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ORGANISATIONAL NETWORKING WITH SIMULATION GAMING

1 Introduction

This article introduces how simulation gaming can be utilised in networking within organisations especially on the level of an individual. In the article, networking is seen as a communication enhancement process increasingly needed as organisational systems become more and more complex. This point of view is noteworthy, because it brings forth the considerable importance of committing resources on well-functioning communication within single organisations as opposed to only focusing on networking between them.

In other words, the term *networking* can refer not only to creating something new, but strengthening something already in place. In an organisational context, networks are established automatically through everyday communication closely tied to tasks and activities of individuals even without express attention to their structure. On the other hand, the conscious efforts and resources spent in order to develop these networks do not necessarily guarantee actual results on individual level.

Simulation gaming can be used to bring forth different points of view on activities and processes not easily discernible in everyday contexts of an individual actor. Being based on reality, simulations can tackle real issues by giving the actors a chance to analyse the community they are a part of and their place in it. ProDesim, a simulation game designed for work communities and teaching organisations operating in the field of product development (PD), is used as an example to illustrate the potential of simulation gaming in organisational networking.

A general overview of simulation gaming is discussed in connection with the user testing process of ProDesim. The case is presented in order to offer a perspective on how simulation games can be used among game participants not only on a personal level, but between different organisational subsystems as well.

2 Experiencing Simulations

Simulations are procedural representations of isolated aspects of reality (Salen & Zimmermann, 2004). They are utilised in several fields of study and can be described as a multidisciplinary collection of different methods, techniques and technologies (see for example Heinonen, 2009; Glenn, 2003; Kamppinen, 2003). Simulated representations can also be called models.

As complexity increases in organisations, it becomes more difficult to manage interactions among tasks and people. The motivation for performing a simulation is most often to maximise profits, to try alternative paths to solve challenges and to minimise risks (Rausch & Catanzaro, 2003). Reasons for networking within organisations are based on basic functions; the need to learn and the motivation to enhance the work experience stem from everyday problems and challenges. As Ruohomäki (2002) maintains, we learn efficiently through personal experience and simulations offer a safe environment to engage in risky activities without real consequences.

To put it differently, simulation games can be seen as one of the best examples of "learning by doing" without really doing. Playing a game, any kind of game, is closely knit to the experience of doing so (see further Lehto, 2008). When the player enters a system that is a game, s/he automatically assumes an ever-changing role in the social network of the game regardless of the nature of the game itself (Salen & Zimmermann, 2004). In simulation gaming however, the player's role in the system is often fixed, which makes the experience of play that more immersive; an actor is encouraged to embrace the role as an integral part of the system.

Modelling is quite often linked with natural sciences or engineering, the most typical ones being task-network or event-drive models, manual control models and deterministic models. These models can also be combined to compensate the deficiencies of individual models (Meister, 1995). There are also systems thinking based simulations, which can be applied to organisational environments (Ruohomäki, 2002). According to Malaska (2005), the difference between these types of simulations lies in the alternative realities; while in natural sciences most factors of a system can be taken into account, in systems thinking uncertainty, born of human intentions and interactions, cannot be explicitly modelled. This dynamic makes designed system models always more explorative rather than analytic in nature, which enables efficient use of simulations in learning processes and networking.

Klabbers (2006) offers a definition of networking using Weick's term "double interact" illustrated in Figure 1. A single double interact is a communication loop, an interaction between two parties, in its most simplistic form. Also on an organisational level, in principle, communication is based on double interacts, but even a slight increase in the number of parties involved has the potential to increase the number of interactions exponentially. In that case, the answer to successful networking can be found in mapping the organisation as a system with actors and subsystems, but from a human perspective.

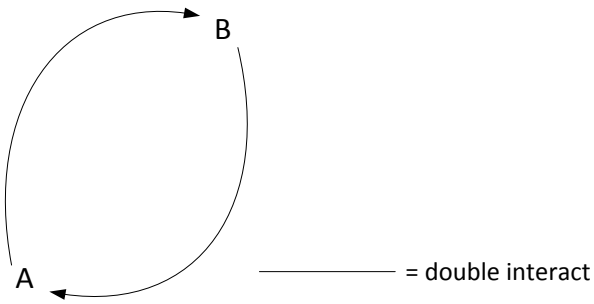

Figure 1. Illustration of a double interact (Klabbers, 2006).

