
Editorial

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Biographical notes: Chris McMahon is a Professor of Engineering Design at the University of Bath and the Director of the Innovative Design and Manufacturing Research Centre. He teaches and researches in engineering design and computer-aided design. He is interested in many aspects of design and computing, in particular how computer aids can assist design in the organisation and management of the information used throughout the product life cycle. He is also a Fellow of IMechE, he has published over 200 refereed articles in journals and conference proceedings. He is the President of the Design Society and the Co-Chair of IFIP Working Group 5.1.

Deba Dutta is the Dean of the Graduate College at the University of Illinois, Urbana Champaign. He is also the Gutgsell Endowed Professor of Mechanical Science and Engineering. His current research emphasis is on global product development and lifecycle management. He is a Fellow of ASME and has published over 150 refereed articles in journals and conference proceedings and serves on four editorial boards. He is the former Chair of two ACM Solid Modeling Symposia (1999 and 2001) and of ASME Design Automation Conference (1997) and the co-founder of the International PLM Conference series.

The International Conference on Product Lifecycle Management (PLM) is a leading international forum for the presentation of developments in PLM. Following the successful conferences held in Bangalore (2003), Lyon (2005), Bangalore (2006), Bergamo/Milano (2007) and Seoul (2008), the PLM09 Conference was held in July 2009 at the University of Bath in the UK. This issue of the journal contains selected papers from that conference.

The papers presented at the conference reflected the diversity of topics in PLM today. Technical and engineering issues such as standards, interoperability, PLM architectures, product development and life cycle engineering have been important in the domain for

many years and had a large presence at the conference. As will be seen later, lightweight approaches were a particular feature of the programme at the conference. There was also a significant emphasis on management issues, including the management of change, of knowledge, of asset information and of supply chains. And of course there was also a strong emphasis on sustainability and on the move to product-service, both areas in which PLM, with its focus on through-life issues, is very important.

Issues of sustainability and the life cycle are the subject of the first paper in the issue, by Takayuki Nakada and Hiroyuki Hiraoka of Chuo University. They describe the difficulty in managing products in the use phase of their life cycle due to unpredictable consumer-behaviour patterns. Their paper proposes a product lifecycle management system using network agents and RFID tags attached to individual parts, to support consumers and promote part reuse in this use phase. In particular, the approach uses a network agent to control the environmental load of the product in the consumer use phase and to predict a part failure.

Lian Ding et al. from the University of Bath are also concerned with the whole life of products, and with mechanisms to support sharing of information from various stages of the product life cycle, but in their paper they describe an approach aimed at small and medium-sized enterprises (SMEs) using lightweight representations. They argue that many of the important benefits of PLM may be achieved by SMEs using the combination of a full-featured CAD system with lightweight visualisation formats and a system of overlaid annotations that may be applied to a model regardless of its format. By referring the overlaid annotations to an underlying model in a consistent way then inferences may be made from the relationships between information.

The paper by Martin Eigner et al. from the University of Kaiserslautern also involves lightweight representations aimed at incorporating easily accessible product visualisation into decision processes at a minimum of implementation costs. They describe the use of the JT format in an engineering change management (ECM) process implementation, using the workflow component of a minimum cost product data management (PDM) system. The JT format allows straightforward access to three-dimensional product data to assist in decision-making in information-oriented decision processes.

Support for the design process, especially in SMEs, was also the subject of the paper by Michele Germani, Maura Mengoni and Margherita Peruzzini of the Università Politecnica delle Marche, which won for the authors the Best-Paper Award at the conference. The paper, which focuses on collaborative processes, presents a structured method for defining a co-design approach and platform for SMEs. Metrics based on collaborative process characteristics are used to assess the functional performance of available tools, with benchmarking based on different levels of collaboration recognised in typical product development processes in SMEs. The paper is notable for using quality function deployment (QFD) techniques to manage the correlation between process metrics, software functionalities and specific collaboration needs.

The improvement of communication between design groups is also the focus of the paper by Keyvan Rahmani and Vincent Thomson of McGill University. Their paper presents a systematic method for management of interfaces in multidisciplinary product development through use of an object-oriented model. The use of object models allows a formalised way of integrating interfaces into product data management software. The approach is presented through the use of the unified modelling language (UML), especially presenting an approach to the modelling of interface data in order to define connectivity between systems with different data models.

It is important for the efficiency and effectiveness of PLM tools that they are based on firm foundations in information science. In this regard, Aristeidis Matsokis and Dimitris Kiritsis, of the Ecole Polytechnique Federal de Lausanne, demonstrate some of the new capabilities PLM models have by using ontologies. In their paper, they describe the use of an ontological approach to the development of a product data and knowledge management semantic object model for PLM. The development and extension of ontology models using description logics (DLs) and semantics makes the models machine-understandable, as demonstrated through the use of the Semantic web rule language and the Jess rule engine to extract knowledge.

As a concluding remark it is perhaps worth noting again the emphasis in the papers in this issue on support for SMEs. PLM has traditionally been seen as a rather ‘heavyweight’ approach that is mainly of value to large companies. The emphasis among a number of authors of the need to support SMEs, and the possibility of doing so with lightweight tools, offers the prospect of a much expanded application of PLM technologies in the future.

The guest editors are very grateful to all those who have made this special issue possible – to the authors for their contributions and for responding promptly to all requests; to the reviewers for their careful consideration of each paper, and to Abdelaziz Bouras, editor of the journal, for his welcome advice and support during the process of editing the issue.