TRENDS IN COMPUTER AIDED INNOVATION

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Edited by

Noel León-Rovira, ITESM, México
Su K. Cho, Chrysler LLC, USA

Contents

Preface vii
List of contributors ix

UXDs-Driven Contradiction Solving For Conceptual Design Using CAIs
Tan Runhua 1

Computational Explorations of Compatibility and Innovation
Ricardo Sosa, John S. Gero 13

Emergent contradictions: A synthesis of TRIZ and complex systems theory
Darrell Mann 23

Creative Tower Generated by Computational Intelligence
Xiyu Liu, Hong Liu 33

General Theory of Innovation An Overview
Greg Yezersky 45

Locating Creativity in a Framework of Designing for Innovation
John S. Gero, Udo Kannengiesser 57

Research and Implementation of Product Functional Design Based on Effect
Cao Guozhong, Tan Runhua, Lian Benning 67

OTSM Network of Problems for representing and analyzing problem situations with computer support
Nikolai Khomenko, Roland De Guio 77

A Text-Mining-based Patent Analysis in Product Innovative Process
Liang Yanhong, Tan Runhua 89

Technology Innovation of Product Using CAI System Based on TRIZ
Zhang Jianhui, Yang Bojun, Tian Yumei, Tan Runhua 97

Axiom-based Potential Functional Failure Analysis for Risk-free Design
Zhang Peng, Tan Runhua 107

Using the CAI software (InventionTool 3.0) to solve complexity problem
Zhang Peng, Tan Runhua 115

Generative Art Images by Complex Functions Based Genetic Algorithm
Hong Liu, Xiyu Liu 125

Supporting the Sytematization of Early-Stage-Innovation by Means of Collaborative Working Environments
Alexander Hesmer, Karl. A. Hribernik, Jannicke Baalsrud Hauge, Klaus-Dieter Thoben 135

Constraint based modelling as a mean to link dialectical thinking and corporate data. Application to the Design of Experiments. 145
Thomas Eltzer, Roland DeGuio

Development of Standard Solutions CAI System with UML and XML 157
Bojun Yang, Jianhui Zhang, Runhua Tan, Yumei Tian, Jianhong Ma

Computer-Aided Patent Analysis: finding invention peculiarities 167
Gaetano Cascini, Davide Russo, Manuel Zini

Automatic shape variations for optimization and innovation, Shape Optimization of Cylinderhead Gasket using CFD 179
Noel Leon, Jose Cueva, Cesar Villarreal, Sergio Hutron, German Campero

Enhancing interoperability in the design process, the PROSIT approach 189
Umberto Cugini, Gaetano Cascini, Marco Ugolotti

Comparison of Strategies for the Optimization/Innovation of Crankshaft Balance 201
Albert Albers, Noel Leon, Humberto Aguayo Thomas Maier

Collaboration in automotive winter testing 211
Mikael Nybacka, Tobias Larsson, Åsa Ericson

Future of CAE and Implication on Engineering Education 221
Seung-Hyun Yoo, Eung-Jun Park, Jae-Sil Lee, Joon-Ho Song, Dae-Jin Oh, Woong–Rak Chung, Yeongtae Lee, Dhaneshwar Mishra

Structuring knowledge use in Inventive Design 231
Denis Cavallucci, François Rousselot

Measuring Innovation in Multi-Component Engineering Systems 243
Kenneth A. Shelton, Tomasz Arciszewski

Preface

It is a great honor and pleasure to welcome you to Michigan on the occasion of the 2nd IFIP Working Conference on Computer Aided Innovation.

As we started with the first ideas of organizing an international conference on Computer Aided Innovation 5 years ago, we got different answers that went from skepticism up to curiosity and enthusiasm. The 1st Conference took place in Ulm, Germany in November 2005 and the 2nd Working Conference on Computer Aided Innovation which is held at Delphi Technical Center in Brighton and at Chrysler Museum in Auburn Hills, Michigan is now a reality. More than 40 contributions from all over the world were received from which 23 have been selected for being published after a thorough reviewing process. The Working Group 5.4 Computer Aided Innovation has now 34 members from 13 different countries.

The design of products and systems is becoming more demanding and complex as the amount of new products and newly developed interdisciplinary technologies increase exponentially. The product and process development must now take into account the entire lifecycle while avoiding environmental damage and facilitating the use of new technologies and physical principles. A structured and goal-oriented innovation process is nowadays mandatory for innovation success. Therefore, innovation supporting software becomes a key factor for the innovation process that guides the project teams through the complexity of the market.

Computer aided simulations are becoming more acknowledged as efficiency and effectiveness of the innovation process is becoming a key competitive advantage. Computational simulations related to the compatibility of novel ideas introduced in a computational social group to suggest acceptance or rejection are being also researched. This new kind of simulations produces insights that provide innovators with new tools to enhance their performance and effectiveness.

The transition from resource-based products to knowledge-based products is compelling the New Product Development process to be more innovative and efficient, making innovation processes even more challenging. Methods for structural and topological optimization, based on generative algorithms, are now used by practitioners to obtain optimal geometrical solutions that were earlier only possible after costly and time consuming trial and error approaches. As Product Life Cycle Management is being integrated with Knowledge Management methods and tools, new alternatives arise regarding the creation of new paradigms of the Engineering Desktop. New Knowledge-Based Engineering systems support innovators' activity through rules and knowledge re-use, thus reducing the product development time while increasing its functionality, quality and reducing environmental damage.

