The 2011 International Conference on Collaboration Technologies and Systems (CTS 2011)
May 23 - 27, 2011, Philadelphia, Pennsylvania, USA

CTS 2011 PANEL SESSIONS

PANEL SESSION I

The Situated Computing Manifesto: A Timely New Paradigm or A Non Starter?

PANEL MEMBERS:

Steve Benford, The University of Nottingham, U.K.
John Carroll, The Pennsylvania State University, USA
Elizabeth Churchill, Yahoo! Research, USA
Prasun Dewan, University of North Carolina at Chapel Hill, USA
Marco Susani, Marco Susani Design Studio, USA

MODERATOR: Giorgio De Michelis
University of Milano – Bicocca and itsme srl, Italy

ABSTRACT:

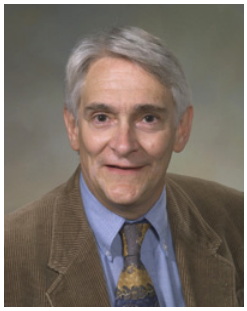
This panel is to discuss what should constitute a "Manifesto for Situated Computing." Situated Computing accounts for the context of design – it considers how we design an application so that it offers to its users all and only the possibilities of action and interaction fitting with the context in which they are situated. As Suchman (1987) argues, designers consider only how the technical design integrates, rather than understanding how interactions with a system fit into the sequence of activities that an actor is attempting to perform. One can argue that Situated Computing is richer than, and encompasses many of the themes of ubiquitous computing and context-specific design. But it also considers how we place the designed application within the flow of activities and align it with the perspectives of actors within the situation it supports, as well as considering the more technical aspects of design.

The panel will address issues such as:

- How do we "situate" IS application design in the users' lived experience?
- What techniques can we use for situated design?
- How do we involve system application users in situated design?
- What outcomes and issues should we emphasize, in situating design?
- Is Situated Computing the next relevant step to take?
- What are the opportunities and challenges ahead?

PANLEISTS SHORT BIOS:

Steve Benford is the Professor of Collaborative Computing, a founder of the Mixed Reality Laboratory, and also a founder of the Horizon Centre for Digital Economy Research at the University of Nottingham. His research explores the creation of new interactive technologies to support cultural and creative experiences, with a particular emphasis on mixed reality and ubiquitous computing. He was an investigator on EPSRC's Equator project between 2000 and 2007 and is currently Directing Nottingham's Doctoral Training Centre in Ubiquitous Computing for the Digital Economy. His artistic collaborations have led to the award of the 2003 Prix Ars Electronica for Interactive Art, the Nokia 2007 Mindtrek award for innovative applications of ubiquitous computing and four BAFTA nominations, while his academic publications have received best paper awards at CHI 2005, CHI 2009 and CHI 2011. He is currently Head of School of Computer Science at Nottingham and will take up a personal EPSRC Dream Fellowship later in 2011.



John M. Carroll is the Edward M. Frymoyer Chair Professor of Information Sciences and Technology at the College of Information Sciences and Technology, Pennsylvania State University. His research is in methods and theory in human-computer interaction, particularly as applied to networking tools for collaborative learning and problem solving, and design of interactive information systems. Books include Making Use (MIT, 2000), HCI in the New Millennium (Addison-Wesley, 2001), Usability Engineering (Morgan-Kaufmann, 2002, with M.B. Rosson) and HCI Models, Theories, and Frameworks (Morgan-Kaufmann, 2003), Rationale-Based Software Engineering (Springer, 2008, with J. Burge, R. McCall and I. Mistrik), and Learning in Communities (Springer, 2009). Carroll serves on several editorial boards for journals, handbooks, and series. He is Editor of the Synthesis Lectures on Human-Centered Informatics. Carroll has received the Rigo Award and the CHI Lifetime Achievement Award from ACM, the Silver Core Award from IFIP, the Goldsmith Award from IEEE. He is a fellow of AAAS, ACM, IEEE, and the Human Factors and Ergonomics Society.

Elizabeth Churchill is a Principal Research Scientist at Yahoo! Research in Santa Clara, CA where she manages the Internet Experiences research group. Elizabeth has an undergraduate degree in Experimental Psychology and an MSc in Knowledge Based Systems, both from the University of Sussex in the UK, and a PhD from the University of Cambridge in Cognitive Science. She has co-edited five books and has published within the areas of theoretical and applied psychology, cognitive science, human computer interaction and computer supported cooperative work. Her current research focuses on mediated communication and collaboration, trust and reputation in online systems, "the gamification" of online interaction, everyday uses of social media and impacts of mobile connectivity, personal and cultural aspects of digital archiving, and the design and development of media spaces.

Until September of 2006, she worked at the Palo Alto Research Center (PARC), California, in the Computing Science Lab (CSL). Prior to that she led the Social Computing Group at FX Palo Laboratory, Fuji Xerox's research lab in Palo Alto. Elizabeth is an Association of Computing Machinery (ACM) Distinguished Scientist. She writes a column for ACM *Interactions*, and is the current VP of ACM SigCHI (Human Computer Interaction Special Interest Group).

Prasun Dewan is a Professor in the Department of Computer Science at the University of North Carolina at Chapel Hill. He received a B.Tech. degree in Electrical Engineering from the Indian Institute of Technology of New Delhi and a Ph.D. in Computer Science from University of Wisconsin at Madison. His research interests are in frameworks for implementing single-user and multi-user applications. He has been an associate editor of ACM Transactions on Computer Human Interaction, ACM Transactions on Information Systems, and Journal of Computer Supported Cooperative Work.

Marco Susani extended the culture of Italian Design to innovation fields like hi-tech Product Design, Interaction Design and Strategic Design, and combines the experience of design consultant, developed as associate partner of Ettore Sottsass, with his International Corporate Design expertise developed as Vice President of Digital Design at Motorola USA from 2000 to 2009. He designed for companies like Motorola, Philips, Seiko, Olivetti, 3M, NTT Japan, Zumtobel, Nissan, Mitsubishi, Tokyo Gas, Toshiba, Apple, Logitech, Mediaset, bTicino, Fontana Arte. His main interest is to combine high technology with emotional design, and to use his design vision to drive toward a more human future. He gave keynote speeches, lectures and seminars at various conferences. He co-authored the books "Interface Design" (Domus Academy Edizioni), "Seamless Media (NTT Japan), "The Solid Side" (Philips Design), "Service Design" (Koeln University), "Presence, New Media for Older People" (Netherlands Design Institute), and wrote articles for the magazines Domus, Interni, ICC Japan, Axis Japan, and FP Japan. He is now preparing a book on social aspects of mobile wireless communication.

