

Enhancing Stakeholder Management Competences in Construction Projects using Serious Games

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Abstract

Projects are applied as a work-form in several organisations. Both public and private sectors widely adopt the project concept to create the product or service that they aim at. Projects are goal-oriented, one-time activities that have time and resource limitations. Even though projects are widely applied in modern organisations, project management is recognised as one of the more challenging tasks in business and one that requires multiple skills to master. The skills encompass technical project management skills such as resource planning and managing a budget; but also a complex mixture of soft skills such as communication, trust building and managing the stakeholders of a project. Current methods for training project managers have received criticisms that call for new approaches to support learning. One such approach is experiential learning for fresh project managers to gain a variety of project experiences in a virtual environment through serious games. This paper discusses the aspects of learning that are important for project manager; in particular, the diverse set of soft skills that are important to managing stakeholder, which are of vital importance for successful projects. The aim of this paper is to examine how specific affordances of serious games can support learning for project managers in construction projects. The main research question that we aim to answer in this paper is: How can serious games support competence development for project managers? This is a conceptual paper and the discussions have been by our work in understanding the diverse technical and soft skills in project management and stakeholder management. This paper aims to contribute to an increased understanding of the competences and how they can be supported by serious games.

Keywords: Serious games, Project Management competences, Stakeholder Management, Learning and reflection, Construction Projects

1. Introduction

Modern project organisations face several challenges; for instance, globalisation and distributed work-teams. And, there has been an increasing focus on project managers developing their soft skills (such as communication, leadership and stakeholder management) sufficiently in addition to their technical skills. Current project management training approaches are focused on certification and provide the basic training to manage projects (e.g. (IPMA, 2006). The skills and experience to manage large, international projects are acquired from several years of managing such projects. How can such skills – specially, soft skills – be developed in a relatively shorter period of time? Serious games is a means of supporting rapid competence development for project managers and can facilitate experiential learning for fresh project managers to gain a variety of project experiences in a virtual environment.

This is a conceptual paper where we consider serious games as a means of training project managers and increasing their competences – specially their soft skills. In this regard, we will look at stakeholder management as an example. Stakeholder management is an important aspect of project management. (Aaltonen, 2010) says that (Cleland, 1986) brought stakeholder thinking to the realm of project management from mainstream general management. She also points out that a definition of the concept of project management, provided by Project Management Institute (PMI), looks at the concept through the lens of stakeholder management: "The process of adapting the specifications, plans, and approaches to the different concerns and expectations of the various stakeholders" (PMI, 2008). (Meng & Boyd, 2017) say that the construction industry has a significant focus on stakeholder management (project-based relationship management). Quoting on several previous studies, [(Yang et al., 2011):page 901] say that "[...] stakeholder involvement is important to project outcomes, and recognition of the concept of stakeholder management has grown in recent years". Hence, it is important to look at enhancing stakeholder management competences in construction projects.

A "serious game" is a game designed for a primary purpose other than pure entertainment. The term "Educational games" is also used to describe games that are designed to teach a specific skill or enhance knowledge as we play. Educational games support a situated context for learning in a virtual world because when you learn by playing a game, you apply that learning immediately in the game and move on to learning new skills (Gee, 2003). Game scenarios and characters in the game that reflect the real world will enable a near-transfer of knowledge. The learning environment of serious games that contributes to rapid competence development can be characterized by the instant feedback on the choices of action that the learner makes, timely feedback on the overall performance of the learner at the end of every game-session and the possibility to play the game several times, choosing alternative paths of decisions every time, based on reflection and experience gained from the previous game-sessions.

Designing serious games or similar virtual environments for supporting project managers to acquire their necessary soft skills requires a fresh look at the training approaches that are currently available. In this paper, we present project management and stakeholder management competences in such a way that they highlight the technical and soft skills, which takes into account an individual's abilities and personality, the knowledge-areas that the individual deals with, organizational factors and environment factors that define a specific situation. We have used the OKEI (Organisation, Knowledge, Environment and Individual) competence modelling framework (Petersen & Heikura, 2010) and (Cowley, Bedek, Rabeiro, Heikura, & Petersen, 2012) to describe the competences. In addition, we

discuss how serious games can contribute to support rapid competence development for project managers.

