

Preface

The first mention of design appears in the Code of Hammurabi around 1750 BC. This was an enunciation of the moral code of that time and the design part covered building design. The next mention appears to be around 50 BC in Vitruvius' *De architectura: Ten Books of Architecture* that outlined design knowledge in the form of rules, both prescriptive and performance. Vitruvius covered both machine design and building design. In 1452 Leon Battista Alberti published *De re aedificatoria: Ten Books of Architecture* that introduced the notion of design process as an intellectual activity. Designing as a human intellectual activity has its roots in human needs expressed by changing the natural world in order to address those needs and then by changing the world that includes designed artifacts. Since designing results in both economic and social benefit it is therefore surprising how little the design world has been studied compared to the physical world we inhabit.

Design research, largely started only 50 years ago, has started to provide some insight into both design processes and designed objects.

Design thinking, the label given to the unique act of designing, has become a paradigmatic view that has transcended the discipline of design and is now widely used in business and elsewhere. As a consequence, there is an increasing interest in design research and government agencies are gradually increasing funding for design research, and increasing numbers of engineering and computer science schools are revising their curricula to emphasize design. This is because of the realization that design is part of the wealth creation of a nation and needs to be better understood and taught. The continuing globalization of industry and trade has required nations to re-examine where their core contributions lie, if not, in production efficiency. Design is a precursor to manufacturing for physical objects and is the precursor to implementation for virtual objects. At the same time, the need for sustainable development is requiring the design of new products and processes, and feeding a movement toward design innovations and inventions.

This conference series aims at providing a bridge between the fields of design computing and design cognition. The confluence of these two fields continues to provide the foundation for further advances in each of them and to an increased understanding of this field whose influence continues to spread.

The papers in this volume are from the *Fifth International Conference on Design Computing and Cognition (DCC'12)* held at Texas A&M University, College Station, Texas, USA. They represent the state of the art of research and

development in design computing and design cognition. They are of particular interest to researchers, developers, and users of advanced computation in design and those who need to gain a better understanding of designing.

In these proceedings the papers are grouped under the following nine headings, describing both advances in theory and application and demonstrating the depth and breadth of design computing and design cognition:

- Design by Analogy
- Design Cognition—1
- Design Creativity
- Design Cognition—2
- Design Generation
- Shape and Space
- Design Knowledge
- Design Function
- Design Processes

There were 91 full paper submissions to the conference of which 34 were accepted and presented and appear in these proceedings. Each paper was extensively reviewed by at least three reviewers drawn from the international panel of 98 active reviewers listed on the next pages. The reviewers' recommendations were then assessed before the final decision on each paper was taken. Thanks go to them, for the quality of these papers depends on their efforts.

Mercedes Paulini and Pinelopi Kyriazi assisted in bringing the papers in this volume into a uniform whole, special thanks go to them.

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