Giorgio De Michelis teaches Theoretical Computer Science and Interaction Design at the University of Milano-Bicocca. His research focuses on models of concurrent systems (Petri Nets), CSCW, community-ware, knowledge management and interaction design, where his group develops prototypes of support systems for cooperative processes and knowledge management systems. He has recently created ITSME, a spin-off of the University of Milano-Bicocca, devoted to the design and construction of a newly conceived workstation. He has authored four books and more than 140 papers in the areas of his interest.

The Situated Computing Manifesto

(A Draft)

Giorgio De Michelis[1] and others[2]

For over fifty years, the development of ICT has constantly augmented and improved the functions and features of its systems to increase the offer of tools, media, information and services to its users. It has been an exponential growth covering progressively almost all the situations of human life: professional practice (via productivity tools and other packages as well as with the information systems and intranets of their organizations), communication (via email systems, chats, twits, VOIP systems, etc.), information retrieval (e.g., browsing the web), collaboration and knowledge sharing (via groupware and knowledge management systems), reading books, journals, magazines and newspapers as well as seeing movies and videos (on PCs, e-books and tablets), listening to music (on special devices like the i-Pod or on smart-phones), accessing commercial and other types of services (in the web or through specialized apps of tablets and smart-phones).

The life of human beings is changing, thanks to the new possibilities ICT systems are offering them. End-user terminals (in particular the PC) today, therefore, are no more multi-purpose tools, as in their initial years: rather they are systems accompanying their users in every circumstance of their life. This has been achieved at a price: today users pay for the advantage of having better support in any moment of their lives with a growing difficulty to get at any time the right support, due to the overload of the possibilities offered to them.

Designers of new systems have focused their efforts on the new actions and interactions they wanted to make possible, but they have paid little or no attention to the growing complexity of the computing environments of their users. As a matter of fact, personal computers, information systems, productivity tools, etc., are not so different from how they were twenty or more years ago, even if they deal with an exponentially grown possibility. Moreover, new systems, as web-based services and social computing platforms, are designed as single applications and their integration is entrusted to users via mash-up systems or the-like, so that, even if they offer powerful tools for supporting social interaction and accessing efficiently valuable services, they are increasing the complexity users are facing to manage their actions and interactions. Even the diffusion of apps, allowing direct access to services, does not solve, in our opinion, the problem since, even if they simplify the access to what users want, their growing number may recreate the complexity management problem we described above.

In the eighties, a multidisciplinary research community, giving rise to research fields like Computer Supported Cooperative Work (CSCW), has developed new insights in human practice, bringing forth its being situated in space and time as well as in the social experience its actors share, and has begun to design new systems supporting collaboration and knowledge sharing on their basis.

A new paradigm has emerged, that has been called ‘situated action’ (also ‘situated cognition’ has been widely used), inspiring new ways to observe, analyze and evaluate work practice, collaboration, organizations and social experience and to design new platforms supporting human beings in various situations of their life.

The potential relevance of the above research has grown as the above recalled limits of existing computing environments were widely recognized. Many of the issues raised in it, entered in the discourse within and about organizations and practice (e.g., communities of practice, context awareness, …), showing their capacity to brighten the changes happening in human practice and experience and the limits of the existing ICT applications. We contend that it is time now to take one further step: on the basis of the experience and knowledge matured

[1] DISCo, University of Milano – Bicocca and itsme srl (gdemich@disco.unimib.it).
[2] The list is open; for signing the manifesto and/or for discussing it, please, contact Giorgio.

within the above mentioned research and of the knowledge reflective ICT practitioners have gained about ICT systems and their users, we are now in a situation to re-think and re-design all the ICT applications so that they become able to couple the support to any action and interaction with an effective management of their complexity.

The basic idea underneath our claim is that we can now design any type of application so that it offers to its users all and only the possibilities of action and interaction fitting with the context in which they are situated. 'Situated Computing', this is the name under which we want to collect any application aiming to couple open access to tools, media, information and services with their contextual filtering and integration. Situated Computing can dramatically increase the quality of social interaction, the effectiveness of human action and interaction, and the efficiency of business as well as administrative processes, contributing to the increase of the productivity of a country, while enhancing its social vitality and cohesiveness. It can, for using the terminology of the European Commission, give impetus to the Knowledge Society and to its social and economical performances.

It is time that we start to work on a New Generation of applications, bringing ICT in a new era where systems are capable to support their users to recognize the context of their actions and interactions and to be effective in it. Information systems, operating systems for workstations, productivity suites, web based sites and services may all be re-designed along the Situated Computing perspective, with substantial advantages for users. The objective is to make them capable of reflecting the different contexts where human beings act and inter-act. Light and flexible integration among components, evolutionary and tailorable platforms, balanced coupling of openness and multiplicity, distributed ontologies are some first requirements we envision for the new applications inspired by the Situated Computing perspective. But Situated Computing requires a good balance between continuity and innovation and almost everything has still to be invented, experimented, and re-invented!

Situated computing is not a simple endeavor: first, it asks for innovative applications changing the way users interact with their systems not offering any reference for understanding if users will accept and appreciate them or not; second, it requires designers find the best balance between innovation and continuity so that users are not frightened and driven back by an unknown computing environment (the typical reaction along this line, is: "interesting but not for me!") but are able to discover the new possibilities it offers and give new sense to their actions and interactions through them; last but not least, existing players in the ICT market look, today, not interested in such a radical innovation, that menaces existing market shares and roles and they could prefer blocking, rather than supporting, it.

An alliance between people from the research field and professional software developers, is needed for promoting and developing Situated Computing: we need research of new ideas but also development of working and usable systems! Mobilizing our energies, creating an open and resolute movement is a necessary condition for the success of our initiative and can also give to people from the research and design fields a role in the development of ICT. We can expect that several actors of the ICT field - big players defending their market shares and institutions fearing innovation, as well as users reluctant to changes - will make nonresistance, if not opposition, to Situated Computing. Public agencies like NSF in the United States and the Commission of the European Union, as well as big or small innovative companies not having or not willing to defend their market shares with technology starvation, should support Situated Computing as one of the promising research directions that may drive to a better Society and Economy in the future years.

