



Calhoun: The NPS Institutional Archive
DSpace Repository

Faculty and Researchers

Faculty and Researchers Collection

2011

Human Social Culture Behavior (HSCB)
Modeling Standards Study Group
Investigations: Objectives and Early Findings

Blais, Curtis

<http://hdl.handle.net/10945/30790>

Downloaded from NPS Archive: Calhoun



Calhoun is a project of the Dudley Knox Library at NPS, furthering the precepts and goals of open government and government transparency. All information contained herein has been approved for release by the NPS Public Affairs Officer.

Dudley Knox Library / Naval Postgraduate School
411 Dyer Road / 1 University Circle
Monterey, California USA 93943

<http://www.nps.edu/library>

Human Social Culture Behavior (HSCB) Modeling Standards Study Group Investigations: Objectives and Early Findings

Curtis Blais
MOVES Institute
Naval Postgraduate School
cblais@nps.edu

Keywords:

HSCB, modeling, simulation, social science, SSTR

ABSTRACT: *Research and development efforts in modeling and simulation are increasingly focusing on the modeling of human societies, culture, and behavior for improved gaming experiences, analytical and decision tools, training, experimentation, and many other purposes. The rapid growth in this area is creating increasing demands for data, models, tools, and techniques. To investigate the potential need for standards or best practices in this area, the Simulation Interoperability Standards Organization (SISO) approved establishment of the Human Social Culture Behavior (HSCB) Modeling Standards Study Group. The Study Group kicked off technical activities at the Fall 2010 Simulation Interoperability Workshop. This paper describes objectives of the Study Group and provides a summary of the various technical activities that are in progress to gather information for the Study Group. Additional details and current status of these activities are provided in separate papers being presented in the Spring 2011 SIW.*

1. Introduction

Human Social Culture Behavior (HSCB) Modeling is a growing area of focus for the M&S community. This endeavor is addressing the challenges of modeling human behaviors and organizations from the individual level through higher social and cultural structures in a variety of contexts, including warfare, homeland defense, crisis management, economics, politics and other social dimensions. The 1998 National Research Council report stated: “The modeling of cognition and action by individuals and groups is quite possibly the most difficult task humans have yet undertaken” and “developments in this area are still in their infancy” [1]. The 2008 National Research Council report, *Behavioral Modeling and Simulation: From Individuals to Societies*, raised the ante, stating that “it has become ever more clear that human behavioral modeling at all levels is critical to DoD specifically and to the nation more generally” [2, p 20].

In preparation for the Spring 2010 Simulation Interoperability Workshop (SIW), the Simulation Interoperability Standards Organization (SISO) approved a new application forum called HSCB Modeling. The forum was created as a venue for examining models, data, and integration frameworks that can help determine requirements for standardization promoting enterprise-wide integration, execution, and validation of human social, cultural, and behavioral models. Following successful inauguration of this forum in the Spring SIW,

organizers recognized close conceptual and contextual relationships with the Crisis Management and Societal Security (CMSS) forum. In preparation for the Fall 2010 SIW, these two venues were combined to form a single HSCB-CMSS forum. The combined forum provides a place for theoretical and technical examination of issues relating to these topics. The group may further evolve as participants determine the direction they would like to see the forum go in future SIWs.

In addition to this important merger of related topics for SIW paper presentations, the success of the newly established HSCB Modeling focus area led to preparation and submission of a Terms of Reference for establishment of a new Study Group, titled “the Human Social Culture Behavior (HSCB) Modeling Standards Study Group.” SISO leadership approved the proposal and the first meeting of the Study Group was held during the Fall 2010 SIW. This paper describes the SG, initial directions for work decided upon in the Fall 2010 kick-off meeting, work accomplished and reported on at the Spring 2011 SIW, and planned work activities leading up to the next meeting of the SG at the Fall 2011 SIW.

2. HSCB Modeling

In [3, 4], the author provides a brief introduction to some of the challenges of HSCB Modeling as represented in recent U. S. Department of Defense programs. Specific topics of interest identified in a recent Broad Agency Announcement (BAA) include [5]:

- Data collection and management: specify the challenges; develop and validate new collection methods and tools; develop standards, methods and systems for managing data so it can be used in models and ingested for analysis by automated information processing systems.
- Multi-scale and hybrid modeling of regional and subregional stability: leverage multi-scale and hybrid modeling to enhance DoD ability to monitor and anticipate changes in political, social, and economic stability, particularly for regional and subregional levels. Research should focus on validating and integrating social scientific theory; on methods/designs for instantiating that theory in multi-scale and/or hybrid models; and on developing indicators of political, social, and economic stability.
- Analysis and modeling of non-kinetic Courses of Action (COAs): develop methods and models to support the U.S. military's planning and execution of non-kinetic COAs, given the characteristics of the "comprehensive approach to operations" (i.e., integrating "tools of statecraft with our military forces, international partners, humanitarian organizations, and the private sector to achieve unity of effort towards a shared goal" [6, p 1-4]).
- Training methodologies: determine how best to provide culture-general and culture-specific training, particularly for training socio-cultural skills at the tactical level, and including how to specify the desired learning outcomes for training.

