Chapter 12 – THE PEER REVIEW PROCESS

The Peer Review process consisted of three events: a joint working meeting with SAS-053 in February 2005 at the Air Force Agency for Modelling and Simulation (AFAMS) in Orlando, FL, the Information Age Metrics Working Group (IAMWG) meeting in March 2005 at Evidence Based Research in Vienna, VA, and the Peer Review Workshop, hosted by NATO ACT, held in Virginia Beach, VA on October 4-6, 2005. Each of these events provided an opportunity for formal and informal dialogue regarding the model. The joint session with SAS-053 provided team members with feedback on the completeness and consistency of the identified variables and relationships between and among the variables. At the IAMWG meeting, an interim version of the model and its variables were shown to the group. In Virginia Beach, SAS-050 members gave detailed presentations of the model to a community of experts from NATO, PfP, and other interested nations for the purpose of eliciting constructive criticism and feedback to assist the Working Group in refining the model before presenting their results to the RTO. More specifically, the SAS-050 Working Group members explained the scope and magnitude of the task undertaken, to show what has been accomplished, and to demonstrate how the model could be applied.

JOINT SESSION WITH SAS-053

SAS-050 and SAS-053 held joint working sessions in Orlando. The primary objective was to familiarize each group with the other's work and plans, and to identify potential areas for synergy. SAS-050 members presented their work to SAS-053 to obtain feedback and to enable SAS-053 to work with SAS-050 to expand upon the human behaviour aspects then incorporated in SAS-050's Conceptual Model. The two teams discussed SAS-053's plan for a NATO Virtual Institute for Research on Human Behaviour Representation. SAS-050 will conclude before the SAS-053 capabilities are available. However, a follow-on group could try to take leverage the work of both groups. The following table displays SAS-053 members that participated in the joint session.

Table 12-1: List of Peer Reviewers at the Joint Session with SAS-053

Name	Organization
Dr. Sheila Banks	*Calculated Insight*
Ms. Elizabeth Bowman	*ARL*
Dr. Uwe Dompke	*NATO C3A*
Mr. Walter Dyck	*DRDC-Toronto*
Hawkins	*US ONR*
Ms. Anne Helsdinger	*TNO HF*
Mr. Allen Murashige	*HQ USAF/XIW*
Sheppard	*Dstl, UK*
Shumaker	*IST*
Dr. Martin Stytz	*IDA*
Ms. Janet Sutton	*ARL*

IAMWG REVIEW

The U.S. OSD sponsored an Information Age Metrics Working Group (IAMWG) in March 2005, in advance of the NATO peer review workshop in Virginia Beach. The group reviewed the model in its then current form. The following table displays those that participated in the IAMWG review.

Table 12-2: List of Peer Reviewers at the IAMWG Meeting

Name	Organization
Dr. David Alberts	*OASD/NII*
Mr. Todd Champberlain	*NORAD-USNORTHCOM*
Dr. Robert Clemence	*EBR, Inc.*
Mr. David J. Duncan	*EBR, Inc.*
Ms. Amber Fagan	*EBR, Inc.*
RAdm. Evelyn Fields (ret.)	*EBR, Inc.*
Dr. Richard Hayes	*EBR, Inc.*
Mr. Kirsch Jones	*Lockheed Martin*
Dr. Irving Lachow	*NDU*
Dr. Daniel Maxwell	*EBR, Inc.*
Mr. John Poirier	*SAIC*
Mr. Eugene Visco	*Visco Consulting*
Ms. Corinne Wallshein	*AFSAA*
Ms. Heather Warren	*EBR, Inc*
Ms. Mitzi Wertheim	*CAN*
Mr. Larry Wiener	

The IAMWG members provided a critique of the model structure, which the SAS-050 group later used to refine the product. During the IAMWG meeting, the suggestion of breaking down the model into smaller components or domains was put forward and resulted in this new criteria being added into the model. The overall achievement of the meeting was the identification of key variables and the discussion of important relationships that were needed to complete the model.

Figure 12-1 shows the three layers of the model with the middle layer (composite variables) as the main focus of the IAMWG meeting.

