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IFIP – The International Federation for Information Processing

IFIP was founded in 1960 under the auspices of UNESCO, following the First World Computer Congress held in Paris the previous year. An umbrella organization for societies working in information processing, IFIP's aim is two-fold: to support information processing within its member countries and to encourage technology transfer to developing nations. As its mission statement clearly states,

IFIP's mission is to be the leading, truly international, apolitical organization which encourages and assists in the development, exploitation and application of information technology for the benefit of all people.

IFIP is a non-profitmaking organization, run almost solely by 2500 volunteers. It operates through a number of technical committees, which organize events and publications. IFIP's events range from an international congress to local seminars, but the most important are:

- The IFIP World Computer Congress, held every second year;
- Open conferences;
- Working conferences.

The flagship event is the IFIP World Computer Congress, at which both invited and contributed papers are presented. Contributed papers are rigorously refereed and the rejection rate is high.

As with the Congress, participation in the open conferences is open to all and papers may be invited or submitted. Again, submitted papers are stringently refereed.

The working conferences are structured differently. They are usually run by a working group and attendance is small and by invitation only. Their purpose is to create an atmosphere conducive to innovation and development. Refereeing is also rigorous and papers are subjected to extensive group discussion.

Publications arising from IFIP events vary. The papers presented at the IFIP World Computer Congress and at open conferences are published as conference proceedings, while the results of the working conferences are often published as collections of selected and edited papers.

Any national society whose primary activity is about information processing may apply to become a full member of IFIP, although full membership is restricted to one society per country. Full members are entitled to vote at the annual General Assembly, National societies preferring a less committed involvement may apply for associate or corresponding membership. Associate members enjoy the same benefits as full members, but without voting rights. Corresponding members are not represented in IFIP bodies. Affiliated membership is open to non-national societies, and individual and honorary membership schemes are also offered.

Kecheng Liu Keiichi Nakata Weizi Li
Daniel Galarreta (Eds.)

Information and Knowledge Management in Complex Systems

16th IFIP WG 8.1 International Conference
on Informatics and Semiotics in Organisations, ICISO 2015
Toulouse, France, March 19-20, 2015
Proceedings

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Preface

The 16th International Conference on Informatics and Semiotics in Organisations (ICISO 2015), following the footsteps of earlier events in the conference series, was devoted to the latest research in informatics and organizational semiotics. The aim of this conference is to provide a focal forum for participants from various domains of information management and information systems, computational science, semiotics, finance and accounting, business and enterprise, service science, and business and engineering. One of the important emphases of this 16th conference was information and knowledge management of complex systems, such as large-scale projects, network of networks, and dynamic and evolving enterprises (see www.orgsem.org for earlier conferences since 1995).

Effective information and knowledge management through the entire lifetime of a complex system such as a space project or a network of networks is critical. Some systems such as space projects are transient and dynamic, with clearly defined stages and involving different players at these stages. Consistency, coherence, and continuity in information and knowledge management are the key to success. However, an adoption of information and knowledge management is often hindered right from the beginning by the challenges and sometimes resultant deficiencies in understanding the complex system itself, and by the related requirements for information and knowledge management.

Between stating the broad objectives and defining precisely the means of satisfying them with a clear plan of action, the project requires the contribution of a growing and changing community of players that must also develop trusting relationships and be able to share information and knowledge, even while working on designs and plans that often introduce creative but possibly conflicting ideas. Such a situation is not the prerogative of space projects; other projects and dynamic systems such as nuclear engineering and product innovation, for instance, also share these characteristics.

Information is an important resource for any organization, whether it is large or small, or in the service or production sector. To understand the nature of information and how it can be effectively managed and used in organizations is highly relevant. Following earlier events in the series, the key theme of this conference was on information, and management in complex organizations such as space industries and research institutions. Particular interest was placed in exploring and understanding from both theoretical and empirical perspectives how information enables an organization to sustain and, furthermore, to leverage innovation and competitiveness. In both cases, the organizations will rely heavily on effective management and use of information.

Informatics is the study of information as a resource, which helps a business organization, often through knowledge management, innovation, and service design, engineering, and management. Organizational semiotics, as a discipline of

study of sign, information, and human communication in organized contexts, will provide a holistic and comprehensive approach with which to examine the issues of information management and utilization from a scholarly and practical perspective.

The conference received 46 paper submissions from 17 countries, which demonstrates the success and global dimension of this conference. From these, 21 (45%) were accepted for presentation. These numbers show the intention of preserving a high level of quality for future editions of this conference. The papers are organized into five topics: organizational semiotics theory and concepts, organizational semiotics application, information systems and services, complex system modelling and simulation, innovation and organizational learning.

The high quality of the papers received imposed difficult choices in the review process. To evaluate each submission, two rounds of paper review were performed by the Program Committee and reviewing panels, whose members are highly qualified researchers in the conference topic areas. Moreover, ICISO also featured a number of keynote lectures delivered by internationally recognized experts, namely, Mr. Ruediger Suess and Mr. Uwe Knodt from DLR German Aerospace Centre, Cologne, Germany, and Dr. Vincent Minier and Dr. Vincent Bontems from CEA French Alternative Energies and Atomic Energy Commission, Saclay, France. Although not included in this volume, we also had great pleasure in having a special contribution from, Prof. Ronald Stamper. These special contributions were significant highlights and brought great added value to the conference.