The 2011 International Conference on Collaboration Technologies and Systems (CTS 2011)
May 23 - 27, 2011, Philadelphia, Pennsylvania, USA

PANEL SESSION II

Sharing Knowledge in Online Communities

PANEL MEMBERS:

Lisl Zach, The iSchool at Drexel, Drexel University, USA
Sean Goggins, The iSchool at Drexel, Drexel University, USA
Michael Khoo, The iSchool at Drexel, Drexel University, USA
Nada Matta, ICD / Tech-CICO, University of Technology of Troyes, France

MODERATOR: **Susan Gasson**
The iSchool at Drexel, Drexel University, USA

ABSTRACT:

Online communities are viewed as a source of knowledge, but also as a source of confusion where knowledge-sharing is required. Knowledge resides in different places: distributed across and between people, documented in documents and online conversations, and created through interactions between community participants. This panel will examine the tensions between the distributed documentation and sharing of community knowledge, from three perspectives:

- Public libraries have long been regarded as a source of knowledge within their communities. Now that many of these communities have become virtual, what is the role of the public library as a source of authoritative information compared with that obtained from "the wisdom of crowds"?
- Online communities have a small number of members who make most of the contributions and a much larger number of members who make small contributions, no contributions or remain as lurkers. Knowledge is shared by a small group of people and consumed by a much larger group. What role do social recognition, social identity and a sense of importance play in keeping online groups together and how can lurkers be connectors of ideas?
- One way for online communities to share knowledge is through the use of online documents. How can we manage document-based knowledge sharing to support complex distributed work? Strategies vary, although they are normally associated with the creation of metadata, which needs to span the boundary between different knowledge domains. If we compare two digital libraries that use online documents to support knowledge sharing, what makes the use of boundary objects successful in one context and not in another? What are the issues that lead to successful knowledge sharing?
- To codify and reuse knowledge successfully, we must be able to interpret the "knowing what" and "knowing about" of a cooperative activity within an organization-specific context. Project documents do not record the context-specific, shared decision-making that underlies the realization of large projects involving multiple teams of people working as co-partners. How can project memory -- defined as "the history of a project and knowledge produced during the realization of a project" -- be preserved for re-use and reference? How can we capture and access knowledge relating to project organization, participants' reference frames, project realization and decision making processes?

PANELISTS SHORT BIOS:

Dr. Lisl Zach specializes in the area of competitive intelligence and knowledge management. Dr. Zach's research interests include investigating the role of information professionals during natural and man-made disasters and developing ways of providing critical information to vulnerable populations in times of crisis. She is currently working on a project with the Drexel University's 11th Street Family Health Center to examine the use of mobile information and communications technology to deliver health information to the population being served by the Center. Dr. Zach has published award-winning articles on the contributions of information services in hospitals and academic health science centers and on the ways in which administrators look for, evaluate, and use information. More information at http://www.ischool.drexel.edu/faculty/lzach/.

Dr. Sean P. Goggins has studied open source software communities, online graduate student classes, political parties on Facebook, the use of community technologies to support the US Navy's Haiti Relief effort, adult kickball and online dating. Most of these studies are conducted with others, including research assistants and colleagues. Sean's research focuses on the small group unit of analysis; and his publications reflect this belief that most productive and important social unit of analysis is the small group. Before an academic career Sean spent 15 years in industry leading the design of collaborative computing systems and systems for the analysis of financial performance and human behavior. He is the oldest of 7 children. His current research interests are Group Informatics and Computer Supported Collaborative Learning at Work. More information at http://www.groupinformatics.org/sean.p.goggins.

Dr. Michael Khoo's research investigates the complex sociotechnical dimensions of technology use, with a focus on information systems and digital libraries. He draws on models of culture, practice and knowledge, from anthropology, communication studies, user-centered design, and sociotechnical studies, and investigates these with a range of methods, including ethnography, interviews, and analyses of organizational communication. He is currently interested in the social and organizational dimensions of metadata work. More information at http://www.ischool.drexel.edu/faculty/mkhoo/index2.html.

Dr. Nada Matta is Professor at the University of Technology of Troyes. Her research investigates techniques in knowledge engineering and management, specializing in how to manage cooperative activities in knowledge work. Dr Matta studied for her PhD in knowledge engineering and Artificial Intelligence at University of Paul Sabatier in collaboration with ARTEMIS. She worked for four years at INRIA in projects with Dassault-Aviation and Airbus Industry. Dr. Matta is a director of The Safety, Security and Control of Complex Systems Group (https://www.gis-3sgs.fr/). More information at http://techcico.utt.fr/fr/membres/matta.html.

Dr. Susan Gasson is Associate Professor at the iSchool at Drexel University. Her research investigates support for distributed cognition in enterprise-spanning design groups and understanding the social construction of knowledge in online learning communities. This work focuses on how individuals and groups negotiate the boundary between knowledge-domains, in cross-functional and interdisciplinary collaborative groups. She received a prestigious NSF Early Career Award for her research and has published award-winning articles on distributed knowledge coordination across virtual organization boundaries and IT-based knowledge management to support organizational learning. More information at http://www.ischool.drexel.edu/faculty/sgasson/.

The 2011 International Conference on Collaboration Technologies and Systems (CTS 2011)
May 23 - 27, 2011, Philadelphia, Pennsylvania, USA

PANEL SESSION III

CR-HRI 2011 Panel

Collaborative Robotics: Social and Technical Perspectives

PANEL MEMBERS:

Jennifer Burke, SA Technologies, Georgia, USA
Kris Hauser, Indiana University – Bloomington, Indiana, USA
Janet Vertesi, Princeton University, New Jersey, USA

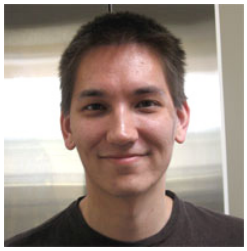
MODERATOR: **Selma Šabanović**
Indiana University – Bloomington, Indiana, USA

ABSTRACT:

Collaborative robotics—the development of robots that can interact cooperatively with each other and with people—holds great promise for applications in industry, science, and even daily life. At the same time, as robots assist and guide people in certain tasks and support collaboration among groups of people and other robots, collaborative robotics poses social as well as technical challenges. To enable collaboration between robots and people, researchers must find ways to develop common ground between people and robots, abilities to portray and read human and robot cues, and complementarity and meshing between human and machine capabilities come. In developing collaboration among people in small and large groups, robot designers have to consider the organization of work and the development of common understanding among geographically distributed groups of people and machines. Developing collaborative robot based systems and applications requires input from multiple disciplines, including artificial intelligence, human-robot interaction, robotics, and computer-supported cooperative work. In this multidisciplinary panel, speakers will discuss collaborative robotics from the perspective of multiple fields of research and development, and from both academic and industry, to pinpoint achievements, challenges, and future directions in collaborative robotics.