The aim of this paper is to discuss serious games as an effective means of competence development, with a focus on developing stakeholder management competence, for the construction industry. The rest of this paper is organised as follows: Section 2 discusses project management and construction projects; Section 3 describes stakeholder management ; Section 4 describes competences for stakeholder management; Section 5 discusses the challenges in competence development for project managers and stakeholder management; Section 6 provides a discussion of serious games for developing stakeholder management competences and Section 7 concludes the paper.

2. Project Management and Construction Projects

According to PMI “a project is a temporary endeavour undertaken to create a unique product or service” (2008:5), (Olsson, 2006). Projects are traditionally seen as temporary organisations designed for unique tasks (Cleland, 2004), (Olsson, 2006), often in contrast to the massproducing core activities of organisations. Application of project concept has a vital role in the construction industry. A significant portion of construction endeavours are done through projects. The construction industry is highly fragmented. Construction is one of the most complex industries and it involves a great number of variables affecting any project development. Winch supports this idea arguing that construction projects are amongst the most complex types of endeavours (Winch, 1987). Dubois et al. supports this idea suggesting that this industry is a “loosely coupled system” characterized by (1) complex elements of uncertainty and tasks interdependences, and (2) inefficiency on its operations (Dubois & Gadde, 2002). These characteristics highlight both the importance of and challenges related to stakeholder management in construction projects, as well as the need to focus on developing / strengthening stakeholder management competences.

Over the years, various standards have emerged in order to frame how project management should be performed. Organisations such as The International Project Management Association (IPMA, 2006), the Australian Institute of Project Management (AIPM (Australian Institute of Project Management), 2008) and Project Management Institute (PMI, 2008) all provide certification in project management. We experience that PMIs standard has increased in popularity all over the world. In addition to these programs, academic institutions all over the world teach project management at different levels and organisations also create their own inhouse project management courses according to their own “standards”. As we mentioned before, we believe that serious games can provide an effective learning arena for developing project management and stakeholder management competences rapidly.

3. Stakeholder Management in Construction projects

A project stakeholder has been defined as "a person or a group of people who have a vested interest in the success of the project and the environment in which the project operates" (McElroy & Mills, 2000). Stakeholder management is an important aspect of project management. A project can be seen as a temporary coalition of stakeholders having to create something together (Andersen, 2005). Success of projects can be determined by how stakeholders of the projects are dealt with and managed (Aaltonen, Kujala, Havela, & Savage, 2015) and (Eskerod & Vaagaasar, 2014). Jepsen & Eskerod (2009, page 335) say:

"Contributions (e.g. deliverables or supporting decisions) from a strong coalition of supportive and influential stakeholders are necessary to carry out a project successfully and it is the responsibility of the project manager to ensure such contributions through management of the stakeholders. An important component of stakeholder management is stakeholder analysis [...]. Proponents for stakeholder analysis [...] argue that stakeholder analysis increases the project manager's ability to anticipate opportunities and problems for the project at a time when the project team still has time and opportunity for manoeuvring. Accordingly, a stakeholder analysis is often carried out front end [...]."

The above description points out the importance for the project manager to have the competence in stakeholder management. Based on previous studies, Jepsen & Eskerod (2009, page 336) presents the following activities as parts that constitute stakeholder analysis: (i) identification of the (important) stakeholders; (ii) characterization of the stakeholders pointing out their needed contributions, expectations concerning rewards for contributions and their power in relation to the project; and (iii) decision about which strategy to use to influence each stakeholder. These activities suggest what aspects that can attribute to the competence that project managers should have in stakeholder management.

The most important stakeholders in construction projects are the owner and the contractor (Jepsen & Eskerod, 2009). In addition, all, at least most, projects have a diverse set of stakeholders as illustrated in (Olander & Landin, 2005). The stakeholders may be related to the environment the project operates in, the community around the project, the cultural landscape and the neighbourhood demography. The local and/or the national government can be an important stakeholder depending on the nature of the project. The media is an important stakeholder that is sometimes overlooked or the influence of whom is sometimes under estimated. The media, although often is not a direct stakeholder, it can be extremely influential on the other relevant stakeholders of the project such as the community or the neighbourhood. Example in this regard is illustrated in Olander & Landin (2005). They also illustrated that stakeholders and their relationship to the project is not a static picture. They can vary in many ways such as the relevance of the stakeholders to the project. Their power in the community and how this could affect the project and all these could vary during the lifecycle of the project. The coalition of the stakeholders as something that is constant is a false assumption and this dynamic and complex picture of the stakeholders and their relationship to the project needs to be well understood by project managers.

