Designing SmallWorld Simulations: Experiences and Developments

Albert A. Angehrn
Center for Advanced Learning Technologies, INSEAD, France
albert.angehrn@insead.edu

Abstract

Managing an important change process within an organization or community. Introducing innovations in an educational institution. Helping a group of diverse and distributed professionals to collaborate effectively. These are a few examples of complex challenges that managers and decision makers are increasingly faced with, and for which an in-depth understanding of the underlying psychological, cognitive and social dynamics of collaboration is required. Smallworld Simulations (SWS) provide a sound basis for addressing such challenges through advanced learning technologies that enable immersive, simulation-based collaborative learning experiences. This paper offers an overview of the key design principles underlying SWS, and of current research and developments in this area.

1. Introduction

Imagine that you are assigned to a small team, and projected during a couple of hours into a realistic scenario in which you will play the role of a "change agent" sent to a company with the challenging mission of introducing a major innovation (e.g. a new Information, Communication or Knowledge Management System, or a new type of work process). Over a period of six simulated months your task will be to get to know and persuade more than 20 simulated characters (representing the top managers of the simulated organization) to adopt this innovation. By using different communication and intervention tactics to address their different forms of resistance to change, and by gradually understanding and leveraging the formal and informal/hidden social networks among the simulated characters and the specific culture of the simulated organization, you and your team will either succeed or fail in your mission.

This is the typical scenario of a learning experience designed around the *EIS Simulation* [1,2,3], a first example of **SmallWorld Simulation** which has been deployed and validated extensively over the last few years in top management schools (such as MIT, Stanford and INSEAD) and corporations (such as BMW, IKEA, Cisco and IBM). As displayed in Figure 1, a whole family of simulations have been developed and deployed successfully over the last years to provide learning experiences for decision makers interested in extending their change and innovation management competencies in specific contexts such as urban communities (innovation management in small towns), universities, family-businesses, or Chinese organizations [4,5], with each SWS reflecting the specificities (of behaviors, attitudes and resistance patterns, relationship networks and cultural factors) of the modeled contexts. Building on the diffusion and impact of this first group of SmallWorld Simulations, similar ones are currently under development, addressing relevant competencies related to distributed teamwork, collaboration dynamics, social networks, as well as organizational and inter-organizational innovation processes.

Figure 1. SmallWorld Simulations addressing change and innovation dynamics in different contexts.

As an example, [5] provides a detailed description of the models and dynamics underlying *EduChallenge*, a special version of the EIS Simulation in which users/learners are challenged with a change project taking place in a university environment, and can interact with simulated characters representing deans, faculty members and university administration staff.

The objective of this short paper is to introduce the design of such simulations, discussing experiences and pedagogical issues related to their development and deployment in different contexts, and current research projects in this area.

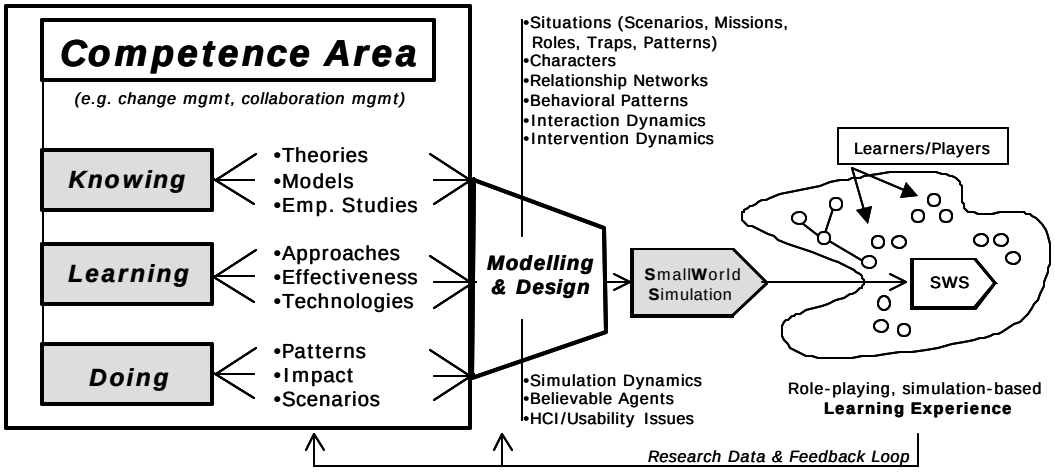

Figure 2. SmallWorld Simulations (SWS) Design Process.

2. Designing SmallWorld Simulations

Figure 2 illustrates the design process underlying the development of SWS. The process starts with the identification of a specific **Competence Area** (e.g. the capability of managing change dynamics) with a significant level of embeddedness in the social context (requiring interaction with people), as well as enough criticality/ relevance.