Production development processes have been studied and found that mental images of a given process differ greatly in varying parts within organisations (Akgün et al., 2005). Due to the globalisation process, the project team can also be dispersed and therefore the information sharing and decision making relies heavily on computer-mediated communication. Teams using computer-mediated communication are not as effective as face-to-face teams and the team cohesion on virtual teams is also lower (de Pillis & Furumo, 2006; Potter & Balthazard, 2002). These teams would benefit in having a face-to-face session to gain a common conception of the whole and creating trust between team members before the process begins. Individuals have also different kinds of mental maps and action patterns that deviate from how they explain their behaviour themselves (Argyris & Schön, 1996). Therefore, individuals from all functions of the organisation should have adequate knowledge of processes in order to have a clearer and more common vision of the overall work system especially in medium and large sized organisations, where processes are complex.

Simulation games offer an arena for organisation members to analyse the present state of an organisation and create new organisational solutions (Ruohomäki, 2003). The bridge between the present and the future mode of working can be built based on the ideas the participants share during the simulation game. Usually a system model is an abstraction of reality, but when a system model is used to carry out a change, the model can also be seen as a possible reality in the future. In systems thinking, models are often designed for understanding and controlling complex systems and changes that take place within systems.

3 System Structure of the ProDesim Simulation Game

Figure 2 presents the three-layer simulation model of ProDesim which consists of teamwork, design process and business layers (Putkonen & Forstén, 2008). These layers include normative and descriptive elements. Modelling of normative elements, like financial calculations, was made by mathematical formulas and flowcharts. The process charts were brought into the model development from the field of design and engineering studies. The literature

included a wide variety of models of design processes. Typically the design process has been divided into phases or stages on a timeline (for example Pahl & Beitz, 1988; Cooper, 1996). This systematic process is developed for moving a PD project through the various stages from the original idea to the launching of the product. Each stage is designed so that the participants gather information and perform all necessary tasks to progress in the project or more broadly, to pursue the strategic goal of the company.