Stakeholders may be individuals or groups or organisations and they can influence one another. The analysis of stakeholders should be an interactive activity with the stakeholders rather than a desk activity conducted prior to the project start. Guidelines for understanding stakeholders and uncovering the stakeholder coalition is complex and requires experience. Managing stakeholders is not always clear and managers have been criticised for their inadequacy (Jepsen & Eskerod, 2009)).

4. Competences for Stakeholder Management

Stakeholder management in construction projects encompasses a complex set of knowledge and skills that form an important part of the project management. The types of skills include theoretical knowledge such as methods, technical skills of project management such as planning and management. Most importantly, the soft skills are pivotal to successful stakeholder management. As we have seen from our earlier work in analysing project management competences; e.g. (Petersen & Heikura (2010), a project manager must look beyond the current project, the organisation and the obvious stakeholders.

Thus, a closer examination of the competences illustrates that knowledge of one's own organisation, the organisation of the stakeholders and the environment or the context that the project is operating within play a significant role in the success of the project.

The OKEI (Organisation, Knowledge, Environment, Individual) competence modelling framework was developed in an earlier project to support rapid competence development using serious games (Oliveira, Andersen, & Torvatn, 2013). In general, the OKEI competence modelling framework highlights the interdependencies and dialogue between intraorganizational factors (e.g. strategy, work organization etc.), external / operational environment factors (e.g. law, culture, infrastructure etc.), knowledge related factors (e.g. the existing body of knowledge relating to the work process, the bulk of which resides outside of any individual), and individual and personal factors (e.g. knowledge, skills, motivation, personality, mental models of work and intentions). The framework aims to function as a check list of the sort of contextual issues which are present in the actual contexts and situations where the learner will be applying the knowledge that he/she needs to acquire. The OKEI factors are described below:

- *Organisation*: represents the organizational aspects that influence the work performance and the application of competences. They include strategies, values and goals of the organization, work processes, organization structure, roles of people within the organization and e.g. the power structure embedded in people and functions.
- *Knowledge*: refers to the external knowledge resources that could be useful to apply. The knowledge resources referred to here may be academic, theoretical or practical.
- *Environment*: considers the context outside of the organization. The environment includes other companies and industries, networks, public sector and governance, the laws and norms, existing technologies and infrastructure, the market and culture, not to mention the people as consumers, users and citizens.
- *Individual*: refers to individual and personal factors that may be applied in work situations and that have varying connections to ones performance level. Among other things, knowledge, skills, past experiences, personality traits, mental models, attitudes, motivation, intentions, perceptions and emotions can influence the work tasks in some way.

We have analysed the competences required for stakeholder management using the OKEI competence modelling framework. We have used the IPMA Competence Baseline (IPMA, 2006) as our starting points and complemented that from other relevant literature (referenced elsewhere in this paper). Table 1 shows stakeholder management competences with respect to the OKEI factors.

