

Multidisciplinary University Research Initiative: Systems for Understanding & Measuring Macrocognition in Teams (SUMMIT)

MURI Program Briefing
Washington, DC
August 09, 2007

Salas, E. (2007). Multidisciplinary university research initiative: Systems for understanding & measuring macrocognition in teams (SUMMIT). *Presentation to the Office of Naval Research Collaboration and Knowledge Interoperability Program, Arlington, VA, August 9th, 2007.*



Report Documentation Page			Form Approved OMB No. 0704-0188		
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 2007		2. REPORT TYPE N/A		3. DATES COVERED -	
4. TITLE AND SUBTITLE Systems for Understanding & Measuring Macrocognition in Teams (SUMMIT)				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) MURI Program Washington, DC				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES The original document contains color images.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	18. NUMBER OF PAGES 15	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Project Vision

- To add, refine, and extend the body of knowledge in the science of collaboration
 - Collaborative problem-solving
 - Macrocognitive processes
- To outline theoretically-based principles of cognition and collaboration in teams
- To develop relevant, valid, reliable, and diagnostic metrics of cognition and collaboration in teams
 - Unobtrusive (some)
 - Triangulate
 - Ease of use
- To create a path for applications, interventions, and demonstrations
 - Net-Centric Warfare



Project Objectives

- To provide a deeper, richer & robust theoretical foundation to macrocognition
- To develop a synthetic task environment to study macrocognition
- To develop, test and improve macrocognitive metrics in ill-structured settings
- To increase our understanding of complex collaboration in problem solving setting
- To develop agent models that can replace human team members



Project Research Foci

- **Focus Area 1:** Theory Development
- **Focus Area 2:** Task Environment Development
- **Focus Area 3:** Metrics Development & Refinement
- **Focus Area 4:** Experimentation
- **Focus Area 5:** Agent Modeling
- **Focus Area 6:** Knowledge Management, Sharing & Dissemination



Our Team

- University of Central Florida
 - Department of Psychology
 - Department of Philosophy
 - Department of Industrial Engineering
 - Institute for Simulation & Training
- Scientists
 - **Dr. Eduardo Salas**
Principal Investigator



Our Team (cont.)

□ UCF Scientists (cont.)



Dr. C. Shawn Burke
Industrial/Organizational
Psychology



Dr. Stephen Fiore
Cognitive Psychology



Dr. Florian Jentsch
Human Factors and
Aeronautical Engineering

Our Team (cont.)

□ UCF Scientists (cont.)



**Dr. Kimberly
Smith-Jentsch**
Industrial Psychology



**Dr. Randall
Shumaker**
Computer Science
& Engineering



**Dr. Valerie
Sims**
Cognitive Psychology
& Human Development



**Dr. Denise
Nicholson**
Optical Sciences

Our Team (cont.)

□ Arizona State University



Dr. Nancy Cooke

Cognitive Psychology

Our Team (cont.)

□ University of Illinois Urbana-Champaign



Dr. Alex Kirlik

Industrial & Systems Engineering



Our Team (cont.)

□ University of Pittsburgh



Dr. Michal Lewis
Engineering Psychology



Dr. Katia Sycara
Computer Science
& Applied Math

Our Team (cont.)

□ Graduate Fellows

■ University of Central Florida

- Helen Boudreaux
- Moshe Feldman
- Elizabeth Lazzara
- Heather Lum
- Rebecca Lyons

- Michael Rosen
- David Schuster
- Shannon Scielzo
- Dana E. Sims



Our Team (cont.)