Challenges abound in this field. First, it is a very large and complex area of study, consisting of a multitude of disciplines (e.g., anthropology, philology, linguistics, philosophy, psychology, theology, sociology, political science, economics, etc.) having diverse and often conflicting theories. Second, numerous methods, models, and tools (MMTs) have been developed, of varying size, complexity, and scope, and generally without concern for integration or interoperability with other MMTs. Third, it is difficult to find and assess the quality of data supporting HSCB modeling.

Furthermore, HSCB modeling is a relatively new area of focus in the SISO M&S community, but has been a long-standing focus in the social sciences. The SISO M&S community is well-founded in traditional combat modeling, but less so in modeling human and social dynamics. Greater interconnection across the M&S and social science communities is needed. One area of potential common interest across those communities is identification and development of standards, as shown in the first bullet above from the recent BAA.

However, some may feel that it is too early to identify standards, that this M&S domain is too immature for identification of standards, or that standards would constrain innovation. A balance is probably needed between structured inquiry and freedom to innovate. SISO has accepted the challenge to step into this high energy arena now through establishment of the HSCB Modeling Standards Study Group.

3. HSCB Modeling Standards Study Group Formation and Initial Directions

The SISO Policies & Procedures manual [7] describes the establishment of Study Groups by the Executive Committee (EXCOM) to consider specific issues and to provide recommendations concerning proposed courses of action for standards development. Each Study Group (SG) operates under specific Terms of Reference (TOR) that identify the issues to be considered and specific questions to be addressed. The TOR designates the SG leadership, the outputs expected, and the time schedule for generation of the outputs.

Following the Spring 2010 Simulation Interoperability Workshop (SIW), an HSCB Modeling Standards Study Group TOR was prepared and submitted for review and approval by the SISO EXCOM (the TOR is summarized in [4]). Following minor revisions, the proposal was approved and a kick-off meeting for the SG was conducted during the Fall 2010 SIW.

The objective of the HSCB Modeling Standards SG is to determine the need for standards (or best practices, or other products as may be determined to be appropriate) in this area of modeling and simulation, and to make recommendations to SISO leadership for the development of any needed standards in this area. The SG is careful not to presuppose the requirement for standards, but recognizes that a case must be made for any proposed standard. Furthermore, the SG may be able to make a significant contribution to the area of study through identification of best practices, tools, or techniques that advance understanding and state-of-the-art without reaching the stage of full standards development.

The TOR identified the following tasks to be performed:

- Bring together M&S and subject matter experts to investigate the need for standards for HSCB Modeling to promote common understanding, information sharing, model interoperability, common data formats, and other areas as determined to be important to this area of study.

- Establish a SG reflector and file sharing space to promote collaboration and communication within the group.
- Schedule and conduct regular meetings to discuss requirements for HSCB modeling standards.
- Establish tiger teams and working groups to address particular aspects of the study questions when additional detail or specialized research is needed.
- Establish recommendations for next steps for the topic within SISO.
- Provide support to other SISO SGs and PDGs potentially related to the topic (i.e., leveraging existing SISO standards, such as Base Object Model and Military Scenario Definition Language).
- Become and remain cognizant of other organizational efforts to research and address HSCB Modeling standards and practices and make every possible effort to make contact with such organizations for the purpose of expressing interest in their efforts and findings, potential collaborations, and in sharing the findings of the efforts of this study group.
- Provide to the SAC an annual report by September 2011 detailing the progress and activities from the previous year and the goals for the following year (e.g., continue the SG, transition to a Standing Study Group, transition to a Product Development Group, etc.).

SG efforts, normally one year in duration, result in preparation and presentation of a SG Final Report. The initial plan therefore called for the HSCB Modeling Standards SG Final Report to be presented at the Fall 2011 SIW.

