

Announcement of Dissertation Defense  
MICRO TO MACRO DYNAMICS OF SHARED AWARENESS EMERGENCE IN  
SITUATIONS THEORY:  
TOWARDS A GENERAL THEORY OF SHARED AWARENESS

In partial requirements for  
PH.D. in ENGINEERING MANAGEMENT

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Old Dominion University, 2013

Director: Dr. Andres A. Sousa-Poza

Date: July 12, 2013

Time: 10:00 to 12:30

Location: KH 239

Overflow/Adobe Connect: <https://connect.odu.edu/r59acja3th9/>

**Abstract:**

Engineering Management is an interdisciplinary field of study. As such, Engineering Management must rely on the energies of its participants to integrate toward the problem being solved. Many techniques exist to aid the researcher towards a common goal; however, it can only be surmised on how effective the techniques have been. Not until the activity is over and the participants reflect back on their results can they know whether they shared a common understanding of the problem. This study explores the emergence of shared awareness based the interactions of disparate perspectives at a particulate level. The study builds from observations of a real-world problem and explores how Shared Awareness emerges.

Given the shared nature of multiple disciplinary approaches quantifying shared awareness would seem particularly important. It is not enough to say that shared awareness has occurred more importantly it is necessary to know when shared awareness has occurred and with whom and what the conditions were for shared awareness in situ. Since any given project is longitudinal in nature, change is inevitable, with change comes different conditions for shared awareness; it cannot be assumed that shared awareness is sustained through change. Without knowing the prior conditions for shared awareness there is nothing to compare with when change has occurred. The study attempts to quantify when the emergent state of shared awareness has occurred and by extension the conditions where awareness is shared within a group of individuals. Most importantly this study will provide a method for studying shared awareness [probability threshold] using percolation theory. Percolation is one of numerous techniques being developed out of statistical mechanics. Statistical mechanics (reinterpreted for the use in this study) provides a framework for relating the microscopic properties of individual atoms and molecules [individual] to the macroscopic bulk properties of materials [whole] that can be observed in everyday life (Albert, 2012). An experiment is proposed to test the hypothesis formed within the study and canons to substantiate the findings of the experiment. Ultimately, the study proposes a General Theory for Shared Awareness that provides the foundation for further research.

Resume of  
**SAMUEL F. KOVACIC**

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Mr. Samuel Kovacic has dedicated the more than a decade to advancing knowledge of Complex Situations. He has undertaken this work as part of an ongoing research program conducted through the Engineering Management and Systems Engineering Department at Old Dominion University. His particular focus has been on operational integration. His research builds on and contributes to several different fields, including: Systems Engineering, Decision Making, Organizational Theory, Management, Project Management, Risk Management, and System of Systems Engineering.

Mr. Kovacic has worked on numerous funded research projects. His main sponsors include: the office of the Under Secretary of Defense for Acquisitions, Technology and Logistics (OUSD AT&L), the Department of Homeland Security Science and Technology (DHS S&T), the Department of Homeland Security Customs and Border Protection (DHS CBP), the Joint Forces Command, the U.S. Coast Guard, MITRE, Lockheed Martin, and SPAWAR San Diego. He has been awarded \$600,000 as the Principal Investigator (PI), \$4.9 million as a co-PI, and nearly \$2.5 million as a research scientist.

To establish the research being undertaken and to leverage capabilities, Mr. Kovacic collaborated closely with numerous academic institutions, small businesses, and corporations. He is the co-founder of the Managing and Engineering in Complex Situations Forum (*MECS Forum*) a community of interest and network. The *MECS Forum* focuses on increasing the understanding of wicked problems, and developing pragmatically sensible, robust methods to manage and engineering in conditions of high uncertainty and transience.

Mr. Kovacic has published more than 10 refereed conference proceeding papers and journal articles. His research projects have resulted in 12 technical reports. His research, networking, and collaborative efforts have culminated in an edited book titled *Managing and Engineering in Complex Situations* published in 2013 by Springer of which he is the co-editor, and to which he has contributed several chapters.

Mr. Kovacic served 21 years in the U.S. Air Force retiring as a Major. He started his scholarly activities and research on retiring from the Air Force, first as a Principle Systems Engineer for the Concurrent Technologies Corporation (2 years), and then as a Research Scientist at the Old Dominion University (7 years). He is presently taking a break from his academic pursuits working as a Risk Manager for the Space and Warfare Command, United States Navy.

Mr. Kovacic holds a B.Sc. in Computer Science from the University of Maryland University College, and an M.B.A. in Business Administration from Embry Riddle Aeronautical University. He is presently a Ph.D. Candidate in the Engineering Management and Systems Engineering department at Old Dominion University.