PANELISTS SHORT BIOS:

Jennifer Burke is a practicing human factors engineer at SA Technologies, specializing in robotic interface design. Dr. Burke is active in the robotics and psychology/human factors communities, and is author of over 30 publications in fields of robotics, human performance, and workplace studies. Dr. Burke is a member of the Association of Computing Machinery (ACM), the American Psychological Society (APS), and the Human Factors and Ergonomics Society (HFES). She received the B.A. in business from Florida State University, the M.S. degree in Counseling from the University of North Florida, and the M.S. and Ph.D. degrees in Industrial-Organizational Psychology from the University of South Florida, in 1980, 1990, and 2006, respectively.



Kris Hauser is an Assistant Professor of Computer Science at Indiana University and director of the Intelligent Motion Lab. He received his PhD in Computer Science from Stanford University in 2008 and received bachelor's degrees in Computer Science and Mathematics from UC Berkeley in 2003. He also worked as a postdoctoral fellow at UC Berkeley in the Automation Lab from 2008-2009. His research studies the motion spaces of complex, high dimensional robotic and biological systems, with the aims of helping robots to perform sophisticated tasks, discovering the task capabilities of physical mechanisms, and exploring how humans and robots can safely perform cooperative tasks. Applications of his work include robotic manipulation, computer- and robot- assisted surgery, and legged locomotion.

Janet Vertesi is a Cotsen Fellow at the Society of Fellows in the Liberal Arts and a Lecturer in Sociology at Princeton University. She studies robotic space exploration teams, their distributed work practices, their organizational norms, and their implications for human-computer and human-robot interaction in groups. Vertesi holds a PhD in Science & Technology Studies from Cornell University, an MPhil from Cambridge University in History and Philosophy of Science, and recently served as a postdoc at the Informatics department, University of California, Irvine. Vertesi has also published on a broad range of topics in Human-Computer Interaction, as well as urban studies and seventeenth century astronomy.

Selma Šabanović is an Assistant Professor of Informatics and Cognitive Science at Indiana University Bloomington and co-director of the R-House HRI Living Lab. Her research explores the intersection of robot design, social cognition, and culture through the study of social presence, coordination, and attribution in human-robot interaction and design. She has published on nonverbal human-robot interaction, interdisciplinary methods in robot design, and cross-cultural studies of social robots in various social science, design, and robotics venues. Dr. Sabanovic received her PhD from Rensselaer Polytechnic Institute (RPI) in 2007 and has been a visiting researcher at the National Institute of Advanced Industrial Science and Technology (AIST) in Tsukuba, Japan and at the Carnegie Mellon University Robotics Institute.

The 2011 International Conference on Collaboration Technologies and Systems (CTS 2011)
May 23 - 27, 2011, Philadelphia, Pennsylvania, USA

CTS 2011 DEMO SESSIONS

DEMO SESSION I

Enabling Humanoid Interaction and Performance

David Grunberg, Alyssa Batula, and Youngmoo E. Kim
Drexel University
Pennsylvania, USA

Emails: dgrunberg@drexel.edu, batulaa@drexel.edu, ykim@drexel.edu

DEMO ABSTRACT

As they become more prevalent, it is important for robots, especially humanoids, to interact appropriately and safely with humans in a manner that we perceive as natural and engaging. Recent research has enabled humanoids to perform several fundamental tasks, including walking, balancing, and shaking hands. We will demonstrate these capabilities using Hubo, an adult-sized humanoid developed by the Korean Advanced Institute of Science and Technology (KAIST). Additionally, we have developed systems enabling our humanoid to perform a variety of music-specific tasks, such as recognizing musical beat locations from live audio and video and performing simple pieces on a musical keyboard and . Our long-term goal is to enable a humanoid to perform tasks alongside humans, so they can participate in interactive group tasks (such as a musical performance).

REQUIREMENTS AND TARGET AUDIENCE

The target audience is people who want to see demonstrations by an advanced humanoid robot. The demonstrations will include general tasks, such as walking and shaking hands, and musically-focused tasks, such as moving in response to beats in audio (dancing).

DEMO DURATION

The demo will be presented in a 30-minute session.

A/V AND EQUIPEMNT

Overview projector, screen and speakers. For the demo itself, we require power (at least two 120V outlets), two tables, and a space large enough to contain the Hubo humanoind and its supporting hoist (ideally 6 x 8 feet). The equipment that we bring will include Hubo and its supporting hoist and laptops to control Hubo and to show a slide presentation.

PRESENTERS BIOGRAPHIES

David Grunberg received a B.S. in Electrical Engineering from Drexel University in 2010. He is currently a first-year graduate student at the Music and Entertainment Technology Laboratory (MET-lab) at Drexel and is supported with a National Science Foundation Graduate Research Fellowship. His research interests include digital analysis of musical signals and the development of new applications for human-robot interaction. He is a student member of HKN, TBP, and the IEEE.

Alyssa Batula received a B.S. in Electrical and Computer Engineering from Lafayette College in 2009. She is currently a second-year graduate student pursuing a Ph.D. at the Music and Entertainment Technology Laboratory (MET-lab) at Drexel University. Her research focuses on combining signal processing and robotics in order to develop a robotic pianist. Her work is supported by a National Science Foundation GK-12 Fellowship, and she is a student member of HKN and IEEE.

Youngmoo E. Kim is an Assistant Professor of Electrical and Computer Engineering at Drexel University. His research group, the Music & Entertainment Technology Laboratory (MET-lab) focuses on the machine understanding of audio, particularly for music information retrieval. Other areas of active research at MET-lab include analysis-synthesis of sound, human-machine interfaces and robotics for expressive interaction, and K-12 outreach for engineering, science, and mathematics education. Youngmoo received his Ph.D. from the MIT Media Lab in 2003 and also holds Masters degrees in Electrical Engineering and Music (Vocal Performance Practice) from Stanford University. He served as a member of the MPEG standards committee, contributing to the MPEG-4 and MPEG-7 audio standards, and he co-chaired the 2008 International Conference on Music Information Retrieval (hosted at Drexel). His research is supported by the National Science Foundation, including an NSF CAREER award in 2007.

