

Preface

Knowledge Management is a wide, critical and strategic issue for all the companies, from the SMEs to the most complex organizations. The key of competitiveness is knowledge, because of the necessity of reactivity, flexibility, agility and innovation capacities. Knowledge is difficult to measure itself but what is visible, this is the way of improving products, technologies and enterprise organizations.

During the last four years, based on the experience of most of the best experts around the World, CIRP (The International Academy for Production Engineering) has decided to prepare and structure a Network of Excellence (NoE) proposal. The European Community accepted to found the VRL-KCiP (Virtual Research Laboratory – Knowledge Community in Production). As its name indicates it, the aim of this NoE was really to build a «Knowledge Community in Production». This was possible and realistic because the partners were representative of the most important universities in Europe and also because of strong partnerships with laboratories far from Europe (Japan, Australia, South Africa, USA, etc...).

Based on such powerful partnership, the main issue was to help European manufacturing industry to define and structure the strategic knowledge in order to face the strategic worldwide challenges.

Manufacturing in Europe currently has two essential aspects:

1. It has to be knowledge intensive given the European demands for high-tech products and services (e.g. electronics, medicines).
2. Given the relatively high labor costs compared to developing countries, manufacturing processes in Europe require high levels of expertise to realize innovation with a very high productivity.

Consequently in Europe, knowledge management (KM) and more widely Knowledge Life-cycle Management (KLCM) has become a major issue in academia and industry in the last 30 years, and it is recognized that the knowledge issue is important for a firm's manager as well as for an operational work.

This book helps to understand what is knowledge, why knowledge is one of the most strategic issues of the future manufacturing competitiveness, mainly based

on high level technologies and very innovative products and how to capitalize knowledge.

The collective experience that contributed to the elaboration of this book is unique because it is based on 34 contributions, very complementary, very representative of Knowledge Life-Cycle Management state and issues.

The knowledge map of the consortium has been built and is the base of an efficient collaboration within the NoE. The use of conceptual maps for competencies mapping and knowledge formalization in a Virtual Lab is also one of the contributions of the book. The fundamental knowledge and knowledge management concepts are described. In particular, the benefit of networks of expertise is highlighted and mainly knowledge sharing between multi-cultural communities. Ontology constitutes the base of knowledge formalization and mapping with respect to the different points of view. Knowledge integration mechanisms within the extended enterprise and more over the value chain, depending on context characteristics, are also described and illustrated, through methods, tools and experiences. Concrete experiences are described and commented, mainly for product, process and resource description and management along the life-cycle of mechanical systems. The role of knowledge life-cycle management and of documents in supporting a radical innovation project is also highlighted. Experience feedbacks are described about knowledge engineering approaches for design, manufacturing, and more generally for enterprise engineering. Several case studies are also provided in design and manufacturing fields, and also related to European level manufacturing knowledge sharing.

The specific context given by the VRL-KCiP NoE community involved in the realization of this book constitutes the main original value-added of this book. This means that this book is unique because it is based on a theoretical and practical experience of the authors who are for most of them members of the CIRP, the best referenced International Academy in Production Engineering.

We hope that you will enjoy this book and have a maximum benefit of it.

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