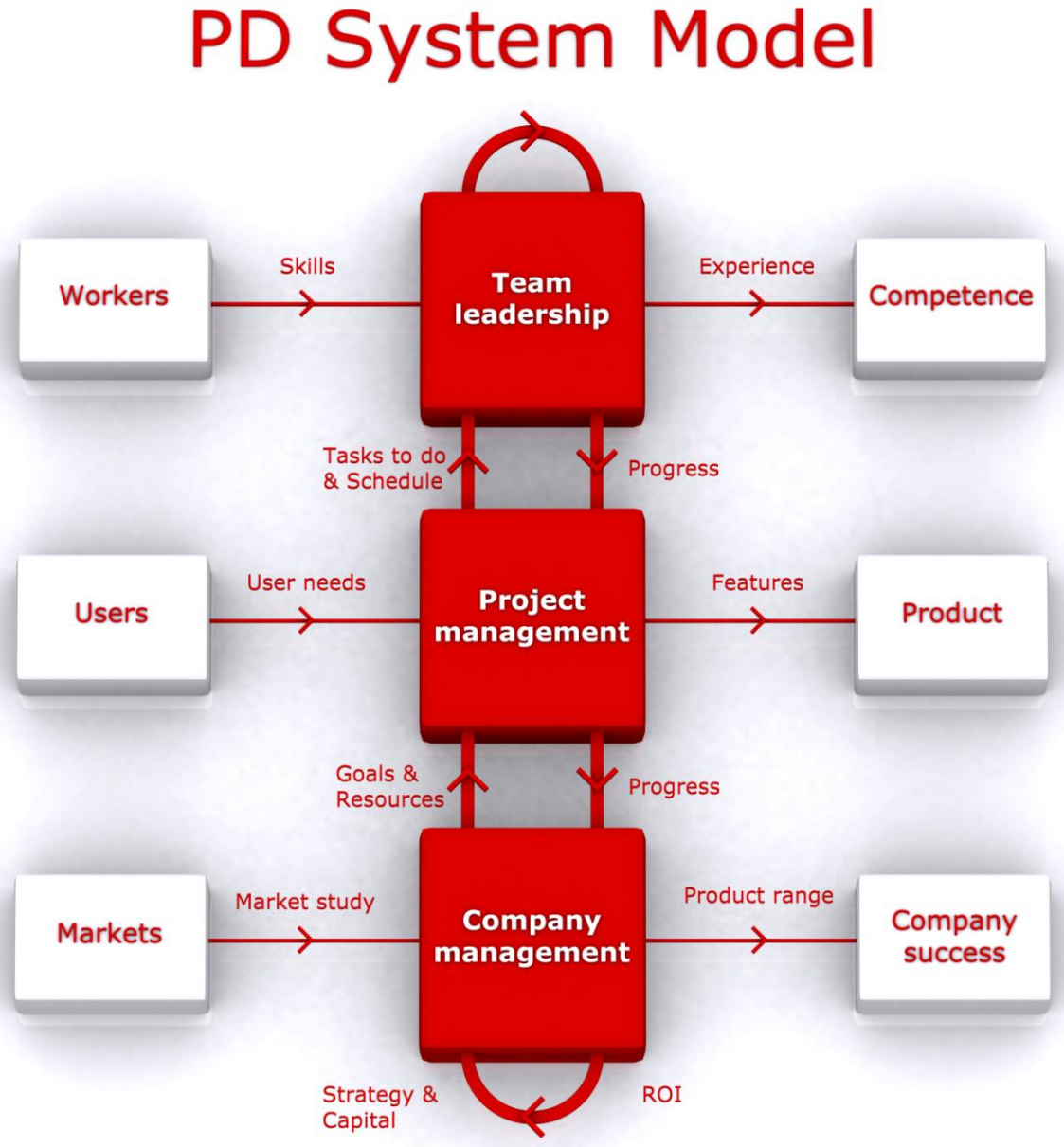

Figure 2. The three-layer meta-model for the product development simulation game (Putkonen & Forstén, 2008).

Descriptive elements, for example decision-making on the teamwork layer, were modelled utilising organisational roles and responsibilities. In the modelling of the descriptive parts of the model, systems thinking was used in mapping the interdependency of roles, demands and tasks in regard to a new

product development process. Clarifying the concept of a system is essential. In systems thinking, reality is a composition of systems, and by analysing the system components (i.e. subsystems) and their interaction between the environment, the system's functions and its parts can be understood (Kamppinen, 2006). When making the system visible, it is possible to develop and streamline interactions between the subsystems and, ultimately, the whole system. Another fundamental idea in systems thinking is that the system is always something more than the sum of its parts. In other words, although any system consists of subsystems which can also be analysed separately, one cannot make conclusions about the whole just by analysing the components. Processes between subsystems are of crucial importance, but what is even more important is that they can be seen as interaction (Rubin, 2009). The goal of the approach is to understand how the system components and their interaction affect the overall system. For example, a product development process can be seen as a highly complex system, where actors are involved in multidisciplinary working environment.

System dynamics (SD), a method based on systems thinking was used to construct the simulation model for ProDesim. SD is an experimental, quantitative approach for designing structures of social systems and policies that can be made compatible with a social system’s growth and stability objectives (Klabbers, 2006). With system dynamics, equations and diagrams can be used to describe and map the changing relationships between system elements (Rausch & Catanzaro, 2003). In this manner, the SD method can be used in gaining new insight into the structure and behaviour of the system. Today, system dynamics is adapted into planning of new policies in various companies and in the public sector. Relations between factors, their effects and time delays can be assumed and used for simulations and the design of alternative scenarios and strategies. The SD method is widely utilised in forecasting as well (see for example Sterman, 2000). The system dynamic approach could also be used as a team discussion tool since the model can be described with causal loops (See for example Putkonen, 2009). Causal loop diagrams (CLD) can be used to convey understanding about the interactions or influences within the system structure. CLD is used to explicitly show the nature of the influence relations between the elements of a system (more on system thinking and CLD, see for example Sterman, 2000, Checkland, 1981).

4 ProDesim Game Description

Klabbers (2006) describes the interaction between players and the simulation model as a process during which players communicate as well as share knowledge and information in order to gain influence in relation to the model. They adjust parameters according to the rules of the game and control the system. In doing so, they develop strategies for steering resources. This way games with computer simulation models provide an interactive learning environment for the participants. ProDesim simulates the activities of a product development company for a five-year period. During that time, the participants develop multiple products according to their interpretation of the current

market situation. It offers participants a model for the business activity of a product development company by taking into account matters relating to personnel, customers, technology, business, production and competition.