During the kick-off meeting at the Fall 2010 SIW, the SG members identified the following areas for initial study:

- Taxonomies and ontologies – investigations into specification of a common vocabulary for describing HSCB modeling concepts.
- Modeling frameworks and techniques – investigations into standard approaches to ways to integrate HSCB models and data.
- Models, methods, and tools – investigations into current and possible ways to design and develop HSCB models.
- Data and data sources – investigations into what data are currently available, how the data are described, and what agencies/organizations provide data relevant to HSCB modeling.
- Interoperability and collaboration – investigations into ways to increase collaboration across the M&S and social science communities, including how to

establish or improve interoperability across HSCB models and data.

- Validation methodologies – investigations into the special challenges of validation of HSCB models, and identification of techniques and methods for validation of HSCB models.
- Experimentation environments – investigations into requirements for experimentation environments for evaluating and testing HSCB models, and for generating data that could be used in HSCB modeling.
- Operational data requirements -- investigations into what data are required to support operational decision-making in a combined C2/M&S environment.
- User needs – investigations into what organizations are pursuing advances in HSCB modeling and for what purposes.

The SG members also agreed the group should try to identify individuals and organizations to bring into the effort, including possibilities for SIW speakers and panels.

4. SG Progress through Spring 2011 SIW

Earlier, a list of activities from the HSCB Modeling Standards SG TOR was provided. This is a useful “checklist” for discussing progress made between the Fall 2010 SIW and the Spring 2011 SIW.

- Bring together M&S and subject matter experts: This is occurring to some extent through growth in the SG investigations, but much more effort is needed. Possibilities include working with conference committee members to identify and invite plenary speakers from the social science community or to invite more to participate in SIW forum presentations and panel sessions. We need a “Bring a Social Scientist to SIW” campaign!
- SG reflector and file sharing space: The reflector is established and SISO provides archival storage of discussion threads from the reflector. There is some capability for file sharing, but the SG members suggested a more collaborative environment, such as a Wiki. Possible approaches are being investigated.
- Regular meetings: This did not occur between Fall 2010 SIW and Spring 2011 SIW. Going forward, the SG members agreed that starting with monthly telephone conferences to touch base on progress of the various areas of study would be useful.
- Establish tiger teams and working groups: Several members of the SG volunteered to begin

investigations into the identified study topics. This approach suffices for this stage of the SG effort.

- Establish recommendations for next steps for the topic within SISO: It is still too early for specific recommendations, but there are a number of promising areas, including creating a standard vocabulary (taxonomy) and metadata standards for data relating to HSCB modeling. This is a standing issue that the group will continue to review as the work proceeds.
- Provide support to other SISO SGs and PDGs potentially related to the topic: Initial inquiries into other SISO standards have occurred (e.g., see [8, 9, 10])
- Be aware of other organizational efforts to research and address HSCB Modeling standards and practices: The group is attempting to stay informed of various activities (e.g., the BAA [5] cited earlier in this paper). One of the SG members provided an excellent summary of programs and projects in the Spring 2011 SIW (HSCB-CMSS Forum; see [11]).
- Provide an annual report by September 2011: This will be provided as a paper for presentation at the Fall 2011 SIW. During the SG meeting in the Fall 2011 SIW, the SG members decided to propose changing the SG to a Standing Study Group. Work is in progress to prepare respective changes to the TOR to provide to the Standards Activity Committee.

In addition to these activities, several SG members performed work related to the identified study topics, including several who prepared papers for presentation at the Spring SIW:

- Taxonomies and ontologies – Several key papers were prepared and presented:
 - Paper 11S-SIW-033, “How Does the Black Swan Fly?: Considerations for an HSCB Metamodel” [12]: *This paper proposes an HSCB metamodel and discusses criteria by which such a metamodel may be validated.*
 - Paper 11S-SIW-048, “Developing Human Social Cultural and Behavioral (HSCB) Ontologies to Support Simulations” [13]: *This paper describes ontologies being developed by the U.S. Army to represent and characterize portions of the HSCB domain. These ontologies are potentially useful for simulation development activities including conceptual modeling, data interchange, and interoperability.*
- Modeling frameworks and techniques – No specific progress in this topic was reported at the Spring 2011 SIW.

