

# **Design Education – Growing our Future**

Editors: Erik Bohemia, William Ion, Ahmed Kovacevic, John Lawlor,  
Mark McGrath, Chris McMahon, Brian Parkinson, Ger Reilly,  
Michael Ring, Robert Simpson and David Tormey



# Dedication

We dedicate the E&PDE13 proceedings to  
Professor Chris McMahon and Professor William Ion.

Chris and Bill have played important role since joining PDE  
- Product Design Education conference of IED and EDE  
– Engineering Design education conference of SEED (now DESIG)  
into the event which was held in Glasgow 1999 and which since 2000  
is known as E&PDE. Over the years, both Bill and Chris have provided  
crucial leadership and helped in developing the conference from the  
meeting of relatively small number of academics in the truly  
international and multidisciplinary conference that covers broad  
range of subjects in engineering and product design education.

We will miss subtle but focused scientific and organizational steering  
of the conference by both of them. However, the legacy of their  
contribution will be preserved through continuation of exploring issues  
related to design education by conducting future E&PDE conferences.

On behalf of the Design Education Special Interest Group (DESIG) of  
the Design Society, and the Institution of Engineering Designers (IED)

Judith Grace, Brian Parkinson, Erik Bohemia and Ahmed Kovacevic



PROCEEDINGS OF THE 15TH INTERNATIONAL CONFERENCE  
ON ENGINEERING AND PRODUCT DESIGN EDUCATION, DUBLIN  
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## **Design Education – Growing our Future**

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## Foreword

# DESIGN EDUCATION – GROWING OUR FUTURE

The 15th International Conference on Engineering and Design Education (E&PDE) was held at Dublin Institute of Technology (DIT) on 5th and 6th September 2013.

The conference was hosted by the School of Manufacturing and Design Engineering in the College of Engineering and Built Environment, Bolton Street, Dublin (Ireland) in close collaboration with the Design Education Special Interest Group (DESIG) of the Design Society, and the Institution of Engineering Designers (IED).

The E&PDE conference was initiated in 1999 in the United Kingdom and was consolidated as an international conference in 2004; alternately taking place in the UK and abroad. Its objective is to facilitate the bringing together of people from within education and industry who are interested in sharing expertise on the implementation and analysis of contemporary and developing methodologies in engineering and design education. It provides educators and researchers from product development, engineering and industrial design, together with industry and government representatives, with a platform for discussion on topical educational issues in design education and its future direction.

### Conference theme

As the host institution for E&PDE 2013 we gave much consideration to the main theme of the conference and decided it would be appropriate to focus on the importance of design education in the context of the current economic situation in Ireland and in Europe. We developed the theme of: *Design Education - Growing Our Future* in the knowledge that in recent years the Irish government has placed significant emphasis on the development of Ireland as a knowledge economy. As educators, we are convinced that design and creativity in engineering and product design education will be the key driver in this strategic goal. The European Commission clearly sees the power and potential of design as a driver for growth and competitiveness and has set up the *European Design Innovation Initiative* (EDII) in 2011 to:

- raise the awareness of design as a driver of innovation in Europe
- enhance its role as a key discipline to bring ideas to market

transforming them into user-friendly and appealing products, processes or services by enterprises and public services in the EU.

The European Commission will promote wider use of industrial design as well as other non-technological innovations for developing high value products, increasing productivity and improving resource efficiency. Design and Innovation enables a virtuous cycle of competitiveness which improves productivity, boosts demand, reduces cost, provides increased revenue and a ready source of reinvestment.

The future is in the hands of the students we educate. The educational experiences of these aspiring professionals in our universities and institutions will largely define their subsequent efforts to create a new and vibrant vision for the Europe and the World. If we are to commence on an upward trajectory there is no better time for a wide ranging discussion on how engineering design education can lead to the development of a brighter, stronger and more stable future. Innovative design, initiated and nurtured within the education process, can contribute greatly to economic recovery and growth. This central theme of Design Education-Growing our Future provides the thinking behind the principle objectives of the conference, namely:

- Provide a broad forum for designers of all disciplines and vocations
- Explore how design education may best promote and encourage sustainable growth
- Seek innovative solutions to a better world through 'best practices' in engineering design
- Encourage innovation through industrial collaboration
- Embed the methodology of design in our curricula
- Discuss how design education may best be used to influence economic recovery and growth
- Explore the broadening and expanding of student experience through international exchange
- Discuss the role designers may play in influencing our economic and political future

### **Conference programme**

Thirty countries will be represented at the Conference this year. 271 contributions were received which explored the full depth and diversity of the conference theme. After reviewing abstracts, full paper submissions and subsequent revisions 139 contributions were selected to be included in the proceedings, of which 23 will be poster presentations at the conference. The accepted papers allowed the committee to build a conference programme with a number of major streams including; Design Methodology, Sustainability, Creativity, Design Education and Business, Design Education in Industry, Best Practice in Design Education. As such, the programme covers the issues and meets the needs that arose when the conference theme was defined.

Our keynote speaker Professor Dr Larry Leifer, Stanford University is a Professor of Mechanical Engineering Design and founding Director of the Center for Design Research (CDR) at Stanford University. Once a design student himself at Stanford University, he has instigated many design initiatives at Stanford including the Smart-Product Design Program, Stanford-VA Rehabilitation Engineering Center, Stanford Learning Laboratory, and most recently the Center for Design Research (CDR).

