1rst Symposium for Empowering and Smart Interfaces in Engineering

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SMART INTERFACES 2017

Nadine Couture

ESTIA INSTITUTE OF TECHNOLOGIES

Bidart, France

Email: nadine.couture@u-bordeaux.fr

***Abstract*—We question what is the best way to perform research on areas of investigation covering systems integration, socio-technical interfaces, cyber physical systems, human system integration and smart system integration. We coin as "smart and empowering interfaces" the design and implementation of human-human interaction, human-system and system-system that may foster the emergence of a positive intelligence for users. Such topics of research require tight collaboration among different scientific and industrial communities. However, the precise implementation of the trans/inter/multidisciplinary approaches is not self-evident. Hybridization of ideas, concepts, methods and subject areas is expected to be a powerful fertilizer, yet it is unclear how to make the best use of it. In addition, the radical changes taking place in science and technology cannot be possible without a genuine and long-term S&T (Sciences & Technologies) and HSS (Human and Social Sciences) rapprochement, which may be challenging due to the cultural divide across these communities of research.**

Keywords–Socio-Technical Interfaces; Cyber Physical Systems; Human System Integration; Smart System Integration

I. MOTIVATION

The goal of the Symposium SMART INTERFACES 2017 is to gather researchers in the field of Empowering and Smart Interfaces, to get them in touch with internationally renowned researchers and to establish networks for the future of this emerging field. This symposium is a unique opportunity to train in the field of Empowering and Smart Interfaces and to discuss your research with other researchers. The Symposium welcomes researchers with different backgrounds from both academic and applied research. We aim to provide participants with useful insights both for their further research and any applied research possibilities, in order to bring Empowering and Smart Interfaces principles out of the lab, in the everyday use.

In order to design and built Empowering and Smart Interfaces we advocate to adopt an approach integrating not only the technical and technological angle but also the societal and environmental angle. We believe that this global, systemic and transversal approach from the idea to the usage makes it possible to improve the solutions proposed and in the longer term, to increase the competitiveness of the industrial partner associated with the research (industrial one, business, or cultural). Understanding the stakes of the interfaces between systems that can be multi-technological, organizational or mixed is an innovation. Finally, addressing the coupling of the technologies and of the organizations (in the sens e of companies) within complex systems in an industrial context, requires an interdisciplinary engineering approach based on both multi-technological and organizational perspectives.

This discipline is at the intersection of several research areas but is not included in any of them: socio-technical interfaces, cyber physical systems, human system integration and smart system integration.

This discipline is emerging. Indeed, as far as we know, there is no interdisciplinary team of researchers working on scientific, technological and societal themes to respond to cross-cutting projects on Empowering and Smart Interfaces.

II. TOPICS

Because we are convinced of the challenges of industrial renewal (industries 4.0, factory of the future) we propose to deal with the issues of tomorrow with this approach of Empowering and Smart Interfaces, especially in Engineering. Empowering and Smart Interfaces in Engineering is positioned in engineering and technology, and is interested in complex systems, which are characterized as open and self-organizing, in which there are also (and above all) Human, users, operators, managers, etc. The complex system integrates several levels of organization, from the minimum unit to the most complex combinations. Intermediate states lead us to consider not juxtaposed but interwoven, hierarchical, interdependent levels combining various technologies and giving the role of the user of the system a fundamental importance. This is all the more true, if we focus precisely on usage and social behavior in order to evaluate opportunities and risks for Human and the company, and that a complex system is itself connected to other complex systems. *The technology links the technique and uses*. The research in the field of Empowering and Smart Interfaces in Engineering is technological because it is in direct contact with society, in particular the economic and industrial world, and its objective is to increase knowledge by relying on various scientific disciplines, to propose new conceptual and systemic approaches, methods, processes, software, instruments, tools, etc. In the field of Empowering and Smart Interfaces, the term "technology" is used in its primary and scholarly sense of

technical science: systematic study of processes, methods, instruments or tools specific to one or more technical domain(s) or trade(s). Therefore, we can highlight several challenges for he field:

- Societal, environmental and economic challenges: accompanying change, improving performance; re-industrialization and open enterprise; Development of renewable energies and energy transition; the futur of interaction (tangible, gestural and natural), ubiquity, mobility; Intelligent building, intelligent city, factory of the future.
- Technological challenges: integration of communicating onboard sensors; Energy storage, SmartMeters; Eco-innovation; Reduction of model.
- Conceptual challenges: natural user interface, optimization, safety, reliability, complexity, hybridization.
- A difficulty to solve, which can also be seen as a challenge, is the recognition of a doctorate on this topic. This is a risk for the doctoral student at a time when evaluations are by domain, especially in Europe and in France. Today, in order to ensure the future of doctoral students, they must specialize in a field that is included in the Smart and Empowering Interfaces and which contribute to and contribute to the overall project.

