

# 4 Collaborative Virtual Environments and Immersion in Distributed Engineering Contexts

Marc Pallot<sup>1</sup> and Ulf Bergmann<sup>2</sup>

<sup>1</sup> Centre for Concurrent Enterprise, Nottingham University Business School, Jubilee Campus, Nottingham, NG8 1BB (United Kingdom), e-mail: Marc.Pallot@ESoCE.net

<sup>2</sup> Otto-von-Guericke University of Magdeburg, Faculty for Mechanical Engineering, Institute for Ergonomics, Manufacturing systems, and Automation, Universitätsplatz 2, 39106 Magdeburg (Germany), e-mail: ulf.bergmann@ovgu.de

**Abstract** Distributed Manufacturing is mostly associated with computing features and sophisticated software logics rather than with working environments concurrently used in distant locations. Nowadays, the global success of Web2.0 and, more specifically, social networking web applications are quite obvious. In fact, information and communication technology (ICT) users are creating web content, applications and online role-playing games with their own activities and related data in using web applications such as eBay<sup>®1</sup>, Facebook<sup>2</sup>, Second Life<sup>3</sup> virtual environment, and World of Warcraft<sup>4</sup>. In manufacturing, interests are quite different and therefore other solutions should contribute to overcome collaborative distance factors that are impeding an effective and efficient distributed collaboration. Using important existing options in this field, this chapter presents an overview on key developments and web applications in the area of distributed computing systems to support effective and efficient collaborative work carried out by different groups of people in different organisational units or companies with a strong focus on engineering communication.

4.1	Introduction.....	72
4.2	Related Theories – Terms and Definitions.....	73
4.2.1	Collaborative Distance.....	73
4.2.2	Information and Communication.....	75
4.3	Collaborative Virtual Environment (CVE) – Technologies .....	76
4.3.1	Video Conferencing and Web Conferencing .....	78

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4.3.2	Instant Messaging and Chat.....	79
4.3.3	Whiteboard .....	80
4.3.4	Shared Workspace and Shared Application.....	81
4.3.5	Internet Forum .....	82
4.3.6	Weblog.....	83
4.3.7	Wiki .....	84
4.3.8	Electronic Mailing .....	85
4.3.9	Virtual Reality and Augmented Reality.....	86
4.3.10	Mobile and Wearable Computing.....	87
4.4	Experiences and Outlook.....	88
	References .....	91

## 4.1 Introduction

Any kind of collaboration in manufacturing becomes more effective as soon as information and communication technology (ICT) support is deployed. At the beginning, the emphasis was on data storage and data processing; later computer networks and finally the Internet gradually added more and more communication capabilities. Meanwhile, broadband communication networks have allowed doing all kinds of communications both synchronous and asynchronous. With this premise, individuals involved in an organisation can intensively communicate in all dimensions without necessarily meeting physically or being located close to each other (collocated at the same office, floor, building or geographical site). On the other hand, people from different places, with various backgrounds, capabilities, skills and knowledge may emerge as somewhat ad-hoc organisations (communities) after they have activated essential motivational quantities and agreed upon powerful communication technologies as well as (network) rules and standards. However, most of the established methods and procedures to communicate and to build up knowledge have been developed without taking into account these technological options.

The technologies in question are also summarised as distributed information systems. Of course, much inspiration for Distributed Manufacturing originates from distributed computing or distributed information systems, which are usually abbreviated as distributed systems. Purely technically speaking, distributed systems are networks of independent communication systems (computers or human actors) that enable electronic data exchange at a range of locations. Thus, information and communication processes will be maintained by database administrators under consideration of specified standard arrangements.

Two characteristics of communication processes in means of collaboration between different actors of different companies by using distributed systems may be differentiated: