparation of battlefield functionality and integration of HSCB information into the tactical battle-rhythm. CultureMap displays HSCB data entities and tactical information in multiple tightly correlated views. CultureMap offers search-based, geospatial, temporal, and network visualization contexts to provide complex HSCB visual analytic functionality and in a user-friendly format.

Joseph Watts (U.S. Army Geospatial Center) presented "Supporting the Assessment and Analysis of DOD Humanitarian Assistance Efforts." Mr. Watts discussed HSCB project involvement in the Cobra Gold Joint Exercise managed by the U.S. Marine Forces Pacific. In particular, he emphasized the role of web mapping interfaces as a central user interface for data and model visualizations.

Dan Delaney (Tanagram) presented on "The Visualization of Hyperlocal Marketing Data for Scenario Building." The presentation showcased the planning application Tanagram is developing for the largest hyper-local media company in the U.S., Geomentum. The user interface visualizes HSCB information in a manner that lets the user manipulate it in a tactile way. Algorithms allow the comparison of new scenarios with historical patterns to predict results. A function is also under development that would allow the tracking of 'viral events,' both positive and negative.

Each of these presenters highlighted, either explicitly or implicitly, the challenge of displaying, navigating, and interacting with complex human, social, culture, and behavioral models. As geographic information and linkages to the human environment, as well as multi-dimensional non-spatial visualizations, become a part of the day to day analysis in this research domain, there will continue to be more up and coming solutions to address the challenges. The presenters in this session identified only some of the ways in which the domain is currently addressing the challenges and pointed participants to directions for future research.

CALENDAR

Date	Event	Location	Website
June 20–23, 2011	79th Military Operations Research Society Symposium—"Developing the Next Generation of National Security Analysts"	Naval Post Graduate School Monterey, California	**https://morss2011.wingateweb.com/portal/cfp/login.ww**
July 9–14, 2011	Human Computer Interaction Conference	Hilton Orlando Bonnet Creek Orlando, Florida	**www.hcii2011.org**
October 9–12, 2011	Computational Social Science Society of America conference	Bishops Lodge Santa Fe, New Mexico	**http://computationalsocialscience.org/17-2**