<p>Organisation</p> <ul style="list-style-type: none"> • Knowledge about the organisations interest in the project • Knowledge about the organisations importance for the project • Knowledge about the expectations of the organisation in the project • Knowledge about the level of influence the organisation can have on the stakeholders • Knowledge about the position of the project in the organisation • Knowledge about the position of the project in the stakeholders' organisations • Knowledge about the context of the project for own organisation 	<p>Environment</p> <ul style="list-style-type: none"> • Ability to analyse the diverse stakeholders according to their interests and their importance to the project, in the different lifecycle phases of the project. • Knowledge about how the other parties see the organisation's importance in the project • Knowledge about the expectations of the stakeholders in the project • Knowledge about how the stakeholders can influence the project • Updated knowledge about stakeholders (any information that may affect the project such as their organisational maturity, standards, practices, etc.) • Knowledge about the context of the project for all stakeholders
<p>Knowledge</p> <ul style="list-style-type: none"> • Methods and means of developing strategies for expectations management • Methods and means of developing networks, internal and external, formal and informal • Methods to identify and evaluate the influence of stakeholders on the project and to detect the influences and consequences of changes in the stakeholders (e.g. if a new party joins or one leaves). • Strategies to cope with stakeholders • Ability to assess the risks and opportunities represented and methods to deal with the risks represented by the stakeholders • Methods to ensure the satisfaction of stakeholders throughout the project and during the different lifecycle phases • Methods and means of developing communications strategies for stakeholders (stakeholder communication plan) 	<p>Individual</p> <ul style="list-style-type: none"> • Ability to build trust with the diverse stakeholders and work on building a relational trust with them • Good communication skills • Knowledge about how the other parties see the organisation's importance in the project • Knowledge about the expectations of the stakeholders in the project • Knowledge about how the stakeholders can influence the project • Updated knowledge about stakeholders (any information that may affect the project such as their organisational maturity, standards, practices, etc.) • Knowledge about the context of the project for all stakeholders

Table 1 Competences for Stakeholder Management

In designing competence based learning games and simulations, the framework guides to list the relevant contextual factors (organization, environment, knowledge), in addition to the factors pertaining to an individual person, such as the personality, attitude or strength of character, which play a role in the application of a competence. In order to be able to do this, in most cases, the competence needs to be elaborated and more detailed sub-competences need to be defined so that the relevant contextual factors can be identified and taken into account in designing games for learning.

5. Challenges in Competence Development for Project Managers and Stakeholder Management

Despite all the training and standardisation of project management, we still see failing projects. Some of this is due to the fact of an increased level of complexity, chaos and uncertainty in projects environment (Thomas & Mengel, 2008). Most of the educators today provide knowledge about the tools to use in order to perform project management; few provide knowledge about how to use these tools in complex situations. There has been a growing criticism of current project management research for being too weak in their relevance to practice and in their general understanding of research methodology (Winter & Smith, 2006). The critique is first of all directed towards the gap between theory and practice in the project management field. Conventional theory on the field has a narrow focus on management of a project and doing it right. In essence, conventional project management theory still remains within the ontological foundations of the 1950s and 1960s with its emphasis on technical concepts of organisations and projects, and realist assumptions about “projects” as existing out there independent of the people involved (Winter & Smith, 2006), (Packendorff, 1995). There is a need now to develop the field further, including new training methods in project management (Berggren & Söderlund, 2008). In order to meet the complexity in everyday project life, there is a need for reflective tools supporting change, creative and critical reflection, cross-cultural and online communication and coping with uncertainty (Thomas & Mengel, 2008). This implies the necessity to focus adequately on soft skills.

Project managers, as a part of their work, interact with other people, such as the diverse set of stakeholders, and various tools for conducting their work. Through working as project managers, they go through different experiences and build up their experience base. Projects are per definition unique, and they usually deal with a high degree of uncertainty, complexity and multidisciplinary nature. For example, project managers often have to work with new people and people that they do not know from before. Good interpersonal relationship is thus essential for fruitful cooperation with the stakeholders and effective execution of projects.

The main challenges in competence development for project managers and stakeholder management can be summarised as follows:

- Understanding the complex and diverse picture of stakeholders and their influences and expectations.
- The possibility to see and perceive the situation well within the context of operation of the project; the development of perceptual skills.
- The possibility to gain experience rapidly over the variety of situations that a project manager may face.
- The possibility to practice their knowledge and skills, in particular, the soft skills such as communication, interaction and reflection upon previous experiences.

6. Educational Games for developing Stakeholder Management Competences

The term "Educational games" or Serious Games is used to describe games that are designed to teach a specific skill or enhance knowledge as we play. Educational games facilitate a situated context for

learning in a virtual world. That is, when a player learns by playing a game, then the player applies that learning immediately in the game and moves on to learning new skills (Gee, 2003). Examples of serious games in the area of project management are described in (Oliveira et al., 2013) and (Petersen & Ekambaram, 2012). One of the main advantages of serious games for learning is the opportunity offered by the virtual environment in the game for the project managers to gain experience with timely feedback in a safe and risk-free environment that does not incur the costs of undesirable consequences.

