

Towards a New Innovation Landscape

Editors: Erik Bohemia, Ahmed Kovacevic, Lyndon Buck, Ross Brisco, Dorothy Evans, Hilary Grierson, William Ion and Robert Ian Whitfield

PROCEEDINGS OF THE 21ST INTERNATIONAL CONFERENCE ON
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Towards a New Innovation Landscape

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E&PDE 2019 Foreword

Towards a New Innovation Landscape

The 21st International Conference on Engineering and Product Design Education (E&PDE) was held at the University of Strathclyde Technology and Innovation Centre, Glasgow, UK on the 11th-13th of September 2019.

The conference was hosted by the Department of Design, Manufacturing and Engineering Management (DMEM) and celebrated 20 years of E&PDE which began in Glasgow, and 30 years of the department. The conference was jointly organised by DMEM, 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. Its objective is to facilitate conversations between 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 their future directions.

Conference Theme

In 2019, the conference reflected on the changes in engineering and design education, and transition towards an innovation landscape. Across sectors, there has been a trend of greater openness and collaboration. The benefits of which enable greater levels of agility and competitiveness, and has been driven by technology and its use in collaborative teams, and globalisation of engineering and design work.

The conference theme '**Towards a New Innovation Landscape**' was used to explore how educators focus on tackling changing engineering and design practices in the coming years in line with the demands of students and industry. This sentiment came from a need to share knowledge and experiences to research trends in engineering and design education and discuss how barriers may be overcome.

The conference aimed to:

- Provide a platform to enable a broad variety of participants to discuss the changing innovation landscape;
- Seek solutions and explore new horizons to achieve a new innovation landscape; and,
- Relate the larger discussion on innovation towards the many levels of education.

These aims were addressed through the following conference topics related to engineering and product design education:

- Innovation in engineering and product design practice;

- The changing innovation landscape in engineering and product design education;
- Industrial involvement in engineering and product design education;
- Creativity in engineering and product design education;
- Ethics and social issues in engineering and product design education;
- Assessment methods in engineering and product design education;
- New engineering and product design paradigms;
- Cultural practice in engineering and product design education; and,
- Engineering and product design for the general public.

During the conference, 26 countries were represented. 153 contributions were received which explored the various subthemes. Amongst them were 18 student contributions. After reviewing abstracts, full paper submissions and subsequent revisions 115 contributions were selected to be included in the proceedings, ten of which were visual presentations at the conference.

Conference Host

The energetic and innovative Department of Design, Manufacturing and Engineering Management was founded in 1989 and is headed by Professor Alex Duffy. Engineers are problem solvers. They must combine creative, practical and technical skills in an innovative manner in order to find solutions to modern challenges.

The internationally recognised and award-winning department delivers broad-based education and research aligned to the needs of innovative global industry and is the only department in the UK to combine end-to-end multidisciplinary expertise from creative design, through engineering design, manufacture and management of the entire system.

Relevance, creativity, quality, and multidisciplinary team working are key themes in the way the department operates. The department is concerned with 'what to make' and 'how to make it', and its research interests involve product and process technologies, design methodologies, advanced manufacturing and organisational modelling.

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Thanks to all the members of the international academic review board who contributed to ensure the quality of the papers and presentations.

Robert Ian Whitfield

Local Organising Committee Chair



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, Copenhagen, Seoul and Milan. The upcoming 2017 conference will be hosted in Vancouver.

The Society has members from over forty countries and it organises 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

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Established in 1945, Incorporated by Royal Charter in 2012, the Institution of Engineering Designers is the premier 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 mentoring and guidance to professional registration, exclusive access to our job board and newsletters to keep members up to date with relevant developments and events. 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 offer a wide range of professional registrations: our own register for professional product designers includes the exclusive Chartered Technological Product Designer (CTPD) which is on a par with all other Chartered registrations and exists to provide professional recognition and standing to those suitably qualified and competent persons working in Product Design, with the sister grade of Registered Product Designer (RProdDes) for those not working at Chartered level.

We are licensed by the Engineering Council to assess candidates wishing to join the register of Professional Engineers and Technicians and we also accredit academic and training courses, for registration with either the Institution or with the Engineering Council. 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. To find out more about becoming a member of the IED and a professional registered designer go to <http://www.ied.org.uk>