ProDesim is a product development simulation game designed for businesses and other working communities to test and develop their work methods. With the aid of the simulation game, it is possible to practice product development processes and strategies virtually risk free. The goal was to create a simulation game with which it is possible to simulate the developing of a product from its conception to the market and the overall business processes of a product development company as well. Those participating in the game will receive feedback, for instance, on the financial feasibility of their product development investment, managing a project, keeping on schedule, understanding the rules in markets and expertise level of the group. By having a grasp on the whole, the participants are more capable to develop their own work and identify flaws in the process and communications in the company. Shared conception of the product idea and a mutual understanding of the design process are essential prerequisites of successful, multidisciplinary networking in organisations.

The ProDesim simulation game is designed for a group of eight people. Participants have role-specific responsibilities in regard to their own activity in the company. All the information gathered during the course of the simulation is used afterwards in the analysing phase, in which the characteristics of a dynamic product development business are discussed in more detail.

A ProDesim simulation gaming session consists of five steps; (i) pre-game briefing with the background story of the company, (ii) organisational role sharing among participants, (iii) strategy selection and goal setting by the participants, (iv) design and marketing of products and operations on the market (v) evaluating the results, comparing with original goals and discussion about the game. In order to succeed in the ProDesim simulation game the participants must collaborate, since the system resources and responsibilities have been distributed among several roles.

To foster this interaction, the game board (see Figure 3) was designed for eight players, its size being approximately 3 meters by 1.5 meters. It is divided into eight different modules based on different roles in the product development process. Together with the simulation game tasks it constitutes the ProDesim multi-user interface (MUI), which can be accessed by several users simultaneously (see further Putkonen & Forstén, 2009; Forstén et al., 2009). The idea of the MUI is to use the roles of the process and show the participants the system structure and process flow. The participants can see the consequences of their actions from the simulation model through a visual display. They also receive information mainly related to the game status and resources from the game board.

The subsystems (i.e. roles), represented in Figure 3, surround the core of the company - product development and market funnels. Participants who fill the roles of R&D Manager, Project Manager, Product Manager and Design Manager

can be combined as a "product team", and they pay more attention to designing new products. On the right hand side, participants playing the Market and Sales Manager can be combined as a "market team". The administrative roles (Managing Director and Personnel Manager) are responsible for actions relating to both ends of the game board. In the figure, the arrows depict a product development process which starts from the product and project planning and ends to the markets and which has a feedback loop from the markets to the product design.

