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## Editorial

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**Biographical notes:** André Liem has been an Associate Professor at the Department of Product Design, Norwegian University of Science and Technology, Norway, since 2005. A graduate of TU Delft, he has previously taught Industrial Design for ten years in tertiary education institutions in Singapore. His research interests include design process and methodology, design education, product planning and goal finding and transportation design. In conjunction with his academic career, he has also undertaken design consultancy projects in the Netherlands, UK, USA and Singapore. He also holds an advisory position within DesignInsight, an industrial design consultancy in Singapore.

Professor Casper Boks holds a Master's in Applied Econometrics (1995) from Erasmus University Rotterdam and a PhD in Industrial Design Engineering (2002) from Delft University of Technology, the Netherlands, where he was an Assistant Professor at the Design for Sustainability Program of the Industrial Design Engineering School until 2006. In 2004, he was a Visiting Professor at the IIIIE at Lund University, Sweden. He is currently a Professor of Product

Design at the Norwegian University of Science and Technology. His research interests include sustainable product innovation and education and focuses on the organisational and managerial aspects of the successful implementation of sustainable product design in the electronics industry.

Dr. Lance Green teaches in the Industrial Design programme of the University of New South Wales, Australia, specialising in Product Design, Plastics Manufacture and Design for Production. He has occupied senior positions in the Australian industry and consults widely to the plastics, packaging and healthcare industries. Dr. Green is a Chartered Engineer and holds a Bachelor's degree in Engineering from the NSW Institute of Technology, a Master's in Industrial Design from UTS, a Master's in Higher Education from UNSW and a PhD from the University of Canberra.

Dr. Martina M. Keitsch is a Senior Advisor at the Oslo School of Architecture and Design, Norway. She has a Doctorate in Philosophy in the field of Environmental Ethics and Aesthetics. She has worked for over ten years in the design area, mainly with eco-industrial design, CSR, design theory, environmental ethics, systems methodology, theory of science and aesthetics. She is also the Co-Editor of *Progress in Industrial Ecology*, the *Journal of Sustainable Development* and the *Journal of Cleaner Production*. She has experiences in the project management of interdisciplinary projects and has been appointed as a Project Evaluator in the 6th and 7th EU Framework programmes.

Dr. Ching Chiuan Yen is an Assistant Professor in the Department of Architecture and Course Director of the Industrial Design programme of the National University of Singapore. He has been on the review and jury boards of numerous design conferences and competitions. His research interests lie in research methodologies for design and he champions the 'pluralistic dimension' of design study for design research. His ability to supervise is highly regarded and has received more than 20 international design awards in the past four years, including: Braunprize (2007), red dot: luminary award 2005 and iF concept award (2007 and 2008).

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*Industrial Design* is not simply about learning skills or making beautiful objects. It is defined as a professional service that nurtures the need to solve problems and develop innovative ideas that impact and contribute to the global community, through creating and developing concepts and specifications that optimise the function, value, and appearance of products and systems for the mutual benefit of both user and manufacturer. The output of a design activity is the mass-produced products of our everyday environment, from sinks and furniture to computers.

Generally, industrial designers are perceived as a cross between mechanical engineers and artists. They study both function and form, and the connection between product and the user. They do not design the gears or motors that make machines move, or the circuits that control the movement. Usually, industrial designers work in partnership with engineers and marketers to identify and fulfil needs and wants of various stakeholders; consumers, users, producers, *etc.*

Although the process of design may be considered artistically 'creative', many analytical processes also take place. Industrial designers often use various design methodologies in their creative process. Some of the processes that are commonly used are user research, sketching, comparative product research, model making, prototyping and testing.

The role of the industrial designer has changed with time from being more operative to strategic. This change occurred because most nations, who are seriously occupied with design, shifted their attention towards building a knowledge-based economy.