Serious Games can support interaction, reflection and learning from experiences through challenging game scenarios that are adapted to challenge and engage the user, and guide the user through a motivating learning experience, in a virtual environment. Experiential learning and reflection in Serious Games are illustrated in Figure 1, where the experiential learning cycle (Kolb, 1984) and the reflection model are merged (Boud, Keogh, & Walker, 1985). When a learner is playing a game, the player goes through a virtual experience, receiving feedback on her actions, where she is able to reflect-in-action and actively experiment in the game by selecting different options and choices. Environments that promote interpersonal interaction may result in greater reflection (Bandura, 1977). We believe that this statement suits to virtual environments too. After playing the game, the player received feedback on her performance, she could revisit the game play and reflect-on-actions during the game play. When she (the project manager) is at work, she has the possibility to conceptualise what she has experienced in the game, possibly discuss with colleagues, thus supporting individual and social learning with her colleagues. Articulation of experience plays an important role in developing project management competencies (Berggren and Söderlund, 2008). Social interaction enhances motivation and prolongs engagement. Engaging in social interaction brings forth different ideas that could be shared and perhaps result in deeper thinking and reflection about the experiences (Wenger, Trayner, & de Laat, 2011). The prompt, interactive nature of serious games allows the player to receive instant feedback on her choices of actions. Feedback on the player's performance can also be provided at the end of each session of the game or during game play. Timely interaction and feedback and responses from the game environment can lead the player to reflect on what she does – reflect on how the interaction progresses as well as her choices of action, while the interaction / play goes on.

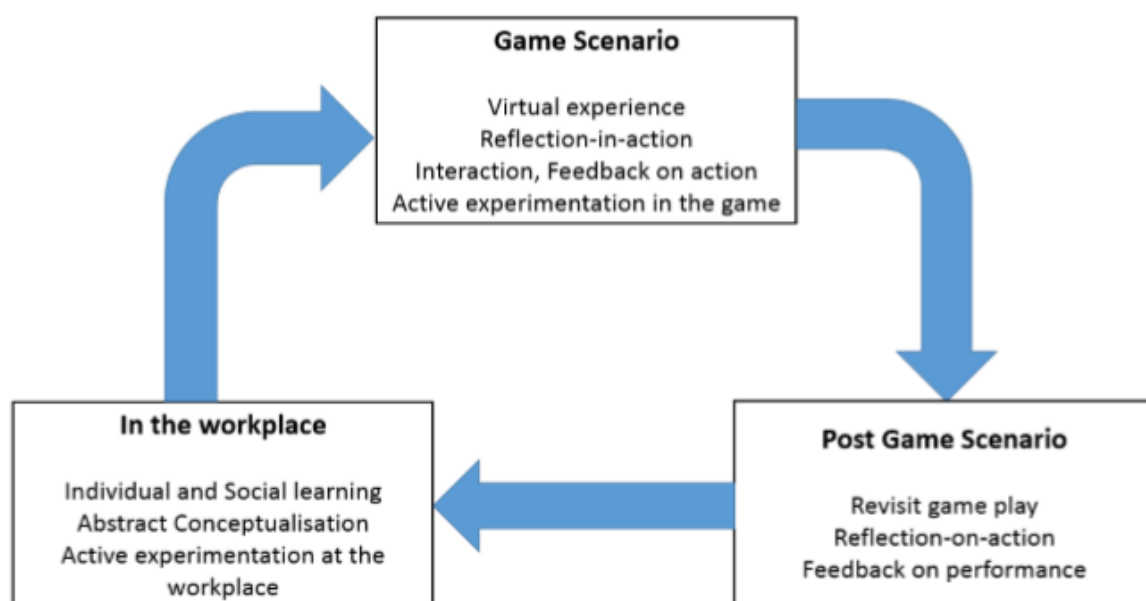


Figure 1 Experiential learning and reflection in Serious Games (Petersen & Ekambaram, 2016)