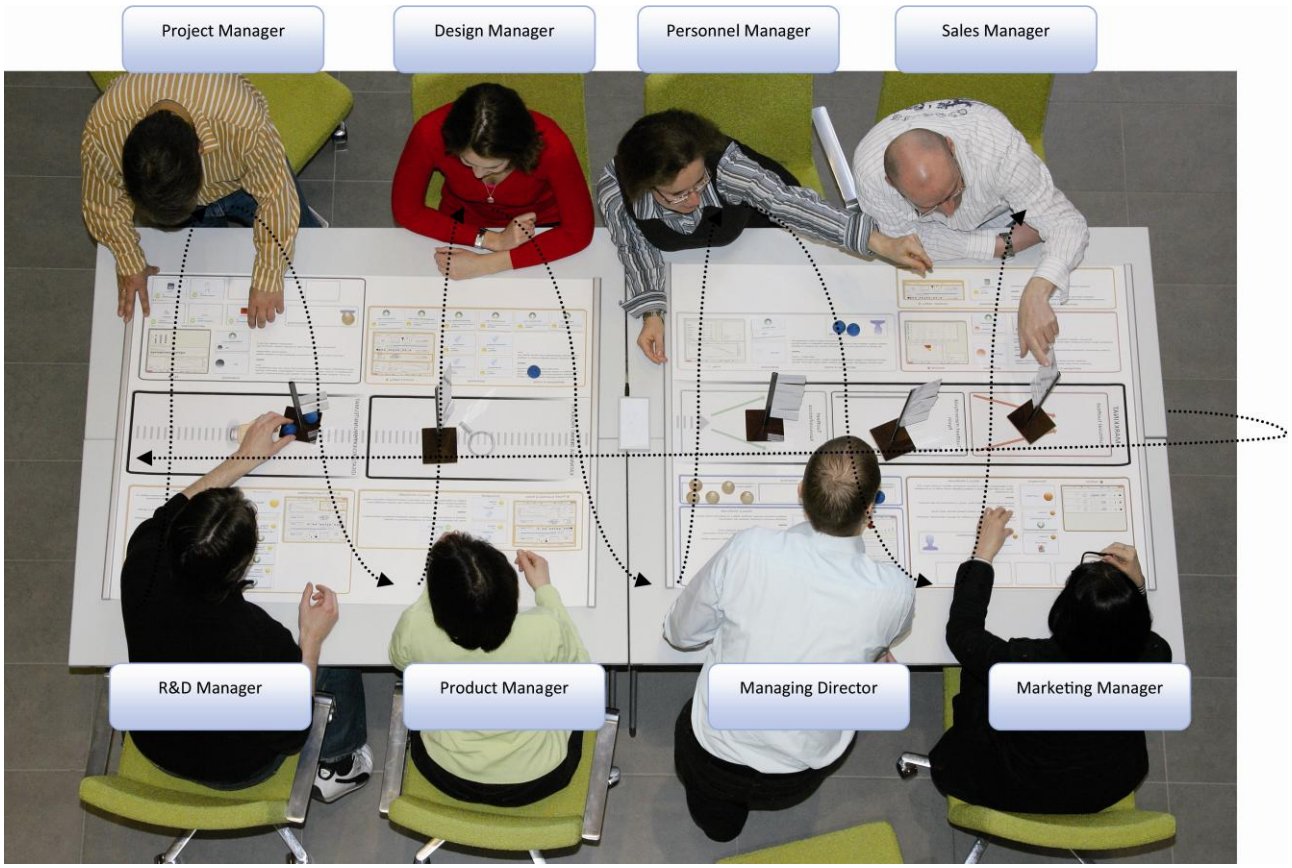

Figure 3. Roles of participants and project process flow of the ProDesim game board.

The decisions are made by the participants individually or by the whole team. Once the decision has been made, the participants feed the information to the computer via an RFID-reader (Radio Frequency Identification, grey box in the middle of the game board in Figure 3). Feedback and the consequences of the decision will be projected to the screen either instantly or with delay, depending on the nature of the simulated event. The game board and the screen show the stages of the PD process: what the costs have been so far and which tasks the team has performed partially and/or fully and so on. The decisions made by the players and the effects of those decisions can be seen as a wall projection. Wall projections are divided into seven different areas: personnel, R&D, finance, market situation, products, projects and summary.

In the ProDesim simulation game, the simulation system core is based on a

computer model of the fundamental aspects of PD as explained in previous part of this paper. However, the system does not exist without participants who take part in the simulation session through a given simulation role according to game board. Figure 3 depicts these roles around the game board and how the project process flows through the roles. The participants with individual skills and competencies function as a subsystem. With the participants functioning together, the simulation model constitutes the simulation game experience.

In a user test (Forstén et al., 2009) participants understood that communications between roles are important for the whole project, so they shared opinions with more roles before making a decision, although some role representatives were on the other end of the game board and made the networking more challenging from the perspective of the decision-maker. The change of the communication patterns indicated the multi-user interface with divided tasks lead players to cross-table instead of only nearby communication. The observation showed that the task-based, multi-user interface supports collaboration between participants in order to achieve a common goal in the simulation game.

Summary

As the complexity of an organisation grows, the clearer the understanding of the organisation systems and processes should be to the people involved. Advances in technology have also changed the way of working in teams. Communication tools, such as e-mail, chat capabilities, video conferencing and other group support systems have made today's teams more versatile concerning the ways of sending and receiving information in addition to face-to-face communication.

Networking with the team or between units of the organisation has a great effect on the outcome. Simulation gaming is a way to get the teams or organisational units to gain an insight and share knowledge and different views on decision making in the process at hand. In particular, the system dynamics approach has been used widely in recent years to develop simulations within different fields of study. The effect of growing capacity of computational calculation, data storage and simulation software development lowers the threshold of developing simulations outside the field of engineering and hopefully towards more human related applications. In spite of the new product development context of this paper, it is possible for these methods to be transferred to other simulation and game design processes as well. The systems thinking principles presented in this paper are useful when a simulation and simulation gaming involves teaching, for example strategic planning and causal effects between different elements of the system. As in any model designing, the danger lies in the trust in computer omnipotence. Therefore it must be stressed that a simulation model never equals the real world, but a model can bring out meaningful and fundamental aspects of reality into discussion.

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