Chapter 8.2
Vision, Trends, Gaps and a Broad Roadmap for Future Engineering

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ABSTRACT

New challenges result from the virtualization and distribution of product development activities. This article analyzes problems of cooperative engineering as well as methods and tools for the virtual engineering of extended products. Based on these analyses, a broad road map is proposed that articulates public- and civil-sector roles in coping with future engineering challenges. With a strategic horizon, the public-sector role targets the creation of a knowledge-intensive global business ecosystem conducive to balanced civil-sector innovation and sustainable growth. The civil-sector roles evolve tactics that implement proven cooperative and virtual engineering practices with a focus on value creation.

INTRODUCTION

This road map has been drafted on the basis of gaps identified at two expert workshops organized by the IMS (Intelligent Manufacturing Systems) NoE Special Interest Group 6 on Collaborative Engineering of Virtual Products. A first workshop took place during the IMS Forum held in May 2004 in Como, Italy. A second took place during the Design of Information Infrastructure Systems for Manufacturing (DIISM) Conference in Octo-
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Over the past decade, the international community has articulated desirable outcomes, including social and environmental ones. It has achieved consensus about global development goals, such as the Millennium Development Goals (Sachs et al., 2005), and environmental targets, such as the Kyoto Protocol. Reporting frames such as that of the Global Reporting Initiative help organizations to report on environmental and social outcomes in addition to profits or losses. In the new growth paradigm, the precompetitive and postcompetitive phases of the knowledge production process (Yoshikawa, 1994) can be addressed in a more mature manner. The paradigm recognizes the broad context within which products are developed and production capabilities develop. The paradigm also admits ICT’s enabling role in achieving development goals such as sustainability and inclusivity. Kimura (2005) lists critical issues for the result-focused management of knowledge in the pre- and postcompetitive phases of product life cycles. Virtual and cooperative engineering require institutions, solutions, and practices regarding knowledge and idea flows that cannot escape the public-civil context.

The emerging vision is to achieve, society-wide, an excellent level of holistic harmonization and fit of technologies, organizational concepts, and company and market culture. The “improvement of the state of manufacturing industries as a whole” envisioned in the IMS program (Yoshikawa, 1994) includes industries’ ability to respond
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