This can be seen as, what Schön calls reflection-in-action (Schön, 1983). Furthermore, Schön says that, "Reflection-in-action necessarily involves experiment". Experimenting can be seen as a source or instance of learning. This experimenting is done in a safe and interactive manner in serious games. Schön also describes another concept called "reflection-on-action". When the player plays the game one more time, then the player would reflect on what he/she did in the previous playing session(s), and accordingly take actions (modified choices of action) in order to obtain better results this time. Reflection-in-action and reflection-on-action are acts that contribute to making sense of the situation, which can in turn facilitate better stakeholder management. Furthermore, interaction, feedback, reflection, and the possibility for the player to play the game several times can also be looked at in connection with creating more learning experience for the player in a comparatively shorter period of time, and thus facilitating rapid competence development. Careful design of tasks, the problem space for the player and the feedback and timing of the feedback can provide the right balance between the working memory and the cognitive load for the learner (Boyle, Ramsay, Terras, & Boyle, 2016). An example of a serious game supporting competence development for stakeholder management in a construction project was developed in the EU project TARGET (Oliveira et al., 2013) and (Bedeck, Petersen, & Heikura, 2011).

Games and virtual environments support contextualised learning, which enhances the understanding of the bigger picture and supports the development of perceptual skills, which is of utmost importance in stakeholder management. The learning context enriches the player's learning of core knowledge elements that are situated in / integrated into the operational context. The context can be considered as the situation in which the competence is applied, which includes the people that are involved in the situation, perhaps their personal qualities, workloads and competences, the organisational culture or the country in which the situation takes place. Understanding the context in which the knowledge is applied is very important in stakeholder management. In addition, playing the game several times allows the player to go through different alternatives of the context or the situations in which a competence may be applied, and hence, it provides the player various instances of learning. Even to make wrong managerial decisions (in a safe learning environment such as serious games) and understand the consequences of them is an effective way to obtain valuable knowledge.

Serious games provide a safe environment to learn from mistakes and for experimentation; learn from making wrong decisions. Unlike in the real world, there will be no damage or cost due to any wrong decisions that are made in serious games. Mistakes provide opportunities to learn from. In a video published on BBC's website, the CEO of Lego, a Danish toy company, (Knudstorp, 2012) says: "The ultimate survival technique is experimentation. When you experiment, you have also said that you are willing to fail. Failure is best way to learn."

Serious games can provide a broader / systemic understanding. According to systems thinking, the focus will be not only on elements that constitute a system, but also on how the elements are interconnected and interact with each other (Senge, 1990). Serious games provide a broader understanding of stakeholder management by presenting consequences of alternative ways of managing stakeholders and allowing the player to try the stakeholder management process several times with various alternatives, in different contexts.

Game scenarios and characters in the game that reflect the real world will enable a near-transfer of knowledge. To summarise, the following aspects can be seen as some of the key contributions of serious

games to competence development: (1) Practice interactions with stakeholders (2) Learning in context (3) Timely feedback (4) An opportunity to learn from mistakes without risks.

7. Concluding Remarks

In this paper, we have discussed serious games as an effective means of competence development for project managers, and in particular, stakeholder management in construction projects. We have discussed the relevance of the context in which a competence is applied to determine the ability of a project manager to apply the competence appropriately. We have presented a detailed analysis of the technical and soft skills that encompass the diverse and complex competences involved in stakeholder management, using the OKEI competence modelling framework.

Stakeholder management in construction projects involves several stakeholders ranging from the direct stakeholders such as the owner of the project and the contractor, the community and the context in which the project operates in and perhaps the national and local governments. The influences and expectations of the stakeholders vary during the lifecycle of the project. The project manager has a demanding role that requires a combination of skills to ensure that all stakeholders are satisfied both during and after the project's lifecycle. This requires experience to be able to recognise and analyse the different situations, the ability to communicate, build trust and skilful interactions with a wide variety of stakeholders in complex and demanding contexts. Current means of developing such competences rapidly are limited. Hence, this paper analyses the contributions of serious games to develop the competences for projects managers in stakeholder management.

Serious games provide a virtual environment where project managers could explore and experiment relevant scenarios and practice different skills in a safe and risk-free environment. It is cheaper and safer to make mistakes and learn from one's mistakes in a virtual environment than in the real world. Aspects such as prompt responses, timely feedback on the player's performance at the end of each game-session and the possibility to play the game several times can lead to rapid competence development through experimenting, reflecting, making trial and error and sense-making.

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