The 2011 International Conference on Collaboration Technologies and Systems (CTS 2011)
May 23 – 27, 2011, Philadelphia, Pennsylvania, USA

DEMO SESSION II

Collaborative Systems for NASA Science, Engineering, and Mission Operations

Richard M. Keller
NASA Ames Research Center
Moffett Field, California USA

Email: rich.keller@nasa.gov

DEMO ABSTRACT

This session overviews a set of collaborative systems projects developed over the past ten years at NASA Ames Research Center in Silicon Valley. NASA recognizes that as its missions become longer and more scientifically complex, support for cooperation among geographically distributed, collaborating teams – on and off earth – will become ever more crucial. With increasing deployment of intelligent software and hardware, NASA must address the challenge of mediating collaboration between human teams and a wide array of automated systems. The work showcased in this session facilitates the process by which NASA engineers, scientists, and mission personnel collaborate in their unique work settings. We employ information management, artificial intelligence, and participatory design practices to build systems that are highly usable, augment human cognition, and support distributed NASA teams.

The systems described in this presentation span collaboration across a wide range of NASA science, engineering, and operations teams. These teams perform discipline-specific work in widely different, but interconnecting contexts. Science teams direct scientific research activities and analyze data generated from a variety of sources: from earth-based field work and analog exploration field tests; from earth-observing satellites; from experiments on the International Space Station; and from planetary spacecraft instruments. Mission operations teams launch, monitor, and control these space systems on behalf of scientists, and work with engineering teams to design, diagnose, and maintain them. Understanding the collaboration needs of these interdependent teams – and building real-world mission-critical systems to support them – is challenging but rewarding work. NASA settings serve as valuable testbeds for studying collaboration and developing new collaborative technologies for the future.

REQUIREMENTS AND TARGET AUDIENCE

The intent of this session is to introduce the unique settings and challenges associated with supporting collaboration at NASA, and to present thumbnail sketches of several systems developed to support collaborating NASA teams.

DEMO DURATION

Presentation will be given in a 30-minute session.

A/V AND EQUIPEMENT

No special equipment required.

PRESENTER BIOGRAPHY

Richard M. Keller, PH.D. is a senior research computer scientist and technical manager of the Information Sharing and Integration Group within the Intelligent Systems Division at NASA Ames Research Center. For over 20 years, Dr. Keller has managed NASA R&D projects in the areas of intelligent information management, collaborative systems, and semantic technologies. He has developed award-winning decision support and knowledge management systems for a wide range of NASA personnel, including astrobiologists, space and earth scientists, spaceflight controllers, accident investigators, and air traffic safety managers. He recently completed work on XSearch, a search and linking engine deployed within the International Space Station's Mission Control Center. Dr. Keller holds a Ph.D. in computer science, with a focus in artificial intelligence, from Rutgers University.

The 2011 International Conference on Collaboration Technologies and Systems (CTS 2011)
May 23 - 27, 2011, Philadelphia, Pennsylvania, USA

DEMO SESSION III

Periscope: Real-Time Monitoring of High Performance Data Transfers

Ahmed El-Hassany, Guilherme Fernandes, Ezra Kissel, Matthew Jaffee, Martin Swany
University of Delaware
Delaware, USA

Emails: ahassany@udel.edu, fernande@udel.edu, kissel@udel.edu, jaffee@udel.edu

DEMO ABSTRACT

Periscope is a metric caching, analysis, and visualization platform for troubleshooting high-performance data transfers. Periscope collects and caches on-demand, real-time measurements from both global network monitoring infrastructures such as perfSONAR as well as locally generated host metrics in a common representation.

In this demo, we are going to describe the architecture, deployment, and different use cases of Periscope. In addition, we are going to demonstrate how Periscope works in real world examples; namely, perfSONAR data caching, GridFTP monitoring, and dynamic network circuit monitoring.

REQUIREMENTS AND TARGET AUDIENCE

This demo is targeted at users and developers wishing to understand network performance issues.

DEMO DURATION

The demo will be presented in a 30-minute session.

A/V AND EQUIPEMNT

LCD Projector. Internet Connectivity (wire is preferred).

PRESENTERS BIOGRAPHIES

Ahmed El-Hassany is a second year PhD student at the University of Delaware. His research interests are high-performance networks monitoring, and designing new operating systems for many-cores architecture. He joined the perfSONAR project as Google Summer of Code 2008 student and since then he joined DAMSL research group at the University of Delaware to continue working on the perfSONAR project. He received BS in Computer Engineering from Islamic University of Gaza.

Guilherme Fernandes is a PhD candidate in the CIS Department at the University of Delaware. He received his BSc degree in Computer Science from the Federal University of Santa Catarina (UFSC), Brazil in 2009. He received his MSc from the University of Delaware in 2011. His research interests include high-performance computing in parallel and distributed systems, and high-performance networking.

Ezra Kissel received the BSc degree in Computer Science from the University of Delaware in 2003. After working in private industry for 2 years, he returned to the University of Delaware earning the MSc degree in 2007 and is currently a PhD candidate in the CIS Department. His research interests include high-performance networking, network protocol design, grid computing, and network security.

Matthew Jaffee is a first year Master's student at the University of Delaware in the CIS Department. His undergraduate degree is a B.A. in Astrophysics from Franklin and Marshall College in 2010. Since making the jump to Computer Science, Jaffee has narrowed his interests to high performance computing, networking, and distributed storage (among others).

Martin Swany is an Associate Professor in the Department of Computer and Information Sciences at the University of Delaware. He received his B.A. and M.S. from the University of Tennessee in 1992 and 1998, respectively. He completed his Ph.D. at the University of California, Santa Barbara in 2003 and joined the faculty of the University of Delaware that year. Since 2005, Swany has been the Internet2 Faculty Fellow involving work in network metrics and performance-enhancing middleware. His research interests include high-performance parallel and distributed computing and networking.