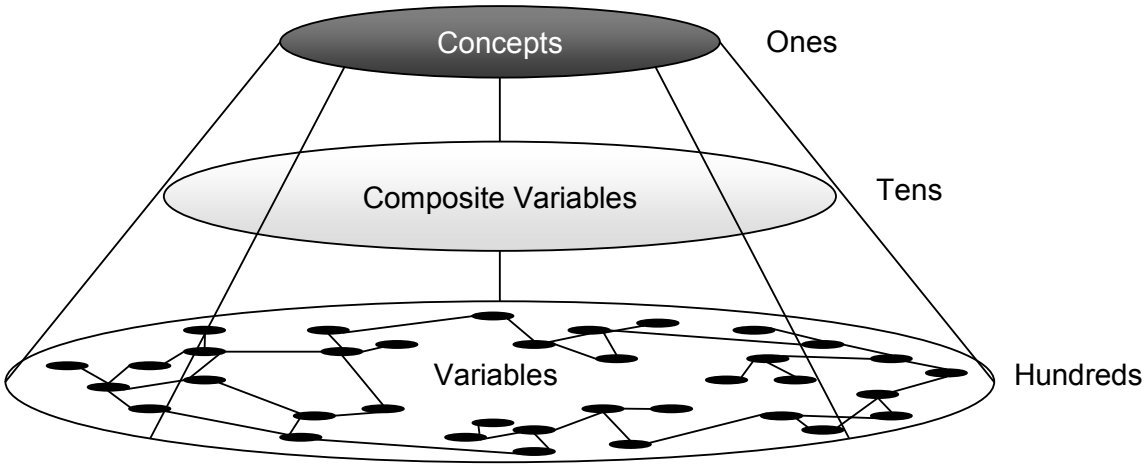

Figure 12-1: Conceptual Model Layers Presented at the IAMWG Meeting.

PEER REVIEW WORKSHOP

Workshop Attendees and Representation

Fifty-four people participated in the Peer Review Workshop. The participants consisted of:

- Government personnel including United States Office of the Assistant Secretary of Defence (OASD/NII), NATO Allied Command Transformation, the German Department of Defence, and United States Joint Forces Command;
- Private sector participants from industries such Boeing, SAIC, and QinetiQ;
- International representatives from countries such as the United Kingdom, Germany, Canada, and the Netherlands;
- Participants from the academic institutions such as the Naval Post Graduate School and Columbia University; and
- SAS-050 Group members.

Figure 12-2: Participants of the Peer Review Workshop.

The SAS-050 Team members who participated in the workshop are listed in Table 12-3.

Table 12-3: List of the SAS-050 Members that Participated in the Peer Review Workshop

Name	Nation	Organization
Dr. David Alberts	US	OSD NII, Chair SAS-050
Mr. Graham Cookman	UK	AMS
Dr. Lorraine Dodd	UK	QinetiQ
Ms. Petra Eggenhofer	GE	ITIS University of the Federal Armed Forces, Germany
Dr. Anne-Marie Grisogono	Australia	DSTO
Dr. Richard Hayes	US	EBR
Dr. Gary Horne	US	Marine Corps Warfighting Lab
Dr. Reiner Huber	GE	IT IS Universitiat der Bundeswehr
Ms. Danielle Martin	US	EBR
Mr. Graham Mathieson	UK	DSTL
Dr. James Moffat	UK	DSTL
Maj. Paulo Nunes	PO	Academia Militar
Dr. Paul Phister	US	AFRL
Mr. Valdur Pille	CA	DRDC-Valcartier
CPT Jens Roemer	GE	IT IS Universitiat der Bundeswehr
Mr. Mark Sinclair	US	EBR
M.Sc. Mink Spaans	NL	TNO Defence, Safety & Security
Ms. Kristi Sugarman	US	EBR
LTC (Ret) Klaus Titze	GE	IT IS Universitiat der Bundeswehr

Peer Reviewers from 6 nations participated and are listed in Table 12-4.