Thereby, topics of interest of SMART INTERFACES 2017 included:

- Empowering and Smart Interfaces in the Internet of Things
- Empowering and Smart Interfaces in Smart-Factory
- Empowering and Smart Interfaces in Smart-Grid
- Empowering and Smart Interfaces in Innovation and Creativity
- Philosophical aspects of Empowering and Smart Interfaces
- Integrating Human Sciences and Technological Sciences
- Comparing methods for cross-disciplinary research
- Typologies of interdisciplinarity: the boundary work of definition
- Interdisciplinarity in Research evaluation and doctoral student career
- How to teach Empowering and Smart Interfaces in high degree?
- Case studies on Empowering and Smart Interfaces

III. Paper Contributions

The program of SMART INTERFACES 2017 consists of seven invited papers which we thematically included in three sessions.

Jean Esterle presented what is a Smart Interfaces in the ESTIA Institute.

Guillaume Terrasson talked about a a multidisciplinary paradigm called "Precision Livestock Farming".

Jacques Péré-Laperne examined the possibility to use smart and semi-automatic interfaces to structure de-structured documents.

Marion Real explained how to build pathways for empowering users toward prosumer behaviors and the design for experience with the Prosumer Empowerment Concentric Model.

Julien Ambrosino presented a smart and tangible user interface, called IdeaBulb, for monitoring ideation during creative sessions.

Zina Boussaada discussed a management Approach for Microgrid Operation Using Multi Agent System Technique.

David Antonio Gómez Jáuregui gave his vision toward an Emotional Internet of Things for Smart Industry.

IV. Organization

A. SMART INTERFACES Chairs

Prof. Nadine Couture, ESTIA, France
Prof. Brygg Ullmer, Louisiana State University, USA

B. SMART INTERFACES Advisory Committee

Prof. Nadine Couture, ESTIA, France
Prof. Jeremy Legardeur, ESTIA, France
Prof. Xavier Fischer, ESTIA, France
Dr. HDR Christophe Merlo, ESTIA, France

C. SMART INTERFACES 2017 Technical Program Committee

Prof. Nadine Couture, ESTIA, France
Prof. Jeremy Legardeur, ESTIA, France
Prof. Xavier Fischer, ESTIA, France
Dr. HDR Christophe Merlo, ESTIA, France
Prof. Laurence Nigay, Universit Grenoble Alpes, France
Prof. Eric Papon, Universit de Bordeaux, France
Ing. Thierry Ferreira, Thales Avionique, France
Prof. Seddik Bacha, Universit Grenoble Alpes, France
Ing. François Pellerin, Rgion Nouvelle-Aquitaine, France
Dr. HDR Jean-Yves Choley, SUPMECA, France
Dr. Gilles Rouquet, Orange, France
Dr. Eric Barquissau, ESTIA, France
MPhil. Clement Marquet, Tlcom ParisTech, France
MSc. Jacques Péré-Laperne, LaBRI-CNRS and ESTIA, France
Prof. Brygg Ullmer, Louisiana State University, USA

Nadine Couture is a full Professor in Computer Science at ESTIA, the Institute of Advanced Industrial Technologies in South-West, France. She received her PhD from University of Bordeaux in 1994 and her HDR in 2010. She is in charge of ESTIA-RESEARCH and a member of the research center LaBRI (UMR CNRS 5800). She is the founder of the European Tangible Interaction Studio (ETIS) (www.etis.estia.fr). Her current research, in Human-Computer Interaction, focuses on Tangible Interaction from embodied interaction to whole body interaction.

Laurence Nigay's research focuses on the Engineering of Human-Computer Interaction (HCI). Her interests include ergonomic as well as software design aspects of HCI. Her primary motivation is to develop ways for making interaction techniques more usable. In particular her research studies center on new interaction techniques, Multimodal and Augmented Reality (AR) user interfaces such as menu techniques, fusion mechanisms, service/component-based approaches for the development of multimodal and AR interfaces.

Jeremy Legardeur is a full professor of the Institute of Engineering ESTIA and he is a member of the laboratory IMS of the university of Bordeaux in France. He was graduated as Design Engineer from the Montpellier University in 1997 and completed his PhD from the Grenoble INP Institut National Polytechnique in 2001. He is the founder of "The 24h of innovation" event (www.24h.estia.fr) and the ERIMA network (European Research in Innovation and Management). His research interest is focused on the methods and tools to foster creativity and ideas lifecycle management in early design phases of innovative product & service. His work is based both on a research action of industrial design situation and the development of new methods and tools to foster interaction and collaboration among design participants in creative concurrent engineering. Since 20 years, he has published more than 100 papers in national and international journals, conferences, and books.

