Chapter 20
Application of Serious Games in Industrial Contexts

Heiko Duin
BIBA Bremer Institut für Produktion und Logistik GmbH, Germany

Jannicke Baalsrud Hauge
BIBA Bremer Institut für Produktion und Logistik GmbH, Germany

Felix Hunecker
BIBA Bremer Institut für Produktion und Logistik GmbH, Germany

Klaus-Dieter Thoben
BIBA Bremer Institut für Produktion und Logistik GmbH, Germany

ABSTRACT

A Virtual Organisation (VO) is a specific type of a Collaborative Networked Organisation (CNO). Nowadays, more and more enterprises are using the opportunity to collaborate in enterprise networks – especially when they are addressing global markets. The creation of such a VO is not necessarily an easy task because often the participating partners are not prepared for collaboration. Therefore, enterprises who plan to cooperate in VOs should seek to participate in strategic networks or pools which act as breeding environments for VOs – the so-called VO Breeding Environments (VBEs). The main function of a VBE is to enhance the preparedness of their members to collaborate as soon as a business opportunity arises.

This chapter describes application areas for serious games in the context of such CNOs. A classification scheme for serious games has been developed based on two different approaches: one based on a process framework, the other one based on a game genome approach. Both are applied on a number of known serious games with the objective to identify uncovered areas and gaps. These gaps represent new opportunities for the application of serious games which has not yet been realised.

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INTRODUCTION

Today's manufacturing is marked by trends towards globalisation and highly-paced technological advancements. This results in more complex and customised products having shorter life-cycle times, which increases the marginal cost per product. Therefore, organisations are confronted with a challenge consisting in the continuous adjustment of their capacities and machineries necessitating a high degree of flexibility in dynamic environments.

In addition to this business state of affairs, a number of behavioural factors come into play. First, the bounded rationality of the economic actors is just a supplemental element, which exacerbates the situation. Second, decision makers, like people in general, are prone to the misperceptions of feedback, which means that their performance in complex and dynamic systems – like the creation, operation and dissolution of a Virtual Organisation – is hindered by nonlinearities, time delays and feedback structures. Third, decision making in dynamic systems is hard because it calls for dynamic decision making, that is, a stream of decisions closely depending on each another. And finally, decision makers are also limited by the magical number seven plus or minus two. This number sets the maximum number of cues that a person can simultaneously consider (Miller 1956).

Subsequently, organisations are more and more eager to collaborate around structured and emergent manufacturing frameworks such as production networks. These networks entail the joint-manufacturing of products and are regarded as a new form of collaboration between organisations. Additionally organisations take advantage in being part of production networks since today competition takes place between entire supply chains or networks instead of single organisations. Dynamic systems such as production networks compel their workforce to be faced with ever-changing working environments. This stresses the need of continuous learning, which constitutes the true competitive advantage for organisations. Moreover, the learning rate of the organisation must be higher than that of competition so that the former can survive. One effective tool for mediating skills and competencies is serious gaming.

Computer games do not only convey hard skills such as the understanding of how complex systems operate, Virtual Organisations being one of them, but also mediate soft skills like collaboration and communication in cultural diverse contexts. Additionally, serious games may be used in other contexts, e.g. for the stimulation of creativity in innovation processes.

To keep an overview on various games and their learning objectives, it is needed to describe a game and to classify its characteristics. Such a description of a game could for example include properties like purpose, gameplay, teaching methods, appearance, knowledge domain, computer platform, number of players and much more.

In this chapter two approaches are presented to classify games. First, the lifecycle of a Virtual Organisation is analysed by identifying the relevant processes in each phase (Baalsrud Hauge et al. 2008). Staff working in the execution of these processes can benefit from serious games in different ways: They can use them as tools supporting the learning of skills and competencies or they use them directly in the support of their tasks within the process. A mapping of some games developed by BIBA (Bremer Institut für Produktion und Logistik GmbH, Bremen, Germany) onto the identified business processes demonstrated its coverage and reveals further needs in research.

The second approach is based on the definition of a game genome. To do so, we analyze the background that makes it more and more difficult to keep the overview over existing games. Then we look at other domains like movies and music, where the number of available material is very big and the content is very hard to classify. Afterwards, we apply the same principles to the domain of games. In this step, we include established classification strategies from the domains E-Learning