Chapter III
Educating Future Product Developers in Virtual Collaboration:
Five Years of the E-GPR Course

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ABSTRACT

Integrated product development is a set of complex activities and its level of difficulty is additionally increased by the ever-changing business environment, primarily by functional associating of geographically dispersed human resources. The key resources for development are product developers, but it is questionable whether the existing systems are appropriate for the education of such professionals. The chapter describes the European Global Product Realization (E-GPR) course program and reflections from the perspective of participating students and company representatives. To investigate the long-term effects of the course, a survey was conducted on all present and former students, and company representatives. Students, lecturers, instructors, and company representatives all have high praise for the course, believing the acquired knowledge and experience to be invaluable for future members of product development teams.

INTRODUCTION

The world is in the middle of the globalization process that, among other things, forces companies into acquisitions and mergers, strategic alliances of various governance structures, and forming of cross-functional teams. This leads to the merging of geographically, organizationally, and culturally heterogeneous human resources, including product developers (Žavbi & Tavčar, 2005).

Research has confirmed that development of innovative and competitive products and the use of information technologies will have a crucial influence on production in the future; only the sale of such products will enable long-term success in the global market (Hundal, 1995; Beitz & Helbig, 1997). The development of such products requires appropriately trained product developers who posses a broad spectrum of professional abilities (e.g. customer-oriented thinking, methods for systematic product development, application of information technology and communication tools, international team interaction). Another characteristic of product development is the high share of tacit knowledge, especially during the conceptualization phase.

Tacit knowledge is personal, hard to formalize (it is often not able to be formalized) and highly context specific, and as such difficult to transfer or share; for example, experience, intuitions, insights, and hunches are of tacit nature. Spender suggested that tacit knowledge could be understood best as knowledge that has not yet been abstracted from practice (Spender, 1996). Another kind of knowledge is explicit knowledge, which can be expressed, for example, in scientific equations, specifications, and blueprints. This type of knowledge can be transferred between individuals formally and systematically (Nonaka & Konno, 1998).

The constraints on engineering problem-solving today are increasingly not technical, but rather lie on the societal and human side of engineering practice (Grimson, 2002). As an example, Beitz and Helbig (1997) found large deficiencies in the fields of group interaction skills and ability to translate thoughts into action.

In addition, integrated product development requires cooperation of all stakeholders in the product life cycle during the early phases of development, especially during product design (e.g. Andreasen & Hein, 2000). More and more of these stakeholders are becoming organizationally, geographically, and culturally dispersed (the automotive industry is a typical example, e.g. May & Carter 2001; Segrestin, 2005).

Market and organizational changes, the integrated product development process, and available information and communication technologies (ICT), thus present a number of challenges for future product developers, including:

- Working with a global customer base
- Work in cross-functional teams
- Work in multidisciplinary teams
- Work in multinational teams
- Work in geographically dispersed teams
- Selection and application of appropriate ICTs
- Developing communication skills
- Learning to apply and further improve engineering knowledge and skills
- Transfer of tacit knowledge

However, it is questionable whether existing conventional systems for educating product developers are adequate for the highly changeable business environment which industry is facing, and to address the high knowledge tacitness of the product development process.

The chapter is structured as follows: First, "Nonconventional Educational Programs" presents three generations of educational programs. "E-GPR Course" then presents the course, its outline, projects, and the communication equipment used. The "Evolution of Task and Prototype Complexity" within the course is described next. "E-GPR Course and Creativity from the Partici-