Xavier Fischer is a full professor in mechanical engineering. His topics of interest are focused on model reduction techniques with the objective to develop interactive simulations and interactive optimization techniques, fostering the interactive design approaches. He is author of more than 150 international publications, Professor Fischer is the international Chair of Virtual Concept international conferences and the editor-in-chief of the International Journal on Interactive Design and Manufacturing, as well as the editor of the book series Research in Interactive Design. He is also the deputy director in charge of academic program and International Affairs of the ESTIA Engineering Institute (France) and the Director of Creat-Innov Franco Mexican Centers of Innovation (Mexico).

Eric Papon, Professor of Chemistry, was Vice-President Research at Bordeaux 1 University from 2012 to 2014. He has just been appointed Vice-President of Innovation at the University of Bordeaux. Ing. Thierry Ferreira - Thales Avionique Thierry Ferreira is Head of the innovation and user experience department in the cockpit area. With a long experience in the development of embedded systems, his interest in human factors and innovation led him to take in charge the management of the Bordeaux Innovation Hub of Thales Avionics. In this Hub, tomorrow's cockpit products are created and prototyped before being launched in development.

Seddik Bacha is a full professor at University of Grenoble. He received his PhD Thesis (Best Thesis Award of Grenoble National Institute of Technology (INPG)) in 1993, and his accreditation to supervise research (Habilitation Diriger des Recherches, HDR) from INPG in 1998. He is the Program Scientific Director within ITE (Institute of Energetic Transition) SUPERGRID and the Director Deputy of the GDR SEEDS (CNRS Group of Research for Energy). He is an associate editor of IEEE Transactions on Industrial Electronics and Wind Energy review. He is a member of scientific committee for IEEE ECCE Europe. His actual interest are focused on Renewable energy integration and power quality; Wind energy, Photovoltaic, Variable speed hydro systems; FACTS and DFACTS systems for grid energy management; V2G, Intelligent buildings and Real Time Simulation.

Since 2014, François Pellerin has organized the Factory of the Future program in the Nouvelle-Aquitaine Region of France, gathering 290 industrial SMEs and featuring technological, organizational and social performance. He supports a long-term plan to support the industry towards a digital factory, fully respectful of employees. François Pellerin, an engineer and a PHD, spent most of his career at Safran Helicopter Engines, in materials research and development, and then in the management of the Bordes plant.

Jean-Yves Choley is an associate professor at SUPMECA. He is Research Director of SUPMECA and Head of Mechatronics research team of IS2M (Ingnierie des Systmes Mcatroniques et Multi-physiques) and QUARTZ laboratory. He graduated as Master in Mechanics at ENC Cachan, UPMC, in 1984; as PhD in Industrial Engineering at Ecole Centrale Paris, in 2005; and he obtained the accreditation to supervise research (Habilitation Diriger des Recherches, HDR) at UTC Compigne, in 2016. . He was General Chair of IEEE Mechatronics-REM 2012 congress, in Paris, and member of IRT SystemX of IEEE System Council at ESRA.

Christophe Merlo is a lecturer at ESTIA, the Institute of Advanced Industrial Technologies in South-West, France, and a member of the research center IMS (UMR CNRS). He is in charge of Studies at ESTIA. After 9 years as a consulting engineer involved in CAD/CAM and PDM projects, he received his PhD in industrial automation from University Bordeaux in 2003. His current research focuses on System Information, Collaborative Design, Product Lifecycle Management, and Human Factors in Design Co-ordination.

Gilles Rouquet is Director of the Xperience Design Lab at Orange. As a Human-Factor specialist, he worked from 1992 to 2005 in various design projects with majors (DGA, EDF, Renault, SNCF ...). Since 2015, he is head of a Research and Development Unit specialized in ergonomics. The user-centered design (user=client) and the organization of the collaboration between the business units that were involved in it, constitute the common thread of his professional career.

Eric Barquissau holds a PhD in Management Sciences and Marketing from the University of Paris-Nanterre and a graduated from Neoma Business School at IAE Pau. His lectures are focused on strategic marketing, e-commerce and e-marketing. His research focuses on social media and online customer relationship management. He also helps startups in developing their marketing and e-marketing strategies.

After a Master degree in Philosophy at Paris 1 Pantheon Sorbonne, dealing with ethics and politics of synthetic biology, Clement Marquet started a Ph.D. thesis in Science and Technology Studies at Telecom ParisTech. His research focuses on the many roles played by digital technologies in reconfiguring urban assemblages.

After a carrier with companies that he created himself, Jacques Péré-Laperne becomes a PhD Student. His research is focused on the structuration of unstructured documents. His goal is to create a new start-up on this theme.

Nadine Couture

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