When the professional practice of industrial design first started to take shape, the designer was a creator whose work was likened to that of an artist. In the 60s, designers began to work in close cooperation with industry, and they became members of teams together with engineers, and representatives of marketing and management. In the 70s, ergonomics was widely considered, and in the 80s, the issue of design management became popular. In the 90s, brand building and strategic design became focal areas, whereas in the new millennium design has been seen as a means of 'responsible' innovation, strongly considering environmental aspects.

Faced with future challenges, industry is supposed to show structural reform as well as the ability to produce client- and user-oriented solutions, along with innovations aesthetically distinct from those of competitors, in a cost-efficient way. This is not an easy task, but industrial design is a fundamental asset in facing the competition, because competence in design is what bridges the gap between the user's perspective and technology-oriented product design. To meet these challenges, future designers need to increasingly aim for new and innovative sourcing strategies to complement their core activities. Competitive advantage for these service providers will only be created through the development of innovative products, services and systems. Therefore, designers are required to become more and more proactive in a design and development environment, which is highly competitive, fluid and collaborative, by engaging into the right alliances to survive and succeed in a global market where end-users are becoming more diverse and demanding.

This special issue of *International Journal of Product Development*, 'Transformations in industrial design: emerging trends, approaches and challenges' aims to present a wide spectrum of topics within the overarching 'umbrella' of industrial design. The issue, which is represented by nine quality papers, focuses on the promotion and application of new concepts and technologies; approaches and merging trends leading to innovative theories; design management, processes and methods; strategic design and branding; sustainable product design; and design for user experience.

The articles 'A computer-aided design tool to facilitate the realisation of cooling systems' and 'The implementation of design for Six Sigma: a development experience' discusses design methodological within a technological context. The first article presents the framework and an internet-enabled computer-aided design tool to assist the designers in the cooling system development. The second article demonstrates how Design for Six Sigma (DFSS) is utilised to design and engineer a new product based on a five-step process, Define, Measure, Analyse, Design, and Verify (DMADV).

From a collaborative-educational design perspective, the article 'The integration of industrial design capability within UK SMEs: the challenges, opportunities and benefits' presents a case for supporting the business of Small- to Medium-sized Enterprises (SMEs) through the building of partnerships between universities and the companies

which fosters and supports the introduction of industrial design processes into the SMEs. 'Providing students with a head start through mentorship and systems thinking within a vertical design studio environment' discusses the potential of systems design through a three-stage approach to be implemented in a vertical studio teaching concept.

Considering biological, emotional and cultural aspects of design, 'Children and aesthetics: exploring toddlers' aesthetic experience of everyday products' explores how young children experience and perceive the world from an aesthetic point of view. Obtained knowledge can inspire the designer to make better products for young children. The article 'Functions in nature' elaborates how functions in nature works, helping the designer to understand and conceiving new concepts as well as principles which may be developed later into metaphors.

Design is inherently linked to companies' commercial (marketing) interests. Still, to acknowledge such interests in the design process is sometimes questioned by designers. 'Not always a victim! On seeing users as active consumers' discusses this ambiguous treatment of commercial interests in design and elaborates how seeing users as active consumers can provide a fruitful path for incorporating commercial interests in the design process. In doing so, it explicates similarities in design and marketing ideals and point to designers' opportunities to influence what is perceived as commercially legitimate. Complementary to the direction of the above article, 'Feature creep and usability in consumer electronic product design' suggests that users see benefits in microelectronics, such as useful functionality, improvements in size, weight and general versatility, but also found the increased complexity and reduced reliability in electronic products as detrimental to usability. Non-electronic products were identified as largely simpler and more intuitive and therefore more usable.

The article 'Transitions in sustainable product design research' proposes that a maturing process, from a group of opportunistic eco-pathfinders trying to optimise products' recyclability, into acknowledged scientific research regarding technology transfer and commercialisation, took place through a number of transitions. This is illustrated by characteristic aspects of each transition, which together provide a historic account of how academic research into sustainable product innovation has matured. In conclusion, a number of possible future transitions or extensions of the research area are discussed.

We would like to take this opportunity to express our sincere appreciation to the authors of those quality papers as well as the *International Journal of Product Development* for inviting us to be the Guest Editors of this issue.