### **Conference host**

E&PDE 2013 is hosted by the School of Manufacturing & Design Engineering in Dublin Institute of Technology (DIT). The School has a strong and vibrant design ethos and offers Honours Degree Programmes in Product Design, Manufacturing & Design Engineering and Medical Device Innovation.

DIT is currently based on six campus sites in the city centre but within five years will relocate all its activities to a new education and research campus at Grangegorman. The new campus will be a unique innovation hub for the Dublin region, with education, research and health facilities co-located with industry, business incubation and community enterprise, and with European centres for international universities. It is expected DIT will have the first student cohort in the new campus in September 2014.

In preparation for the new campus, the Institute was reorganised in 2009, aligning programme provision into four new Colleges; Arts & Tourism, Business, Engineering & Built Environment and Sciences & Health.

Hosting E&PDE 2013 will provide a platform to showcase the design programmes in the school and to provide the opportunity for DIT to become a more relevant and visible stakeholder to the educational, academic and industrial domains both nationally and internationally.

### **Acknowledgements**

This 2013 edition of the E&PDE conference was made possible through the commitment and efforts of many people. I would like to thank Chris McMahon, Ahmed Kovacevic, William Ion, Judith Grace, Brian Parkinson and Erik Bohemia for their excellent leadership in organizing this conference and their dedication to the common cause: guaranteeing a conference series of growing quality and impact. I am grateful for having had the opportunity to work with Alison Parker from the Institution of Engineering Designers, the work of organising the conference would have been much more onerous without the practical support, hands-on experience and in-depth knowledge which Alison provided. To Nadine a big thank you for your administrative work particularly the onerous task of proof reading the author contributions.

I would sincerely like to thank all the members of the International Academic Review Board. They succeeded in the timely review of a vast number of papers, while retaining a true professional and academic stance on the intrinsic value and qualities of all papers submitted.

I am really indebted to Azeeta Seery and Donna Brogan from the Irish Tourist Board (Fáilte Ireland) who were a great help in printing conference flyers, funding our participation in the Antwerp Conference and providing conference bags. The Director & Dean of the College of Engineering & Built Environment was generous in providing funding to refurbish the conference area while Tom Corrigan, Dean of Craft Education & Training made a significant contribution by opening doors of opportunity to progress the necessary infrastructural improvements.

Naturally, I would like to express my gratitude to all colleagues from the School of Manufacturing & Design Engineering – especially Ger Reilly, Mark McGrath, William Bergin, Robert Simpson and David Tormey from IT Sligo.

On behalf of the conference programme committee;

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William Ion	Design Education Special Interest Group (DESIG)
Ahmed Kovacevic	Design Education Special Interest Group (DESIG)
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The Design Society is an international non-governmental, non-profit making organisation whose members share a common interest in design. It strives to contribute to a broad and established understanding of all aspects of design, and to promote the use of results and knowledge for the good of humanity. The Design Society was founded in 2000, taking on the previous activities and responsibilities of the Workshop Design Konstruktion (WDK) Society, especially the organisation of the International Conference on Engineering Design (ICED) series of conferences, which had been running since 1981. Since 2000 the Society has organised ICED conferences in Stockholm, Melbourne, Paris, Stanford and Copenhagen, with the 2013 event planned for Seoul. It has also expanded with members from forty countries and with further very popular events such as the Engineering and Product Design Education conferences and the International Conference on Design Creativity among many other activities. The Society is very active in publishing papers and proceedings on design topics, and it has a developing portfolio of other design resources available to members including a repository of theses and collaborative agreements with a number of design research journals. The Design Society concentrates on activities that transcend national boundaries, and, where possible, will seek to complement national activities. The objects of the Society are to promote the development and promulgation of understanding of all aspects of design across all disciplines by

- creating and evolving a formal body of knowledge about design;
- actively supporting and improving design research, practice, management and education;
- promoting co-operation between those in research, practice, management and education;
- promoting publications and their dissemination;
- organising international and national conferences and workshops;
- establishing Special Interest Groups and other specialist activities;
- co-operating with other bodies with complementary areas of interest.

The Design Society is a charitable body, registered in Scotland, number SC 031694. Registered Company Number: SC401016

The Design Society is open to new members. [www.designsociety.org](http://www.designsociety.org)



Established in 1945, Incorporated by Royal Charter in 2012, the Institution of Engineering Designers is the only organisation in the UK to represent those working in the many fields of engineering and product design.

Our members enjoy a range of benefits, including advice on professional codes of conduct, a job board, regular newsletters to keep members up to date with relevant developments and events and a helpful legal advice line. We host regular events which offer our members the chance to network with other professionals and members receive the Institution's bi monthly journal – Engineering Designer.

We are committed to encouraging CPD for all our members, and support ongoing training and skills development.

We are licensed by the Engineering Council to assess candidates wishing to join the EC's Register of Professional Engineers and Technicians and we also accredit academic and training courses, both for membership of the Institution and registration with the EC. Those members who achieve the appropriate academic and competence standards receive Chartered Engineer, Incorporated Engineer or Engineering Technician status.

We are also a licensed body of the Society for the Environment and are able to register suitably qualified and competent members as Chartered Environmentalists (CEnv).

We welcome members from any organisation that has a design function and employs design engineers and we have many academic teaching staff in membership. The first step to becoming a member is to register as an Affiliate, you can find out more about becoming a member of the IED at <http://www.ied.org.uk>