The 2011 International Conference on Collaboration Technologies and Systems (CTS 2011)
May 23 - 27, 2011, Philadelphia, Pennsylvania, USA

DEMO SESSION IV

A Business Process Design Framework for B2B Collaboration

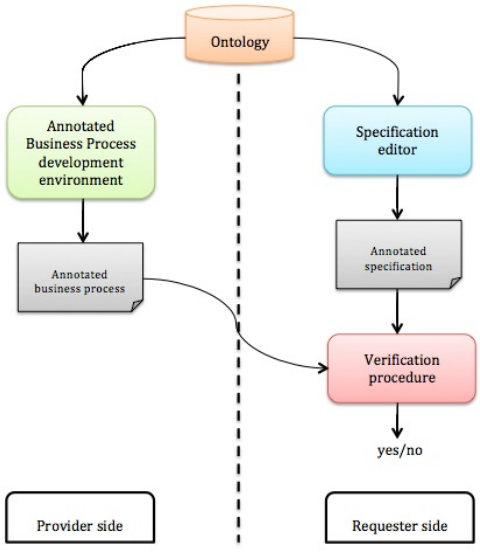
Lorenzo Boaro, Emanuele Glorio,
Francesco Pagliarecci and Luca Spalazzi
DIIGA, Università Politecnica delle Marche, Italy
Emails: boaro@diiga.univpm.it, glorio@diiga.univpm.it, pagliarecci@diiga.univpm.it, spalazzi@diiga.univpm.it

DEMO ABSTRACT

Due to the growing globalization, companies need to interact closely with their partners to collaborate and bring new and better products to fulfill the demand of the market. The involved enterprises can share their public business processes with their partners. The chance to establish interactions at this layer is clear: if companies show their missions, they can share costs, skills and resources in offering value-added services. At this level the interoperability becomes an important challenge. It requires the understanding of the semantics of partner business processes. Indeed, taking into account only the workflow of a business process, it does not guarantee that partners involved in the collaboration will understand the shared mission.

A B2B collaboration framework

Moving from these assumptions we describe a framework, called Development and Reasoning Environment for Annotated Models (DREAMs), for improving B2B collaboration. As depicted in Figure 1, we can distinguish two different actors: a provider and a requester. The first one represents the organization which wants to share its mission with other partners. The second one describes an other organization which searches for an external actor to jointly execute business processes. Both actors adopt a shared ontology which focuses on a specific domain of interest.



Figue 1

At the provider side, the first organization must deploy its business processes. This means publishing a set of files, e.g. through a repository mechanism, that enable their discovery and selection. Each process is an abstract view of the activities supported by an organization's mission as assembling a computer or processing insurance claims. The behavior of a process can be represented by several languages. In our approach a business process is described by means of BPEL. Even if this language has emerged as the de-facto standard for connecting Web services, its application is not limited to this area. The semantics of a process can be expressed by means of semantic annotations. In the proposed approach an ontology is described by the WSML language. The annotations are described through an XML-based language called SWSAL [1].

At the requester side, the organization must formulate the requirements that the needed process must satisfy, it must search in a given repository for processes that perform the desired function, and it must select which one has the right behavior. In particular, the requester must complete two different phases. In the first one, the requester formulates its requirements: the behavioral part of the specification is expressed through the BPMN language, the ontological part of the specification is expressed by means of semantic annotations written in SWSAL. In the second phase, the requester can verify if there is a process which satisfies its specifications by means of Semantic Model Checking (http://code.google.com/p/smc4ws/). The reader can refer to [2] for a detailed description of the Semantic Model Checking algorithm.

The provided tools

While both the verification procedure and the description of the process workflow can be made by means of existing tools, the process annotation and the creation of specifications can be complex and laborious. In fact, these activities can be performed only manually since there are no tools for supporting them. With this understanding in mind, we have developed two different tools, implemented as Eclipse plug-ins, as instruments for collaboration.

On the provider side, DREAMs4BPEL (see Figure 2) is the tool which enables the creation of the business process workflow and its semantic annotations. While a process is described by a BPEL representation, a domain ontology is represented through a WSML tree structure. Since the Service Oriented Architecture (SOA) plays a central role in the fast growing online economy and is used to support collaborative models, we have decided to adopt Web services as enabling technologies for finding partners to cooperate with and for automating B2B interactions. As a consequence, DREAMs4BPEL also allows to represents the interface of a Web service described by the WSDL language.

Concerning the requester side, DREAMs4SPEC (see Figure 3) is the tool which allows to create annotated specifications. The main steps required to produce a specification are the creation of a BPMN diagram and the annotation procedure. In the first case, the tool provides the instruments needed to draw a partial process. The requester can insert the proper visual elements according to BPMN specification. In the second case, instead, the user is able to start the annotation by means of drag and drop operations. To simplify the exploration and the annotation mechanism, DREAMs4SPEC adopts a tree structure for representing a specific domain ontology.

Conclusions

The aim of this demo is to show how the developed tools facilitate the using of our framework for inter-enterprise collaboration at the business process level. Indeed, while both requester and provider procedures could be considered complex and annoying tasks, the use of both DREAMs4SPEC and DREAMs4BPEL can make easy and natural these activities. In particular, concerning the first tool, the key aspect is represented by the chance to create and annotate a partial process (which represents the specification) in an integrated environment. Instead, regarding the second tool, the creation and the annotation procedure must be done in the same simple way as documentation generation for several programming languages.

