Marine Agogué,
Sophie Hooge,
Frédéric Arnoux,
Ingi Brown

An Introduction to Innovative Design

Elements and Applications of C-K theory

Foreword A. Hatchuel and B. Weil

Afterwords of C. Trémoureux and G. Amar

MINES ParisTech

Sciences de la Conception

Presses des Mines

Marine Agogué, Sophie Hooge, Frédéric Arnoux, Ingi Brown, *An Introduction to Innovative Design. Elements and Applications of C-K Theory*, Paris: Presses des Mines, collection Sciences de la Conception, 2014.

This book is the augmented and revised edition of: *Introduction à la conception innovante. Éléments théoriques et pratiques de la théorie C-K*. Paris: Presses des Mines, collection Économie et gestion, 2013.

60, boulevard Saint-Michel - 75272 Paris Cedex 06 - France

presses@mines-paristech.fr
www.pressesdesmines.com

ISBN: 978-2-35671-069-7

Dépôt légal 2014
Achevé d'imprimer en 2014 (Paris)

An Introduction to Innovative Design

An Introduction to Innovative Design

Elements and Applications of C-K Theory

Marine Agogué, Sophie Hooge,
Frédéric Arnoux, Ingi Brown

Contents

Foreword

This book offers an introduction to C-K theory and some of its main practical lessons for the innovative design of products and services for organizations looking to enhance on their existing innovation capabilities. C-K theory has been the subject of numerous publications and is taught in various academic institutions; moreover its value in industrial contexts is well-established. Still, there was no available overview of its principles and current practices. This book specifically aims to fill this gap and who could better do it than post-doc researchers who extended the theory and developed applications in several contexts?

C-K theory was conceptualized in the Engineering Design and Management Curriculum, which was organized within the Center for Management Science[1] at Mines ParisTech[2]. Created in 1994, this curriculum provided engineering students with courses on modern design theories and methods. The purpose of this course was to better manage innovative projects or to re-align the R&D departments through collaborative research with industrial partners. Soon, the main design approaches and traditions were studied and questioned. Clearly, there was a lack of an integrated approach articulating both research and creativity, within a design framework. Indeed, it seemed difficult to model within a unique framework these different types of reasoning. However, such integration was also strongly advocated by firms coping with global competition through innovation.

These challenges were the point of inception of C-K theory. In 1996, Armand Hatchuel sketched its main principles. It was further consolidated by Benoit Weil, Pascal Le Masson, Akin Kazakçi, Blanche Segrestin from Mines Paristech, along with contributions from Yoram Reich, Offer Shai, Jean-François Boujut, Chris McMahon and Ade Mabogunje, from other universities, who played a major role in bringing design theory to its present

1 Translation of: Centre de Gestion Scientifique

2 Former, Ecole des Mines of Paris.

state and revitalizing a design theory community of research. In 2008, the Design Society asked Armand Hatchuel and Yoram Reich to create the Special Interest Group on Design Theory, now an active community in the field. Since 2009, large companies[3] have supported the creation of the Design Theory and Methods for Innovation chair at Mines ParisTech. It aims to further develop the research on C-K theory and other advances in design theory.

In some ways, C-K theory is paradoxical: it requires some technical background for those who want to get into its mathematical foundations, and yet from a practical perspective, such a detour isn't necessary to handle it, as it can be taught easily. There are strong reasons for the technical principles of C-K theory. Innovative design is a venture in the unknown which strange rationality could be captured only with unprecedented theoretical means. Surprising results and similarities were found between C-K theory and the Forcing technique of Paul Cohen in set theory: a fascinating tool which introduces the design of new sets at the heart of mathematics. It was also amazing to find striking similarities with the teachings of Johannes Itten and Paul Klee, great masters at the famous Bauhaus school. Such fascinating developments only unveil further the strong roots of the C-K theory. Fortunately, their study is not necessary to understand its principles and utility and they cannot be treated in this introduction.

On the other hand, the KCP method is the most widely known application of C-K theory. In more than thirty field experiments with our partners, the KCP method has shown and proved that it can be helpful to develop innovative projects and to generate disruptive concepts, while a company adopts a participatory and collaborative approach. It is worth mentioning that the KCP method builds on opposite principles than those of classic brainstorming, as the latter ignores research and tends to isolate creative groups when they should learn from others.

3 Dassault Systems, RATP, Renault, SNCF, Thales, ST-Microelectronics, and Vallourec.

Today, C-K theory is taught in engineering and management departments as well as in industrial design schools, fostering a common language between different design professions. Presenting all existing research about C-K theory would require a huge book. Partners and friends urged for a more accessible introduction. Our post-doc colleagues accepted the challenge. We express to them our warm gratitude and thank the Presses des Mines for publishing their text. We hope that readers will find this book a useful introduction of C-K theory for a wider audience.

Armand Hatchuel & Benoit Weil,
November 2013