- Models, methods, and tools – Relevant papers included the following:
 - Paper 11S-SIW-037, “HuBSiG: Human Behavior Signal Generation for Clutter and Scenarios” [14]: *This paper describes a technique for generating human ‘signatures’ and behavior patterns from a set of primitives of behavior and the resulting activities and synthetic environment.*
- Data and data sources – Relevant papers included the following:
 - Paper 11S-SIW-027, “Toward Data Interoperability for HSCB Models” [15]: *This paper reports the results of a study performed by the Johns Hopkins University/Applied Physics Laboratory for the ONR HSCB program on achieving data interoperability.*
- Interoperability and collaboration – Several collaboration sites are available to support HSCB modeling efforts, to include:
 - LinkedIn (see <http://www.linkedin.com>) discussion group on “DIME, PMESII, and HSCB,” with a subgroup for “HSCB Modeling Standards.”
 - Irregular Warfare Community of Practice (see <https://connect.dco.dod.mil/r35151781>).
- Validation methodologies – While not presented at the Spring 2011 SIW, members of the SG continue to work on a project to describe best practices for validation of Irregular Warfare Models and associated data requirements [16].
- Experimentation environments – No specific progress on this topic was reported at the Spring 2011 SIW.
- Operational data requirements -- Relevant papers included the following:
 - Paper 11S-SIW-047, “Operational Environment Scenario Generation! Aligning MSDL for Planning in an IW Context” [8]: *This paper explores how existing standards (e.g., MSDL) were used by the ABCA nations (US, Great Britain, Canada, Australia) to create a scenario generator for an Irregular Warfare operational environment.*
- User needs – Relevant papers included the following:
 - Paper 11S-SIW-014, “Status Report: A Review of the Critical Needs for Interdisciplinary Standards within the HSCB User Community” [11]: *This paper provides an overview of the current funding available for HSCB-related research. In addition to the survey of funding*

sources, the centrality of the research interests is discussed and analyzed.

Other relevant papers/presentations at the Spring 2011 SIW included:

- Paper 11S-SIW-008: How is M&S Interoperability different from other Interoperability Domains? [17] (also see [18]): *The challenge of M&S is that the product that needs to be made interoperable is not the service or the system alone, but the model behind it as well. This paper shows that the alignment of conceptualizations is the real problem that is not yet dealt with in current interoperability standards, and discusses the particular problem this poses in the area of HSCB modeling.*
- Paper 11S-SIW-060, “Building an Angry Grandmother” [19]: *This paper describes efforts to develop technology to create characters who can force infantry trainees to make a variety of complex decisions in non-kinetic situations. These characters need to be visually and behaviorally plausible, culturally appropriate, and responsive to the actual situation and the actions of the trainees. They should be able to act autonomously, but also be responsive to operator control.*

5. Next Steps

A significant next step will be obtaining approval for changing the group to a Standing Study Group for greater flexibility in pursuing various lines of inquiry. Interest shown in the Spring 2011 SIW was an encouraging indication of the viability of this group as it continues its investigations. Greater interactivity and collaboration among the group members will be sought during the next cycle of work. Work on various study topics that were reported on at the Spring 2011 will continue, with specific tiger team efforts in the areas of HSCB Modeling Taxonomy and HSCB Modeling Data.

Interested individuals are invited to participate in the SG activities. We also expect to continue to work closely with the SISO HSCB Modeling / CMSS Forum to invite speakers and promote submission of papers for future SIWs to further articulate, promote, and report on the SG activities.

6. Summary

HSCB Modeling and the issue of the need for standards are exciting and challenging areas for M&S community involvement. We encourage SISO membership to participate in the SG and invite comment and advice as this work moves forward.

7. References

- [1] National Research Council: *Modeling Human and Organizational Behavior: Application to Military Simulations*, R. W. Pew and A. S. Mavor (Eds.). Panel on Modeling Human Behavior and Command Decision Making: Representations for Military Simulations, Commission on Behavioral and Social Sciences and Education, the National Academies Press, Washington, DC, 1998.
- [2] National Research Council: *From Individuals to Societies, Behavioral Modeling and Simulation*, G. L. Zacharias, J. MacMillan, and S. B. Van Hemel (Eds.), Committee on Organizational Modeling, The National Academies Press, Washington DC, 2008.
- [3] Blais, C.: “Human Social Culture Behavior (HSCB) Modeling Standards Study Group Proposal: The Need for Model and Data Standards in HSCB Modeling,” Paper 10S-SIW-004, *Proceedings of the Spring Simulation Interoperability Workshop*, Simulation Interoperability Standards Organization, Orlando, FL, April 2010.
- [4] Blais, C.: “Setting a Course for the Human Social Cultural Behavior (HSCB) Modeling Standards Study Group,” *Proceedings of the Fall Simulation Interoperability Workshop*, Simulation Interoperability Standards Organization, Orlando, FL, October 2010.
- [5] Office of Naval Research: Human, Social, Cultural and Behavioral Sciences (HSCB) Applied Research and Advanced Technology Development, ONR BAA 11-014. Refer to: <http://www.onr.navy.mil/~media/Files/Funding-Announcements/BAA/08-025.ashx>
- [6] US Army Field Manual 3-07, *Stability Operations*, October 2008.
- [7] SISO Executive Committee: Policies & Procedures, SISO-ADM-002-2008.1, Simulation Interoperability Standards Organization, 14 October 2008.
- [8] Abbott, J.: “Operational Environment Scenario Generation! Aligning MSDL for Planning in an IW Context,” Paper 11S-SIW-047, *Proceedings of the Spring Simulation Interoperability Workshop*, Simulation Interoperability Standards Organization, Boston, MA, April 2011.
- [9] Turnitsa, C., Gustavson, P., and Blais, C.: “Exploring Multi-Resolution Human Behavior Modeling Using Base Object Models,” Paper 10F-SIW-063, *Proceedings of the Fall Simulation Interoperability Workshop*, Simulation Interoperability Standards Organization, Orlando, FL, April 2010.
- [10] Whittington, E., and Blais, C.: “Extending Capabilities of the Military Scenario Definition Language (MSDL) for Nontraditional Warfare