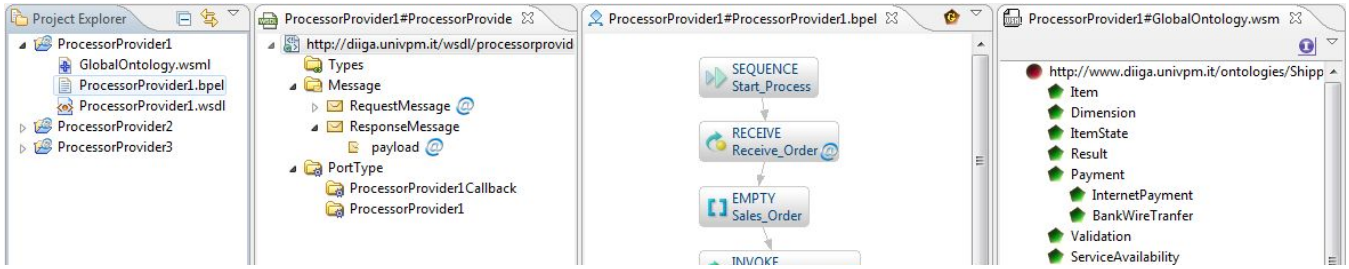


Figure 2

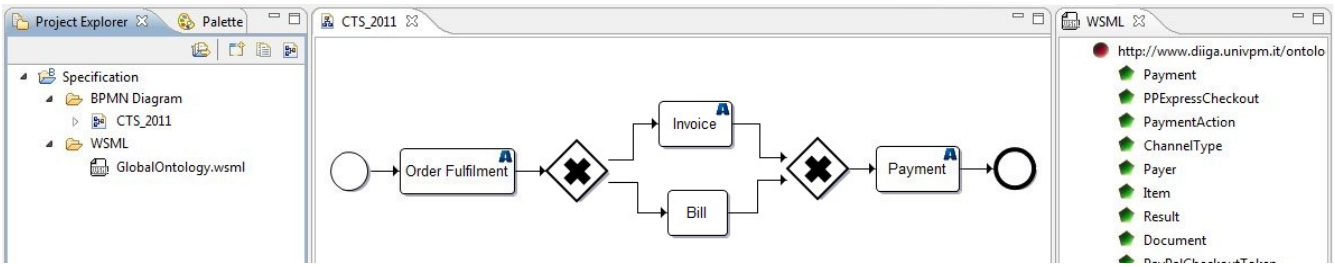


Figure 3

REQUIREMENTS AND TARGET AUDIENCE

This demo is addressed to people and organizations that want to establish collaborative B2B relationships with their partners in a semi-automatic way. No specific knowledge of the topic is required, since formal models are not going to be discussed. Our intent is to propose a self-contained demo session.

DEMO DURATION

The demo will be presented in a 30-minute session.

A/V AND EQUIPEMNT

Standard projector. Demonstrations will require Internet access.

REFERENCES

[1] I. Di Pietro, F. Pagliarecci, and L. Spalazzi. SWSAL: Semantic Web Service Annotation Language. no. 2008004453, SIAE Sezione Opere Inedite, Roma, 15 October 2008.

[2] I. Di Pietro, F. Pagliarecci, and L. Spalazzi. Model Checking Semantically Annotated Services. Software Engineering, IEEE Transactions on, January 2011.

PRESENTERS BIOGRAPHY

Lorenzo Boaro is a PhD student at the Università Politecnica delle Marche, Ancona, Italy. He obtained his second level degree in Computer Engineering in 2009. His research interests include: Web services, specification and verification of software systems, software agents, user profiling techniques and social networks. In 2010, he attended the Marktoberdorf Summer School organized by Microsoft Research and DAAD, Germany. He is also collaborating with Duepuntozero s.r.l., Jesi, Italy, a software company dealing with knowledge management and decision support systems.

The 2011 International Conference on Collaboration Technologies and Systems (CTS 2011)
May 23 - 27, 2011, Philadelphia, Pennsylvania, USA

DEMO SESSION V

Web-based Intelligent Argumentation and Collaborative Decision Support System

Xiaoqing (Frank) Liu, Ravi Santosh Arvapally
Missouri University of Science and Technology - Rolla, Missouri, USA

Emails: fliu@mst.edu, rsamb6@mst.edu

DEMO ABSTRACT

Collective intelligence is a collective wisdom of a large number of people who work together on an issue based on their composite body of knowledge. The Web has an ability to support collective intelligence by harnessing intelligence of a large number of people who are geographically scattered around the World. Argumentation is one of the widely engaged activities in our society. People spend a tremendous amount of time on argumentation, and a group of people come to a conclusion on a critical issue only after thorough argumentation. Poorly conducted argumentation often hurt people's feeling, damage their relationships, and be counter-productive. More importantly, it prevents people from collaborating with each other and reaching consensus in a collaborative decision making process. In this demo, we present a Web-based intelligent argumentation and collaborative decision support system, a tool of collective intelligence. It allows a large number of participants to present and share their knowledge on an issue in the form of issues, alternative solutions, arguments, evidences, and their relationships over the Web. We discuss how argumentation is realized and collaborative decision making is supported by the system. We also show its effectiveness by presenting results of empirical studies. In this system, collective intelligence is realized as a large number of participants exchange arguments and evidences regarding critical issues and their alternative solutions and the most favorable solution is identified based on intelligent inference with argumentation. Intelligent analysis and inference with argumentation support collaborative decision making with self-conflicting arguments, intelligent priority assessment, and identification of the most favorable solution of an issue. Argumentation-based collective intelligence provided by the system enhances the quality of the decision made, and possibly reduces the level of uncertainty in a complex decision making environment.

The Web-based intelligent argumentation and collaborative system allow participants to identify alternative solutions to an interesting issue, post arguments for or against specific alternative solutions or other arguments, and add evidences supporting their arguments over the Web. The issues, alternative solutions, arguments, and evidences form a complex argumentation network which represents a complex knowledge map for concerned subjects. The Web-based intelligent argumentation system is a Web-based application developed on the Java platform based on the Client – Server architecture. The role of the server is to manage the argumentation network, provide intelligent inference with argumentation based on fuzzy logic inference engines, and provide a common work space to all the clients. When an argument is added to the knowledge map, it carries a strength which represents how credible it is. If an argument supports or attacks an alternative solution or another argument, its strength indicates degree of support or attacking. The strength of an argument is re-assessed based on the priority of the stakeholder. The server takes the arguments posted by stakeholders and places them in an argumentation tree. Impact of arguments on solution alternatives is assessed through intelligent argumentation

reduction in order to find the most favorable alternative for a given issue and this is done by the fuzzy logic inference engine which is running on the server side. The intelligent argumentation reduction is carried out by the fuzzy logic inference engine based on the argument's weights and relationships between arguments. The system computes favorability factors of solution alternatives. The fuzzy logic inference engine is also used for intelligent self-conflict detection and priority assessment. The intelligent argumentation system is an incentive based system where the priority of a participant changes dynamically based on the contribution made by the participant.

We have conducted two different empirical studies to evaluate the Web-based intelligent argumentation system with two different groups, each group consisting of 25 stakeholders. A primary objective of the first empirical study is to validate the developed framework for deriving performance scores in Multi-Criteria Decision making and a primary objective of the second empirical study is to validate the developed framework for the priority assessment based on the contribution of a stakeholder. The results of these empirical studies show that the system improves communication of stakeholders, help develop a consensus on interesting issues, and identify the most favorable solutions in a collaborative decision making process.

