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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 less 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 in information 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.

Denis Cavallucci Roland de Guio
Gaetano Cascini (Eds.)

Building Innovation Pipelines through Computer-Aided Innovation

4th IFIP WG 5.4 Working Conference, CAI 2011
Strasbourg, France, June 30 – July 1, 2011
Proceedings

Volume Editors

Denis Cavallucci

Roland de Guio

INSA Graduate School of Science and Technology of Strasbourg

LGECO, Design Engineering Laboratory

24, Boulevard de la Victoire, 67084 Strasbourg Cedex, France

E-mail: {denis.cavallucci, roland.deguio}@insa-strasbourg.fr

Gaetano Cascini

Politecnico di Milano

Dipartimento di Meccanica

Via Giuseppe la Masa 1, 20156 Milan, Italy

E-mail: gaetano.cascini@polimi.it

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Preface

Nowadays, the term “innovation” has become a common mantra that is supposed to be the answer to several current issues. In industry, innovation is considered as the “key” to remaining competitive. In the scientific community, it is meant/seen/perceived as a focus/challenge to be addressed by all those disciplines that can contribute to the development of the collective knowledge in this broad area: from engineering to economics, from the physical sciences to the social sciences. Within the more specific domain of product development, a rich literature contributes to the discussion on the support provided by the innovation activities by means of dedicated methodologies and tools.

Nevertheless, computer support to innovation-oriented tasks mainly focuses on detail design and prototyping phases, while pioneer experiences relate to the earliest stage of the product cycle and to the information system supporting the innovation process.

Since 2004 the Computer-Aided Innovation (CAI) working group of IFIP (WG 5.4 of the Technical Committee dedicated to Information Technology Applications) has gathered academic scholars, industrial researchers and specialists interested in sharing their know-how on theoretical and practical aspects related to the development of computer-aided systems supporting the innovation process.

Being an emerging domain of science and due to its intrinsic multi-disciplinary nature, computer-aided innovation is broadly open to the contribution of interested researchers from basic research to industrial applications.

This book collects the accepted papers among those submitted to the 4th Working Conference on Computer-Aided Innovation, held in Strasbourg (France) from June 30 to July 1, 2011.

Some of them (N. Leon et al., C. Ramirez et al. H. Yu et al.) represent practical proofs of the benefits that CAI tools can bring, through case studies dedicated both to the inventive aspects of design and to the optimization of a conceptual solution. On the theoretical side, complementary aspects are covered, as a demonstration of the variety of issues that the research in the field of CAI has to deal with. S. Hüsigg positions the development of CAI systems with respects to the more general trends of innovation, from designer-driven to user-driven, from closed to open-innovation. Bringing the focus on the market into the innovation process is also addressed by Q. Ma et al. through a discussion about how to structure flexible product platforms.

A key aspect covered by several authors is the relationship between innovation and the complexity of modern technical systems. C. Conrardy et al. investigate the possibility of automatically extracting a hierarchy of design conflicts, or more precisely contradictions, the elementary models of inventive problems according to the TRIZ theory. G. Syal et al. propose a methodology for the management

of multi-physics simulations by networking CAE systems in order to support the development of complex products as in the automotive sector. H. Liu et al. describe an approach to the functional decomposition of complex system, which leverages TRIZ principles.

Among the other topics, F. Wuttke and colleagues address the uncertainty of innovation processes and propose an approach to support decision making, with a special focus on the automotive industry.

The fundamental characteristics that a computer-aided inventive problem-solving tool should have are discussed in the first part of the paper by Borgianni et al., while the second part proposes an algorithm for coaching the analysis of an inventive situation that the authors claim is suitable also for training purposes.

The assessment of the performance of R&D inventive activities is dealt with in the paper by L. Burki et al. also in the framework of the CEN TC 389 project, an initiative of the European Community aimed at establishing a norm to guide innovation practices in industry.

Last, but clearly not least, D. Russo presents a proposal to integrate eco-design principles and computer-supported analyses for reducing the environmental footprint of new products. Although several examples presented in this book deal with traditional industrial topics, such as those related to the automotive sector, not surprisingly sustainability, environmental issues and renewable energy sources seem to be a transversal topic addressed by several papers, since it is evident that a major thread of inventive problems that engineers and designers will have to cope with is making innovative products sustainable.

March 2011

Gaetano Cascini
Denis Cavallucci
Roland de Guio

Conference Organization

4th IFIP Working Conference on Computer-Aided Innovation (WCCAI 2011)

WCCAI 2011 was organized by

INSA Graduate School of Science and Technology
Strasbourg, France

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Denis Cavallucci
Design Engineering Laboratory (LGeCo)
INSA Graduate School of Science and Technology of Strasbourg

Program Co-chair

Roland de Guio
Design Engineering Laboratory (LGeCo)
INSA Graduate School of Science and Technology of Strasbourg

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