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EDITORIAL

Cooperation on the Shopfloor: CSCW in Manufacturing and Industry Settings

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The research field of CSCW has always been interested in technology supporting collaborative practices in work contexts. Many of the early studies focused on manufacturing settings and examined the impact of computing technology on collaborative work and, conversely, how collaborative work and organizational circumstances shape IT development (Carstensen et al., 1995, 1999; Schmidt and Bannon, 1992; Schmidt and Simone, 1996).

Retrospectively, the industrial and manufacturing (r)evolutions can be divided into four classes. While the first industrial revolution involved the appropriation of water and steam power for mechanization, the second used electric power for mass production. Within the third industrial revolution, which introduced electronics and information technology (Schwab, 2017) to manufacturing process, the first CSCW issues emerged. How are IT and cooperation related? How is IT used for articulation work? How must IT be designed in work contexts to serve as coordination artifacts? What are the organizational causes to and effects of IT use?

The vision of interconnected small computers, which Weiser (1991) described in the early 90 s as Ubiquitous Computing, coupled with the penetration of the Internet as well as the miniaturization of computers and electronic assemblies is now commonly known as the Internet of Things (IoT). When looking at the interconnected mix of physical hardware and digital software spheres within increasingly sophisticated value chains and digital transformations of industrial work settings (Industrial Internet of Things), the developments are commonly described in Europe as “the fourth industrial revolution (Industry 4.0)”.

The first three revolutions had far-reaching effects on cooperation relationships, division of labor, coordination processes, and power relations within companies. However, we see that the current developments within Industry 4.0 will have, again, far-reaching effects not only on the actual manufacturing and applied production goods, but also on the internal organization, and external cooperation between companies and the human workers. Developments such as autonomous, but connected and ubiquitous cyber-physical systems (CPS),

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and the connection of data-, technology- and process-driven manufacturing shift cooperation processes as well as human-technology interaction.

While the early vision of Industry 4.0 was oriented toward technocratic and fully automated concepts and forms of work design, the practical design of the first Industry 4.0 concepts showed a completely opposite picture. Thus, it can be seen that human labor and the employees themselves still play the central role in manufacturing settings and that Industry 4.0 is nothing more than a new form of technology-induced work design, which enables a paradigm shift in human-technology interaction (Brödner, 1986; Ludwig et al., 2018; Wurhofer et al., 2018). With this insight, established CSCW concepts and approaches are now becoming more relevant than ever.

Even though modern technology and machines will indeed bring a great deal of automatization to industry and therefore offer new possibilities and functionalities that have come along with (and will continue to come along with) the interest in the IoT, they will also support the complexity of the cooperative practices and work arrangements associated with the ecologies of technology they encompass (Ludwig et al., 2014, 2017a; Stein et al., 2016). This will be a result of: (a) increasingly complex devices; (b) an increasing number of less obvious connections and dependencies between IoT devices; (c) more and more changes that ensembles of IoT technologies will need to undergo to fully integrate the most recent technological options and advances; and (d) a new interweaving of the 'digital' and the 'physical' world (Ludwig et al., 2017b).

In line with the mindset that humans are at the center of Industry 4.0 efforts, this special issue contributes, through case studies, to developing a better understanding of the complex and cooperative interplay between people, machines, and organizational structures in practice. The selection of papers demonstrates the relevance of coordinative practices and expertise sharing within the current technological era, and shows how technology can support current manufacturing practices through concrete interventions. The studies range from peer-creation processes in the manufacturing process to new technological ways of expertise-sharing and maintenance work. In conclusion, we hope the design and research community will find this special issue to be a useful collection of papers that examine how cooperative work and working structures have (not) changed within manufacturing settings over the last years. With our special issue we hope to provide an informative foundation for further research in this field.

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