REQUIREMENTS AND TARGET AUDIENCE

The goal of the demo is to present the leading-edge system of intelligent argumentation and collaborative decision support to practitioners and researchers in the areas of collaborative decision making and support, collaborative conflict management, Web- and internet-enabled collaboration, soft computing solutions for collaboration systems, and social computing. There is no prerequisite for the audience for attending the demonstration of this project.

DEMO DURATION

The demo will be presented in a 30-minute session.

A/V AND EQUIPEMNT

To demonstrate the Web-based intelligent argumentation and collaborative decision support system we need standard audio equipment and a projector that can be connected to our laptop which should have an internet connection to present and demonstrate the system.

PRESENTERS BIOGRAPHIES

Dr. Xiaoqing (Frank) Liu is a Professor in Department of Computer Science at Missouri University of Science & Technology. Dr. Liu has received his Ph.D. from the Texas A&M University in 1995. He is a director of McDonnell Douglas Foundation Software Engineering Laboratory at the computer science department in the Missouri University of Science and Technology. His research interests include software engineering, computer supported argumentation and collaborative decision support, object-oriented design, fuzzy logic and knowledge based systems, software total quality management, artificial intelligence applications, and hardware/software co-design. He has published over 80 referred journal and conference papers in these areas.

Ravi Santosh Arvapally is currently a PhD graduate student in department of computer science at Missouri University of Science & Technology and he is a graduate research assistant at McDonnell Douglas Foundation Software Engineering Laboratory.

The 2011 International Conference on Collaboration Technologies and Systems (CTS 2011)
May 23 - 27, 2011, Philadelphia, Pennsylvania, USA

CTS 2011 DOCTORAL DISSERTATION COLLOQUIUM

Ethical Concerns of Twitter Use for Collective Crisis Response

THOMAS HEVERIN
Adviser: **Lisl Zach**
Drexel University, Pennsylvania, USA

Deconstructing Information Flow in Student Groups

SANDRA TOZE
Adviser: **Elaine Toms**
Dalhousie University, Halifax, Nova Scotia, Canada

Interpersonal Boundary Regulation within Online Social Networks

PAMELA WISNIEWSKI
Advisers: **Heather Richter-Lipford** and **David C. Wilson**
University of North Carolina - Charlotte, North Carolina, USA

The 2011 International Conference on Collaboration Technologies and Systems (CTS 2011)
May 23 - 27, 2011, Philadelphia, Pennsylvania, USA

CTS 2011 POSTER PAPERS AND POSTERS

(Partial List)

POSTER PAPERS

Layered Interactive Visual Interface Design: A Visual Interface for the Navigation and Analysis of Digital Text Communications
Erica Edelman, John McIntire
Wright State University; Air Force Research Laboratory, Ohio, USA

Integrating Online and Offline Community through Facebook
Shaoke Zhang, Hao Jiang, John M. Carroll
The Pennsylvania State University, Pennsylvania, USA

Dependency Based Collaboration: Ontology Based Information Management
Brian Drabble
On Target Technologies, Inc., Virginia, USA

Cultural Aspects in Groupware Application as an Intercultural Collaboration Technology
Rein Suadamara, Stefan Werner, Axel Hunger
University of Duisburg-Essen, Duisburg, Germany

Development of Visualizations for Social Network Analysis of Chatroom Text
John McIntire, O. Isaac Osesina, Michael Craft
Air Force Research Laboratory, Ohio; University of Arkansas at Little Rock, Arkansas; Middletown High School –Middletown, Ohio, USA

Use of Multi-Context Systems for Crossing Boundaries
Hilda Tellioglu
Vienna University of Technology, Austria

Change Management: Developing a Tool to Foster Adaptive Collaboration
Anne Offner, Stephanie Swindler, Greg Padula, Arlene King, Joseph Fedora, LaToya Malone
Offner and Associates, LLC, Missouri; Air Force Research Laboratory, Ohio; C5T Corporation, Illinois, USA

Green Daily Guide: Easier Environmentally Friendly Transportation with the Help of Mobile Technologies
Andrey Bliznyuk
Østfold University College, Halden, Norway

Collaborative Systems for NASA Science, Engineering, and Mission Operations
Richard M. Keller, William J. Clancey, Matthew C. Deans, Joan C. Differding, K. Estelle Dodson, Francis Y. Enomoto, Jay P. Trimble, Michael H. Sims
NASA Ames Research Center, California, USA

POSTERS

A Business Process Design Framework for B2B Collaboration
Lorenzo Boaro, Emanuele Glorio, Francesco Pagliarecci Luca Spalazzi
DIIGA, Università Politecnica delle Marche, Italy

Constraints or Consequences in the U.S. Electric Smart Grid
John C. Hoag, Stanley E. Klein, Burzin K. Khajotia
Ohio University, Ohio; Open Secure Energy Control Systems, LLC; KPMG, Ohio, USA

Man and Machine: A Collaborative Approach to Digital Collection Evaluation
Catherine Hall, Mi Zhang
Drexel University, Pennsylvania, USA

Healthcare Information Behavior: Implicit Collaboration with Social Tagging Systems
Michael A. Zarro
Drexel University, Pennsylvania, USA

Use of Sensor-Based Feedback Technology in Reducing Home Energy Consumption
Annika Matta, Aurelia Heitz, Banny Banerjee
Stanford University, California, USA

Educational System for Diabetic Children
Sofia Tretyakova
Østfold University College, Halden, Norway

Drupal: Collaborative Framework in Science Research
Ranjeet Devarakonda, Harold Shanafield
Oak Ridge National Laboratory, Tennessee, USA

Green Box: An Innovative Approach of e-Grocery with Shared Reception Box
Manish Shrestha, Satya Ram Twanabasu
Østfold University College, Halden, Norway

Universal Devices for Public Transport
Lada Rodzina, Olga Ionova
Østfold University College, Halden, Norway

Real-Time Carpooling System
Nickolay V. Pukhovskiy, Rashid E. Lepshokov
Østfold University College, Halden, Norway

INDUSTRY POSTERS

Annotation and Deep Search of Semi-Structured Technical Documents
Chris Macks
Progeny Systems Corporation, Virginia, USA