Chapter 47
Siemens' Customer Value Proposition for the Migration of Legacy Devices to Cyber-Physical Systems in Industrie 4.0

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ABSTRACT

Industry is transforming from Industrie 3.0, automation, to Industrie 4.0, digitalization. Siemens intends to be a key player in Industrie 4.0, whose customer value proposition will shape manufacturing industries at customers. This chapter analyzes Siemens' customer value proposition for cyber-physical systems as manufacturing equipment and products in terms of this technology's impact on value. The goal is to identify concrete value drivers which cyber-physical systems technology in Industrie 4.0 brings. The statements about these value drivers belong to Siemens and are compared to operations' management literature. Cyber-physical systems negotiating as peer-to-peer in Industrie 4.0 will bring a new level of complexity. Manufacturing complexity builds complex products. Cyber-physical systems peer-to-peer negotiation decides manufacturing scheduling and brings unprecedented levels of complexity and flexibility. Manufacturing complexity enables new business models, one of which is mass customization.

INTRODUCTION

Within the context of digital disruption, Industrie 4.0 is a vision for the digital disruption in manufacturing. This vision involves a proposal of technology to be developed, cyber-physical systems, as manufacturing equipment. This chapter explores, analyzes, induces, critiques Siemens' research and development strategy

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for cyber-physical systems as manufacturing equipment, as products, the manufacturing processes they perform, their capabilities and performance achievements, the smart factories they are part of and the new business models they enable. The ground of this research is the advent of Industrie 4.0 at Siemens, competitors and customers (manufacturing industries). The research methodology for the literature review follows the main topics proposed by the Industrie 4.0 project in the journal databases. For the empirical study, the research relies on a large body of evidence about Siemens that covers all publicly available communications about Siemens in annual reports, on the Siemens Web site, in Siemens Pictures of the Future, Siemens the Magazine, in press releases, other reports and Google searches by key words. As Siemens is researching and developing cyber-physical system technology, this chapter expounds how Siemens complements cyber-physical systems technology with its key value drivers.

BACKGROUND

The Industrie 4.0 proposal

Industrie 4.0 is the name for the fourth technology generation in manufacturing history, which is attributed to a technology revolution. Whereas Industrie 1.0 was driven by steam and lasted between 1700-1860, Industrie 2.0 means the assembly line and spanned 1870-1969, Industrie 3.0 involves automation technology during 1969-2020 and Industrie 4.0 refers to manufacturing based on cyber-physical systems to take place after 2020 (Kagermann et al, 2013; Toro, Barandiaran & Posada, 2015).

Industrie 4.0 is a German name, which originates in 2011 from a project in the high-tech strategy of the German government, Zukunftsprojekt Industrie 4.0 and an initiative which promoted the idea as an approach to strengthening the competitiveness of the German manufacturing industry. Industrie 4.0 is a pillar for Germany's competitiveness in manufacturing. The key promoters of the idea are the Industrie 4.0 Working Group and the Plattform Industrie 4.0, and describe the vision, the basic technologies the idea aims at, and selected scenarios (Kagermann et al, 2013; Plattform Industrie 4.0, 2014). Industrie 4.0 is part of the Horizon 2020 research project CREMA launched in 2015 (CREMA, 2015). Industrie 4.0 is a topic of debate for the European Parliament (2015), which calls it *digitalization for productivity and growth*. This involves debates at the European Parliament organized with Angela Merkel, Germany's Chancellor, among others. The European Parliament (2015) relates cyber-physical systems technology with value drivers such as increased flexibility, mass customization, speed, quality, productivity, new business models. Industrie 4.0 has trigerred investment in future manufacturing technology in countries around the world. According to an expert quoted by the European Parliament, investment in the Industrial Internet cyber-physical systems create is to shift from 20 billion USD in 2012 to 500 billion USD in 2020. The investment will shift value added from 23 billion USD to 1300 billion USD in 2020. Countries around the world follow. In USA, the National Network for Manufacturing Innovation is funded with 1 billion USD (European Parliament, 2015). In Asia/ Pacific, companies are expected to invest 60 billion USD in Industrie 4.0 by 2020 (European Parliament, 2015).

Industrie 4.0 is a collective term for technologies and concepts of value chain organization (Hermann, Pentek, & Otto, 2015). Within the modular structured smart factories of Industrie 4.0, cyber-physical systems monitor physical processes, create a virtual copy of the physical world and make decentralized decisions. Over the Internet of Things, cyber-physical systems communicate and cooperate with