Information Science Approaches to Studying Virtual Organizations: A Panel

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ABSTRACT

The National Science Foundation’s Virtual Organizations as Sociotechnical Systems program (VOSS) provides funding for “research directed at advancing the understanding of what constitutes effective virtual organizations and under what conditions” such organizations “can enable and enhance scientific, engineering, and education production and innovation.” This panel brings together representatives of four VOSS-funded research teams (from Florida State University, Syracuse University, Pennsylvania State University, and the University of Arkansas) to discuss the role of information science theories and methodologies in their different approaches to studying virtual organizations. The projects of these four teams investigate a variety of phenomena associated with virtual organizations, ranging from the life-cycles of distributed scientific teams, through the interactions between core groups of scientists and volunteers in “citizen science,” the socio-technical requirements of loosely coupled emergent teams, to the roles of communication, trust, and leadership in teams. Following the theme of the conference, this panel focuses on navigating two different “streams” in “information ecosystems”: it examines the ways in which information science scholars have successfully navigated one particular NSF funding stream, and it will also examine how these scholars investigate the information ecosystems of virtual organizations. Each member of the panel brings a particular theoretical and methodological perspective informing their VOSS projects, and the panel addresses issues related to Information Science scholars who are pursuing NSF and other funding opportunities.

Keywords
VOSS, virtual organizations, distributed scientific research.

PARTICIPANT BIOS AND POSITION STATEMENTS

Note: We anticipate that several members of each of the four research teams will be in attendance at ASIS&T and will participate in this panel. The following four participants will serve as the primary representatives of their projects.

Panel Moderator: Gary Burnett, Florida State University
Gary Burnett is an Associate Professor at the College of Communication and Information at Florida State University, received his PhD in English from Princeton University and his MLS from Rutgers University. His research focuses primarily on three related areas: the text-based information environments and social norms of virtual communities; the relationship between information exchange and social interaction; and the development of a theoretical approach to “Information Worlds,” which melds previous work by Elfreda Chatman and Jurgen Habermas in order to further our understanding of the social, political, and economic contexts of information access and exchange. His book, titled Information Worlds: Social Context, Technology, & Information Behavior in the Age of the Internet and co-authored with Paul Jaeger of the University of Maryland was published by Routledge in 2010. His work has also been published in journals such as Information Research, The Journal of the American Society for Information Science and Technology, Library Quarterly, The Journal of Computer Mediated Communication, and Library and Information Science Research.
Besiki Stvilia, Florida State University

Dr. Besiki Stvilia is an Assistant Professor at the College of Communication and Information. He received both his M.S. and his Ph.D. in Library and Information Science from the University of Illinois at Urbana-Champaign, and his M.S. in Applied Mathematics from Tbilisi State University, Georgia. He studies and teaches about Metadata and Ontology Design, Information Quality Assurance, Image Retrieval, and Social Informatics. In particular, he studies the evolving patterns of collaborative work organization and technology use in large community based open information systems, and develops models for information and metadata quality measurement, dynamics and intervention.

The Florida State University VOSS project will model the lifecycles of virtual multidisciplinary scientific teams using the facilities of the National High Magnetic Field Laboratory, an interdisciplinary scientific center with distributed facilities in Tallahassee, Florida, Gainsville, Florida and Los Alamos, New Mexico. To improve understanding of the sociotechnical factors that affect lifecycle development, this research asks what social and organizational factors best support the transition of short-term experiment-focused multidisciplinary virtual scientific collaborations to long-term productive and innovative programs of scientific research? The goal of the research is to develop and validate a lifecycle model to support distributed scientific teams through the transition from discrete experiment-focused projects to long-term distributed collaborations, thereby advancing discovery and innovation and increasing productivity. The lifecycles model will be built from data collected through descriptive multiple-case studies, grounded in an analysis of social and organizational factors related to the concepts of the theory of information worlds: social norms, social types, values and information behaviors. The researchers hypothesize that discrete multidisciplinary scientific collaborations are more likely to persist as long-term programs of innovative research when members share information worlds, which are characterized by shared context, mutual understanding, and strong ties between members. The FSU project employs multiple methods to analyze the information worlds and lifecycles of these teams of scientists, including social network analysis, textual analysis of documentary artifacts of the interactions of collaborating scientists, intensive semi-structured interviews, and observations.

Kevin Crowston, Syracuse University

Kevin Crowston is a Professor in the School of Information Studies at Syracuse University. He received his Ph.D. (1991) in Information Technologies from the Sloan School of Management, Massachusetts Institute of Technology (MIT). His research examines new ways of organizing made possible by the extensive use of information and communications technology. Specific research topics include the development practices of Free/Libre Open Source Software teams and work practices and technology support for citizen science research projects, both with NSF support.

This project is a two-phase theory-based study of virtual organizations (VOs) that enable massive virtual collaboration in scientific research. The VOs to be studied have a core of scientists and project leaders coordinating the work of a larger number of volunteer contributors, a format sometimes called citizen science. The project is directed at advancing the understanding of what constitutes effective citizen science VOs and under what conditions citizen science VOs can enable and enhance scientific and education production and innovation. The study is theoretically grounded in small group theory and rooted empirically in a survey of and case studies in citizen science projects. The survey will be used to develop a typology of citizen science projects, thus illuminating the important dimensions of this form. The case studies will identify key lever points in work design for enabling citizen science VOs to involve distributed, diverse volunteers in producing large-scale, high quality, valued scientific research in an organizationally sustainable fashion. Findings from the study will be shared and validated with citizen science practitioners in a workshop. The broader importance of the research is that it will indicate opportunities for employing citizen science in scientific research, which could lead to novel implementations of citizen science in other areas of scientific and engineering research and education. Results will aid scientists and project leaders in identifying appropriate project structures and best practices to employ when revising current citizen science projects or launching new ones.