Next, a **"knowledge harvesting" phase** starts, consisting in the identification and selection of relevant design components from three domains: **(1)** Theories, models and empirical studies related to the specific competence area reflecting the insights generated and validated in related academic areas, **(2)** Approaches aimed at supporting learning in the specific competence area, as well as insights documenting the effectiveness and variety of technological artifacts involved, **(3)** Patterns related to best/worst 'practices' reflecting the specific competence area, their productive or counter-productive impact, and scenarios in which the competence is of critical value, e.g. in determining success or failure of a managerial initiative.

To provide the required multi-disciplinary perspective, the design components resulting from the second step should reflect the psychological factors, as well as the motivational, cognitive, emotional, social, organizational, cultural and technological factors affecting behavior and reactions to managerial interventions (in a specific organization, community, or group). These factors provide the basis for modeling convincingly the attitudes and behavior of a **set of virtual characters** operating within a challenging and realistic scenario (similar to the one outlined in section 1), with whom users can interact/intervene during the SWS-based learning experience.

The conceptual basis for such role-playing, simulation-based learning experiences is outlined in section 2.1, and the related pedagogical design challenges in section 2.2.

2.1 Conceptual Basis

In the terms described above, SWS relate on one hand to games such as the popular "Sims" (although building on more sophisticated models of human behavior and interpersonal relationship networks in organizational contexts), and on the other hand to recent developments in the area of learning-oriented simulations of social interaction contexts [6,7,1,4,5,8,9,10].

The initial impetus for the design of SWS originated from a critical analysis of pedagogical approaches used in management education and continuous development, such as traditional lectures or the widely used case method [7]. This analysis led to the formulation of an extended, technology-enhanced approach emphasizing the direct link between theory and practice (the "Knowing-Doing Gap" formulated by Pfeffer and Sutton [11]), the need for more experiential and collaborative learning approaches, and for addressing complex managerial competencies from a multi-disciplinary perspective [7].

Accordingly, the key hypotheses underlying SWS is the validation of the extent to which ICT-based systems can be used to (1) model cognitive and behavioral processes related to organizational interaction dynamics, (2) embed such processes in interactive game-like learning experiences, and (3) help individuals and organizations to diagnose and learn to

address cognitive and behavioral barriers (in others, in systems, or in themselves) to improve the effectiveness of their own managerial action.

In particular, SWS model explicitly the dynamics of relationship and influence networks and their impact on individual attitudes and behavior, enabling the learner(s) to validate the reactions of a realistically modeled group of individuals to several types of interventions. It is from this specificity that SWS take their name – "small world" being a term coined by Milgram [12] in his studies of social network analysis, and illustrated in recent books [13,14].

2.2 Pedagogical Design Challenges

A critical step in the design of SWS is the integration of the design components identified in the "knowledge harvesting" phase into the virtual characters populating and interacting dynamically in the simulated context.

As listed in Figure 2, this integration phase needs to lead to credible scenarios, challenging and realistic missions (to increase the attention level and motivation of the learners), believable characters reflecting individual diversity (to enable learners to identify a variety of stereotypical attitudes and behaviors), realistic social dynamics (reflecting the importance of relationship and influence networks) and contextual factors (to emphasize e.g. cultural specificities).

A second critical dimension is the **pedagogical** one, as **(1)** SWS have as primary objective to stimulate and facilitate learning, and **(2)** the "learning-by-playing" approach employed is not the currently dominant model for adult learning. The key role of games in triggering learning, knowledge structuring and change in children has been extensively analyzed in the work of Piaget and Vygotsky (see e.g. [15]). However, the successful deployment of games in organizational learning contexts remains a challenge in most cultures and organizations.

To fulfill their pedagogical objectives, SWS need to be able to trigger transformational learning by enabling individuals and groups to come in touch, during the simulations, with the limits of their own competencies - and fail accordingly, but in a risk-free context.

Furthermore, SWS need to engage learners both cognitively and emotionally (SWS sessions are typically very animated), providing a sufficiently rich set of intervention experiences to trigger motivation for extending ones' competencies at the individual, group or organizational level.

3. Conclusions and Developments

SmallWorld Simulations are a promising area of research and effective deployment of advanced learning technologies. In this paper we have illustrated SWS examples and discussed their design process, their conceptual basis and a number of pedagogical issues related to their development in a variety of competence development contexts. A number of projects are currently extending SWS theory (design framework, modeling components, involved technologies) and practice (deployment in several domains) providing the basis for future research.

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