Some existing ideas and concepts of Computer Aided Innovation (CAI) focus on assisting product designers in their creative stage, however a more comprehensive vision conceives more comprehensive CAI systems that begin at the creative stage of perceiving business opportunities and customer demands, that also offer support for inventions and also provide help for turning inventions into successful innovations in the market. It is now accepted that computers have

an important role to play in helping innovators to find the direction and solutions for new products and processes. In order to achieve higher performance in product and process innovation the Theory of Inventive Problem Solving (TRIZ) is being integrated into CAI Systems. As a result new methods and tools are taking shape under the name of Computer Aided Innovation that are now helping engineers and technicians to find innovative solving approaches. CAI therefore stands out as being a break from the usual trends.

The 2nd IFIP Working Conference on Computer Aided Innovation will play an important role in clarifying the essential factors characterizing these new arising methods and tools for bridging the gap between the traditional methods and current trends in search of efficient innovation. The technical program of the conference includes three keynote speeches, two panel discussions as well as 23 technical paper presentations. We greatly appreciate three keynote speakers as follows: Dr. Gustav Olling, former IFIP TC5 Chair person, Rapid Product Creation LLC, Dr. Andrew Brown Jr., Executive Director & Chief Technologist, Delphi Corporation and William Whedon, Director of Product Development IT, Chrysler LLC.

The Conference provides a forum for presenting and discussing current research and recent advancements in all fields of supporting innovation with computer tools for product and process development.

The aims of the papers presented at the conference are:

- Making contributions for clarifying the role of computer aided innovation tools.
- Contributing to the further development of the Engineer's Desktop focusing on end-to-end product creation process with methods and tools to ensure the feasibility and success of innovations in early stages of the innovation process product-related validation (e.g. requirements processing, simulation) process-related validation (e.g. frontloading).
- Enhancing the engineering innovation activity with computer tools and methods.
- Discussing organizational, technological and cognitive aspects of the application of CAI methods and tools, and also contributing to the evaluation of their effectiveness and efficiency.
- Developing the theoretical foundations of CAI.

The contributions published in this proceeding represent the state of the art in research, development and implementation in these fields. They include:

- Research Papers describing contributions and latest results of fundamental investigations;
- Industrial Papers presenting applications of CAI experiences and methods;
- Speculative Papers advancing experiences with new theories, approaches and methods, without necessarily offering validated results;
- Engineering Creativity and Innovation Papers on new experiences from education, training, teamwork and case examples.

The contributions are focused on following topics:

- The innovation process;
- Engineering design and innovation;
- TRIZ, CAI and Artificial Intelligence;
- Basic definitions to CAI;

- Fundamental approaches: CAD/CAE and CAI software;
- Optimization and innovation;
- Shape and topology generators and optimization;
- Integration of CAI methods and tools into engineering processes;
- Innovation in collaborative networks of enterprises;
- Social impact of innovations.

We would like to extend our sincere appreciation to the International Program Committee for their reviewing efforts and to the Local Organizing Committee for their hard work toward making this Working Conference a success. We owe our special thanks to a local organizing chair, Mr. Mansour Ashtiani, Delphi Corporation, and two sponsor companies, Delphi Corp. and Chrysler LLC.

N. León-Rovira,
Co-Chair 2nd IFIP Working Conference on Computer Aided Innovation
Director Research Chair Creativity, Inventiveness and Innovation
Center for Innovation in Products and Processes
Tecnológico de Monterrey, Campus Monterrey

Su K. Cho,
Co-Chair 2nd IFIP Working Conference on Computer Aided Innovation
Research Engineer, Product Development IT
Chrysler LLC

Contributors

Name(s)/Affiliations

Tan Runhua, Zhang Jianhui, Yang Bojun, Tian Yumei, Liang Yanhong, Ma Jianhong, Lian Benning, Cao Guozhong, Bai Zhonghang, Zhang Peng; Hebei University of Technology, Tianjin, P.R. China.

Mikael Nybacka, Tobias Larsson, Åsa Ericson; Luleå University of Technology, Sweden.

Ricardo Sosa; ITESM Campus Querétaro, Mexico.

John S. Gero; George Mason University, Fairfax, VA, USA and University of Technology, Sydney, Australia.

Darrell Mann; Systematic-Innovation, Cleavedon, United Kingdom

Greg Yezersky; Institute of Professional Innovators, Farmington Hills MI, USA.

Udo Kannengiesser; NICTA, Australia

Hong Liu, Xiyu Liu; Shandong Normal University, Jinan, China.

Alexander Hesmer, Karl. A. Hribernik, Jannicke Baalsrud Hauge, Klaus-Dieter Thoben; University of Bremen, Bremen, Germany.

Gaetano Cascini, Davide Russo; Università di Firenze, Florence, Italy.

Manuel Zini; DrWolf srl, Florence, Italy.

Nikolai Khomenko, Roland DeGuio, Thomas Eltzer, Denis Cavallucci, François Rousselot; INSA Strasbourg Graduate School of Science and Technology - LgéCo, Strasbourg Cedex, France.

Noel Leon, Jose Cueva, Cesar Villarreal, Sergio Hutron, German Campero, Humberto Aguayo; ITESM Campus Monterrey, Mexico.

Umberto Cugini, Marco Ugolotti; Politecnico di Milano, Milano, Italy.

Albert Albers, Thomas Maier; University of Karlsruhe, Germany.

Tomasz Arciszewski, Kenneth A. Shelton; George Mason University, Fairfax, VA, USA.

Seung-Hyun Yoo; University of Maryland, Maryland, USA, On leave from Ajou University, Suwon, Korea.

Eung-Jun Park, Jae-Sil Lee, Joon-Ho Song, Dae-Jin Oh, Woong-Rak Chung, Yeongtae Lee, and Dhaneshwar Mishra: Ajou University, Suwon, Korea.

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