Table 12-4: List of Peer Reviewers that Participated in the Peer Review Workshop

Name	Nation	Organization
Mr. Anthony Alston	UK	QinetiQ
Mr. Don Anderson	US	JFCOM J9 (Contractor)
Mr. Bernard Arata	FR	SACT
Mr. Timothy Bacon	US	USJFCOM J9
Mr. Paul Bloch	US	Boeing
Mr. Gary Bradley	US	Dataline
Mr. Ian Carter	UK	ACT
Mr Victor Corona	US	Columbia Univ
Mr. Louis de Chantal	FR	NATO ACT
Mr. Shane Deichman	US	USJFCOM J9
Mr. Bruce Dickman	US	TRADOC/S3
Mr. David Grant	US	NATO ACT
Mr. Jeffrey Hansberger		ARL
WgCdr Torben Harris	UK	RAF
Dr. Paul Hiniker	US	DISA
Dr. Susan Hocevar	US	NPGS
Mr. Fred Koch	US	USJFCOM J9 Contractor
Mr. Tor Langsæter	Norway	
Dr. Clifford Lieberman	US	USJFCOM/GD-AIS
Mr. Martin Lidy	US	IDA
Mr. Steven Litwiller	US	NATO ACT
LTC Steele MacFarlane	US	USJFCOM J9
Mr. Billy Murphy	US	BCBL Leavenworth
Dr. James Myers	US	NG-MS
LTC J. Neureuther	GE	Bundeswehr Transformation Center @ USJFCOM-J9
LtCol Mike Newman,	UK	SO1 CDE Comd
COL James O'Neal	US	USJFCOM J9
Mr. George Pickburn	UK	Defence Science & Technology Laboratory
Mr. John Poirier	US	SAIC
CAPT Denis Raguin	FR	ACT, NNEC ICT
Mr. Tom Roskowski	US	Lockheed Martin
LtCol Heinz Schweitzer	GE	GE DoD
Dr. Ed Smith	US	Boeing
Dr. Richard Taylor	Australia	DSTO
Mr. Charles Turnitsa	US	VMASC
CDR Arnaud VanDame	FR	NATO ACT
Dr. Colin Wright	UK	NATO ACT

WORKSHOP AGENDA

During the course of the three day event, presentations covered topics such as Criteria for a Conceptual Model, Structure of the Reference Model, Approach to C2 and Decisionmaking, Value View, Information Domain, Individual and Team Characteristics and Relationships, Validation, Tools, Adaptability and Emergent Properties, Example Applications, Agent-Based Modelling, Guidelines for Use, and Future Work Needed.

AGENDA FOR THE PEER REVIEW WORKSHOP

Tuesday	0730	Registration
	0830	Welcome & Opening Remarks – Allied Command Transformation (ACT)
	0845	**Keynote Address** – CAPT Denis Raguin, ACT, NNEC ICT
	0915	**ACT & the RTO** – Dr. Colin Wright, ACT
	1000	Break
	1030	**Overview** – Dr. David S. Alberts, US OSD/NII, Chair SAS-050
	1200	Lunch
	1330	Feedback & Discussion
	1415	**Criteria for a Conceptual Model of C2 –** Dr. Anne-Marie Grisogono
	1445	**Structure of the Model (Intermediate Level)** – Dr. Richard Hayes, Dr Reiner Huber
	1545	Break
	1615	**C2 Approach –** Dr. Richard Hayes, Dr. James Moffat
	1745	End of Session
	1800	Reception
Wednesday	0800	Facilitated Discussion/Feedback
	0830	**Composite Variables Value View** – Mr. Valdur Pille, Mr. Mink Spaans **Structure of the Model – Information Domain** – Dr. Paul Phister, Dr. Lorraine Dodd
	1000	Break
	1030	**Individual & Team Characteristics & Behaviours** – Ms. Petra Eggenhofer, Dr. Reiner Huber, Mr. Graham Mathieson, CPT Jens Roemer, LTC (Ret) Klaus Titze
	1200	Lunch
	1330	Facilitated Discussion/Feedback
	1400	**Validation of the Conceptual Model** – Dr. James Moffat, Mr. Graham Mathieson
	1500	Break
	1530	**Tools – Relational Database** – Ms. Danielle Martin **Tools – UML Version** – Maj Paulo Nunes
	1700	End of Session