Andrea Tapia, Penn State University

Andrea Tapia is an Associate Professor in the College of Information Sciences and Technology at Penn State University. She received her Ph.D. (2000) in Sociology, with a concentration on Technologies and Culture, at the University of New Mexico. She followed this with a post-doctoral Fellowship at the University of Arizona with a research focus on socio-technical change in large public institutions. Her current research continues this focus on public institutions and technologies at the intersection of socio-technical systems for collaborative humanitarian relief and disaster response and collaborative scientific data, resource and tool sharing.

Our subject for sociotechnical analysis is the virtual organization that has emerged around a rare piece of scientific equipment, a High Resolution Computed Tomography (HRCT) scanner, one of three such scanners worldwide. The scanner belongs to the Center for Quantitative Imaging (CQI), a research center associated with Penn State’s Department of Anthropology; it is used to
generate three-dimensional internal maps of physical structures for human and animal subjects. The availability of these high-quality images has promoted many cross institution and international research collaborations within the scientific community of physical anthropology. While this collaboratory represents the important class of scientific collaboration structures that are “glued together” by a central critical resource, its goals and operations are more complex than simply coordinating access to a tool. The complexity of the HRCT collaboratory arises from its two-layer structure that is constantly changing shape. In one layer, it acts as a loosely-coupled organization providing persistent support for managing the scanning tasks and resulting data; in the other layer it serves as a source of project-specific support that requires more tightly-coupled communication and coordination for a cohort of distributed projects that emerge, coalesce, and follow their own trajectories. Within the project layer, each project develops its own organizational sub-structures and problem-specific relationships to the shared resource (e.g. type and timing of scanning; research protocols that must be followed and documented; meta-data or archival requirements and so on). In one layer it provides persistent support for managing the scanning tasks and resulting data; in the other layer it supports emergent projects that overlap in timeline, personnel, and resources. Because at any given point in time, the set of distributed projects supported by HRCT-VO are at different points in their lifecycles, the associated requirements for coordination and communication may also be quite varied. The project will yield a rich qualitative account of the dependencies and coordination practices of virtual organizations that leverage a shared resource among diverse and overlapping distributed projects, including how these practices evolve in the presence of customized technology support.

Rolf Wigand, University of Arkansas

Rolf Wigand is Maulden-Entergy Chair and Distinguished Professor of Management and Information Science at the University of Arkansas at Little Rock. He researches information systems and management, electronic commerce, virtual organization, information systems standards and the strategic deployment of information and communication technology. His research interests lie at the intersection of information and communication business issues, the role of newer information technologies and their impact on organizations and society, as well as their strategic alignment within business and industry. Most recent and current NSF-funded research has focused on virtual organizations, the global impact of electronic commerce in ten nations, the impact of electronic commerce on the real estate industry, as well as the information systems standards development in the mortgage, retail and automotive supply industries.

Collaboration and cooperation are essential to innovation and knowledge creation, and virtual teams are valuable tools for such collaborations. Characteristic features of virtual teams, such as the dispersion and diversity of team members and the reliance on information and communication technology rather than direct interaction, are advantageous but also pose challenges to the social dynamics of the team. The purpose of this project is to examine what enables teams to best meet these challenges. We use the concept of trust as an organizing principle for understanding how technostructural and social-psychological factors affect the behavior in virtual teams in the setting of a Massively Multiplayer Online Game (MMOG). Since skills required in such games are similar to those required in work organizations, MMOGs are not only useful for the study of virtual teams, but can serve as tools for developing leadership and team skills. This investigation builds on research previously conducted with the cooperation of Travian Games (4.3 million players, 48 country versions in 43 languages), a designer of MMOGs that has provided us unique access to conduct experiments, collect behavioral data, and administer surveys. We pursue two empirical investigations, a series of experiments and a large-scale correlational study involving multi-level, longitudinal data. This research will provide long-needed insight into the development and role of social bonds in virtual teams and the interplay between social dynamics and technostructural factors. As a multidisciplinary effort, the findings of this project will inform distinct literatures including leadership and group dynamics, the management of virtual organizations, and information technology. The findings will provide practical insights into how to design virtual teams and organizations to better enable collaboration and innovation. The methodology involving MMOGs is itself an innovative contribution to both science and practice, as it demonstrates a new platform for conducting social science research and provides insight into using virtual games for leadership and team development.

PANEL STRUCTURE AND PROCEDURE

We anticipate that several participants from each of the four research teams will be in attendance. All four projects share a funding stream – VOSS – and thus share an overall focus on virtual organizations. However, the four teams vary widely in the theoretical and methodological aspects of their projects; further, even individual projects integrate multiple conceptual and methodological approaches. Because of this variety, this panel is likely to produce a lively conversation among the primary representatives of the teams and other team members in attendance. The issues raised concerning funding streams and the relationship between the projects’ “information ecosystems” and theoretical and methodological concerns should also elicit an active response from the audience.