Building an interesting and successful program for the conference required the dedicated effort of many people. We would like to express our thanks to all authors including those whose papers were not included in the program. We would also like to express our gratitude to all members of the Program Committee and auxiliary reviewers, who helped us with their expertise and valuable time. Furthermore, we thank the invited speakers for their invaluable contribution and for taking the time to prepare their talks.

Moreover, we thank the session chairs, whose contribution to the diversity of the programme was essential. Finally, we gratefully acknowledge the professional and organizational support from Centre National d'Etudes Spatiale (CNES), France, and Henley Business School, University of Reading, UK.

January 2015

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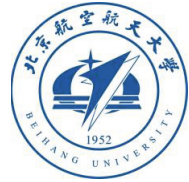
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Abstracts of Invited Talks

Bottom-Up! - Social Knowledge Sharing in DLR

Ruediger Suess and Uwe Knodt

DLR German Aerospace Centre, Cologne, Germany

As a research organisation, the German Aerospace Centre (DLR) relies on creative and disruptive ideas to create new knowledge efficiently. But how can those new ideas be raised when you see that there is a lot of inefficiency in the knowledge flow? Three years ago Mr. Uwe Knodt started to investigate the knowledge management processes of DLR. For this purpose a new internal project “Establishing an integrated knowledge management system (EIWis)” was launched. By conducting surveys on employees’ needs concerning knowledge, he found out that the knowledge processes were not primarily driven by technology but especially by the way people react and interchange information with each other. The information technology is not the key to a successful knowledge management, but the people are. Following that, the improvement of knowledge processes can be done by bringing the right people together - whether online or offline – in order to share their knowledge and develop new ideas. Whenever technology is used to enhance these knowledge processes, it has to be in a social way to improve the bottom-up knowledge flow.

Mr Ruediger Suess integrated EIWis into his strategic project portfolio. He connected other strategic projects with knowledge management and reported the results directly to the board. He will show how an organized project portfolio can help to reach the strategic goals.

Uwe and Ruediger will also show two examples. The first example is the DLR-Wiki, in which each employee can easily share his/her own knowledge with others inside DLR. The second example is the Knowledge Sharing Meeting, a format of collaboration workshops aiming at creating communities of experts by using a bottom-up approach with the acceptance of executive staff. An overview of the other knowledge management activities at DLR will also be given.

Mr Ruediger Suess is project portfolio manager at the Corporate Strategy and Alliances division at the headquarters of DLR – the German Aerospace Center, located in Cologne /Germany. In his current function. As project portfolio manager Ruediger Suess coordinates the update of the corporate strategy at DLR and manages the portfolio of strategic projects for the implementation of the corporate strategy.

Mr Uwe Knodt is Project Manager for Knowledge Management, DLR.

Knowledge Management and Digital Diagrammatisation of Innovative Technical Systems

Vincent Minier and Vincent Bontems

CEA French Alternative Energies and Atomic Energy Commission,
Saclay, France

A novel methodology is proposed for the analysis and knowledge management of the processes leading to innovative industrial. The methodology is derived from study cases in the field of “big science” instruments, such as space telescopes, for which the technical and natural environments are necessary conditions for their functioning. Big Science instruments are designed and realised over a long time, sometimes decades, and each generation represents a major technical progress compared to the precedent ones as they are always made to accomplish huge breakthroughs in science. They result from international planning, complex management, scientific cooperation, industrial research and production, and inventions born in the fundamental research laboratories. Similar properties characterise large programs in the space, energy or maritime industries. In this paper, we focus our study on the Herschel space observatory, an ESA space science mission launched in May 2009 and ending in April 2013. The study consists of various steps, including technological analysis, interviews with the designer team, analysis of transductions inside the instruments, historical analysis of technical lineages, and socio-technological analysis of the industrial design process. At the end of the study process, thanks to digitalisation, this information can then be displayed as digital database, diagrams and images allowing knowledge management, innovation forecast and even public outreach. Then, we introduce the concept of digital “Image-Objects” in the framework of the Gilbert Simondon’s cycle of technology. “Image-objects” could be, for example, some interactive diagrams, e-book, MOOCs or even exhibits. The cultural role of these digital devices is not only to display technical information about the objects but also to valorise their cultural signification. They are not some scientific relics. They are Image-Objects, which convey explicit and latent meanings about the technical objects and, above all, about their invention. Image-Objects are meant to be a major booster for the culture of invention.

Dr Vincent Minier, is an astrophysicist at CEA (French Alternative Energies and Atomic Energy Commission) in Saclay, France. He leads the ExplorNova research project that explores the scientific, technological and cultural dimensions of space sciences, deduces innovating models for the future and share knowledges with all (<http://explornova.cea.fr>).

Dr Vincent Bontems, is a philosopher at CEA (French Alternative Energies and Atomic Energy Commission) in Saclay, France. His work concerns mainly the philosophy of sciences and technology, the sociology of sciences and the images. He is an expert of Gilbert Simondon, a french philosopher of technology and the author of Bachelard (*Les Belles Lettres*. Paris. 2010). He leads a seminar in Paris on Design and Innovation.

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