- Graduate Fellows

- ASU

- Jasmine Duran
- Jamie Gorman

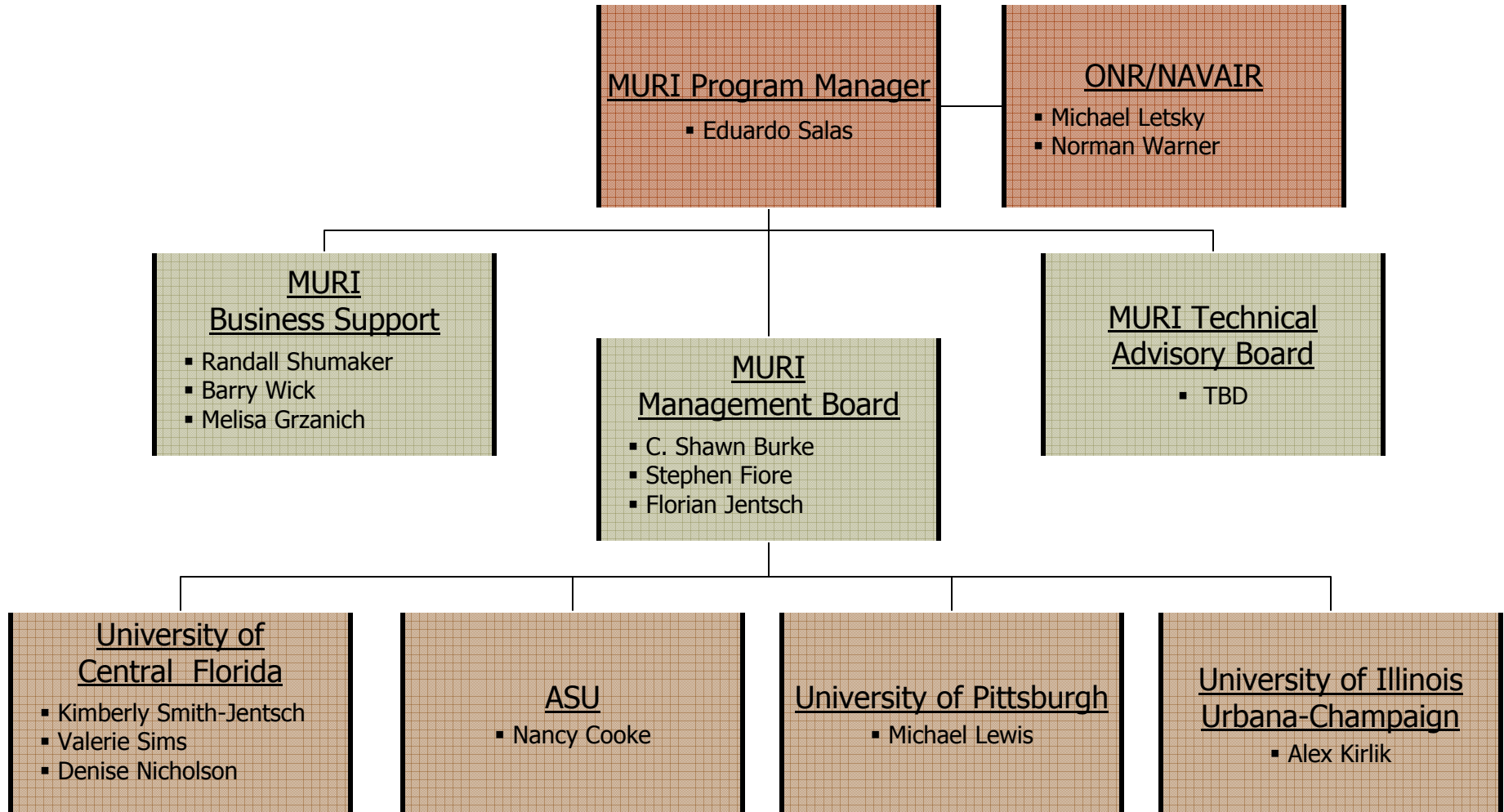
- Amanda Taylor
- Jennifer Winner

- University of Pittsburgh

- Jijun Wang



Management Structure



Scholarly Output

Publications & Presentations:

- Completed:
 - 1 book chapters
 - 7 proceedings papers
 - 13 presentations w/o proceedings
 - 4 working papers
- Submitted/Under review:
 - 1 edited book, in preparation
 - 1 journal manuscript
 - 1 book chapter
 - 3 proceedings papers

Student Support:

- 15+ Graduate Students
 - Applied Experimental & Human Factors
 - Industrial/Organizational
- 8+ Undergraduate students

Synergies

- Metrics meeting at OSU
- Representation at InGroup



SUMMIT Task Flow and Key Milestones Gantt Chart

Fiscal Year	FY06	FY07				FY08				FY09				FY10				FY11		
	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
Calendar Year	CY 2006		CY 2007			CY 2008				CY 2009				CY2010				CY 2011		
	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2
Foci of Research	Project Year 1				Project Year 2				Project Year 3				Project Year 4 (option)				Project Year 5 (option)			
Joint Meetings Advisory Board Mtgs.	▲1				▲5 ▲7				▲12	▲15			▲20					▲26		
					tbd				PA				FL					DC		
Theory Development	▲				▲3	▲			▲13		▲15		▲							
Task Environment Development	▲				▲5				▲9		▲16									
Metrics Development & Refinement		▲			▲6			▲10			▲15					▲22				
Experimentation		▲		▲				▲11					▲19					▲24		
Agent-Modeling		▲		▲					▲12		▲17							▲25		
Workshops			▲					▲7	▲13	▲		▲20	▲		▲22					
Reports	▲2		▲4				▲8	▲14			▲18		▲21		▲23			▲27		

Milestones (▲Number):

- 1) Kick-off meeting (Orlando, FL)
- 2) Report with minutes of kick-off meeting
- 3) Report describing the initial theoretical framework
- 4) Year 1 technical report
- 5) Joint demonstration of the initial SOC-STE to the sponsor (location to-be-determined), in conjunction with Advisory Board Meeting
- 6) Exchange of initial metrics and data collection procedures
- 7) First workshop: Development of theoretical models (Orlando, FL)
- 8) Report with minutes of the first workshop
- 9) Specifications/descriptions of the final SOC-STE
- 10) Exchange of refined metrics and data collection procedures
- 11) Raw data from the Year 2 experimentation
- 12) Joint demonstration of initial agent models (Pittsburgh, PA), in conjunction with Advisory Board Meeting
- 13) Final manuscript of edited book based on Workshop 1 (theoretical models of macrocognition) to publisher

Milestones (▲Number) (cont'd.):

- 14) Year 2 technical report
- 15) Joint meeting to exchange the final theoretical model and metrics
- 16) Final manuscript for edited book on synthetic task environments to publisher
- 17) Initial validated emulation model
- 18) Year 3 technical report and base period final report
- 19) Submission of draft journal manuscript describing the empirical studies
- 20) Second workshop: Tools and measurement (Orlando, FL), in conjunction with Advisory Board Meeting
- 21) Report with minutes of the second workshop
- 22) Final manuscript for edited book on synthetic task environments to publisher
- 23) Year 4 technical report
- 24) Submission of a second draft journal manuscript describing the empirical studies
- 25) Draft special issue of journal special section on team member emulation
- 26) Third workshop: State of the science (Wash., DC), with Advisory Board Meeting
- 27) Year 5 and program final technical report; includes minutes from the third workshop