- Scenarios,” Paper 09S-SIW-001, *Proceedings of the Spring Simulation Interoperability Workshop*, Simulation Interoperability Standards Organization, San Diego, CA, March 2009.
- [11] Byrd, K.: “Status Report: A Review of the Critical Needs for Interdisciplinary Standards within the HSCB User Community,” Paper 11S-SIW-014, *Proceedings of the Spring Simulation Interoperability Workshop*, Simulation Interoperability Standards Organization, Boston, MA, April 2011.
- [12] Riggs, W. C.: “How Does the Black Swan Fly?: Considerations for an HSCB Metamodel,” Paper 11S-SIW-033, *Proceedings of the Spring Simulation Interoperability Workshop*, Simulation Interoperability Standards Organization, Boston, MA, April 2011.
- [12] Lacy L. W., D. Hartley, and P. Works: “Developing Human Social Cultural and Behavioral (HSCB) Ontologies to Support Simulations,” Paper 11S-SIW-048, *Proceedings of the Spring Simulation Interoperability Workshop*, Simulation Interoperability Standards Organization, Boston, MA, April 2011.
- [14] Turnitsa, C. D.: “HuBSiG: Human Behavior Signal Generation for Clutter and Scenarios,” Paper 11S-SIW-038, *Proceedings of the Spring Simulation Interoperability Workshop*, Simulation Interoperability Standards Organization, Boston, MA, April 2011.
- [15] Morse, K. L., and J. Schloman: “Toward Data Interoperability for HSCB Models,” Paper 11S-SIW-027, *Proceedings of the Spring Simulation Interoperability Workshop*, Simulation Interoperability Standards Organization, Boston, MA, April 2011.
- [16] Appleget, J., R. F. Brown, C. Blais, D. Duong, T. Perkins, and M. Thompson: Irregular Warfare (IW) Model Validation Best Practices Guide, TRADOC Analysis Center, Monterey, CA, 24 November 2010.
- [17] Tolk, A., S. Y. Diallo, J. J. Padilla, C. D. Turnitsa: “How is M&S Interoperability different from other Interoperability Domains?,” Paper 11S-SIW-008, *Proceedings of the Spring Simulation Interoperability Workshop*, Simulation Interoperability Standards Organization, Boston, MA, April 2011.
- [18] Tolk, A., P. K. Davis, W. Huiskamp, G. L. Klein, H. Schaub, and J. A. Wall: “Towards Methodological Approaches to meet the Challenges of Human, Social, Cultural, and Behavioral (HSCB) Modeling,” *Proceedings of the Winter Simulation Conference*, B. Johansson, S. Jain, J. Montoya-Torres, J. Huan, and E. Yücesan (Eds.), IEEE CS Press, December, 2010, pp 912-924.

Disclaimer

The opinions expressed in this paper are those of the author and not necessarily those of the Naval Postgraduate School or any of its sponsoring organizations.

Author Biography

CURTIS BLAIS is a Research Assistant in the Modeling, Virtual Environments, and Simulation (MOVES) Institute at the Naval Postgraduate School, Monterey, California. He has over 36 years of experience in M&S management, research, development, and education. Current research areas include design of simulations of non-traditional warfare and application of Semantic Web technologies to address effective interchange of information across M&S and C2 systems. Mr. Blais has a B.S. and M.S. in Mathematics from the University of Notre Dame.