Thursday	0800	Facilitated Discussion/Feedback
	0830	**Example Applications**
		AF2T2EA – An Illustrative Example (US Air Force) – Dr. Paul Phister, Mr. Mark Sinclair
		Collaborative Applications of Agent Based Modelling & Data Farming – Overview – Dr. Gary Horne, Dr. Lorraine Dodd
		An Application of Agent Based Modelling to Explore Effects on Organisational Performance – Ms. Danielle Martin
		Agent-Based Models and the Conceptual Model – Mutual Benefits – CPT Jens Roemer
	1000	Break
	1030	**Application and Guidelines for Use** – Dr. Richard Hayes, Dr. Anne-Marie Grisogono, Dr. Reiner Huber, Mr. Mark Sinclair
	1100	Facilitated Discussion/Feedback
	1200	Lunch
	1330	**Future Work**
		Overview
		Code of Best Practice for C2 Assessment Redux – Dr. James Moffat
		Cognitive and Social Experimentation – Ms. Petra Eggenhofer
		Break
		Assessment of Emerging Concepts of Operation – Dr. David Alberts
		Focus on Dynamic Emergent Properties – Dr. Anne-Marie Grisogono
	1630	**Feedback & Wrap-up**
	1700	End of Workshop

THE PEER REVIEW WORKSHOP

The peer review process generated by the workshop was essential in order to obtain constructive feedback on the strengths and weaknesses of the model itself and the groups' ability to present it in a clear and coherent fashion. Each sub-group of the SAS-050 Working Group presented their portion of the model and then opened the floor to comments and feedback from the peer reviewers. The agenda shows the order of presentations, and identifies the sub-groups that worked together throughout the creation of the model. Upon completion of the workshop, the feedback was assembled, analysed, and accepted or rejected by the SAS-050 Working Group. Changes were made to the model to reflect the accepted comments of the peer reviewers.

SUMMARY OF FEEDBACK FROM PEER REVIEWERS

The SAS-050 Working Group received comments on each portion of the model that was presented during the 3-day workshop. The comments were divided into the following categories that generally corresponded to the sub-working groups:

- Criteria;
- Structure;
- C2 Approach;
- Value View;
- Information Domain;
- Tools;
- Validation;
- Individual and Team; and
- Miscellaneous.

Many comments were received, both positive and negative, with regard to the model and its application. One comment that arose multiple times was the need to review the group's definition of the Conceptual Model, its main objective, and the arena in which it will be used (i.e., military or civilian). A number of the reviewers felt the model was only applicable for use within the military while a smaller number of people felt that the model, with a few adjustments, could be used for civilian-led operations as well.

Another frequent comment regarding the Conceptual Model as a whole was whether it was a "Conceptual Model" or a "Reference Model." A number of comments noted that there needed to be greater clarification of the terms Conceptual Model and Reference Model, and that there should be a clear distinction drawn by the group with respect to this model. One suggestion was to seek clarification during the validation process and then determine the type of model that the group had put together.

An often-repeated concern of the majority of the peer reviewers involved the description of the intermediate level variables and their structure. To many, it appeared to be an artificial construct inserted to aid in the explanation of the model when, in fact, it only confused most who examined it. After review of these comments, the SAS-050 group decided to take out the intermediate level and focus on the top-level view and the variables within each domain. This also prompted the SAS-050 Working Group to focus on the top-level view and reassess the model's structure. The overview diagram of the model seemed to confuse many of the peer reviewers who suggested a new top-level view (diagram) might be drawn to reflect the domains and the important variables within them.

While all of the comments were useful, some of the general comments suggested posting material to a Web site so that outsiders could use the group's findings in their respective fields and alluded to the challenges faced by the group due to working with a number of countries that may have unique goals. Many felt that, at first glance, the model was appealing; yet, it needed additional work to explore the variables and their relationships in more depth. Lastly, the general consensus of the peer reviewers was that the work was very important, had made a major contribution to the ability to study C2, and needed to continue on after the end of SAS-050 in order to allow for further development and proof of the model through instantiation in a specific case study.

SYNTHESIS OF FINDINGS AND LESSONS LEARNED

The peer reviewers identified some key issues that needed to be addressed by the group. It was apparent that the top-level diagram caused some concern and confusion regarding the model layers. As a result of the peer review process, significant work was done by the individual SAS-050 Working Group members and by the Working Group collectively in Berlin in order to rethink how to better represent and summarize the model.

ACTION ITEMS

The SAS-050 members met the day after the conference to discuss the feedback they received. The group identified areas for improvement and divided up work for the final report. Dialogue and collaboration followed in order to further develop and refine the Conceptual Model. Efforts were taken to develop a final briefing for the NATO SAS Panel. Additional work was done to solidify a topic for a follow-on group.