

Teaching Risk with Virtual Worlds

Experience and Lessons Learnd in Second Life and Other Virtual Worlds

Marc Conrad

University of Bedfordshire, Luton, U.K.

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Abstract: We discuss and demonstrate how Virtual Worlds available at the University of Bedfordshire have been used to teach Project Management using a ‘situated learning’ approach. In particular we have a closer look on the aspect of teaching risk management and identify how different aspects of risk are addressed in a variety of implementations of Virtual Worlds, namely Second Life, a Virtual World provided by an external provider, not Linden Lab, a Virtual World that is maintained ‘in-house’ and a Virtual World hosted by the students themselves. We note that the student experience of risk is different in each of these incarnations of a Virtual World which impacts their perception of risk and hence the effects this has concerning the teaching goals.

1 INTRODUCTION

Project management is an inherently interdisciplinary activity of relevance in many areas ranging from software development to the construction industry. The Project Management Institute (PMI, 2008) defines project management as “the application of knowledge, skill, tools, and techniques to project activities to meet project requirements”. In order to teach project management an approach based on team-based, practical, hands-on experience seems most appropriate. Within an educational institution, such as a university, this can be implemented following the ‘situated learning’ approach developed by Herrington and Oliver (2000) which encompasses parameters such as authentic context, multiple roles as well as perspective and collaborative construction of knowledge.

A prominent knowledge area within the project management profession is risk management. The importance of risk registers and contingency plans need to be part of the practical activities to which students are exposed. In the context of a university activity the risks encountered by the students need to be considered by the educators. Risk embraces an inherent aspect of unpredictability and this should be reflected in the design and implementation of the student activities.

Virtual worlds provide a somewhat controlled

environment but still have aspects of uncertainties. Therefore – as we will see in this paper – they provide a useful way to implement risk management within a project management course. This paper discusses how virtual worlds have been used at the University of Bedfordshire to enhance the student experience, in particular in the context of project management and draws conclusions on how different types of virtual worlds impact upon the students’ perception of risk.

Indeed, virtual worlds such as Second Life and OpenSim based implementations have been used within teaching of Project Management at the University of Bedfordshire since 2008. The more experimental experience during the early years with Second Life as the platform and Linden Lab as the provider is documented by Conrad, et al. (2009) while a more systematic exposition of the Second Life experience is then detailed within (Conrad, 2011a).

In 2011 a different provider, Reaction Grid, has been used which is based on the OpenSim architecture. While the underpinning technology is similar there are notable differences between these two environments, in particular – as shown by Christopoulos and Conrad (2012) – concerning immersion and context.

The paper is organized as follows. In Section 2 we provide the background on how project management is defined as a combination of nine

different knowledge areas and the role of risk management within this framework. Section 3 introduces the 'situated learning' approach and highlights the rationale of using virtual worlds. We then go on in Section 4 to discuss the various ways in which virtual worlds have been used within the University of Bedfordshire so as to facilitate an assignment within project management. Section 5 then focuses on the risks that the students encounter as part of their assignments and Section 6 follows this up by providing a more detailed taxonomy of virtual worlds and how the risk management changes within these worlds.

2 KNOWLEDGE AREAS

The Project Management Institute (PMI) defines Project Management as "the application of knowledge, skills, tools, and techniques to project activities to meet project requirements" (PMI, 2008). In doing so it identifies nine knowledge areas, namely time, cost, scope, quality, risk, human resources, communication, procurement and integration. Most prominently in this list features the so called triple constraint of cost, time and scope. These are clearly interdependent (an apocryphal joke within Project Management is "fast, cheap and good – choose two") in that an early delivery (time) of the product with more features (scope) will imply the necessity of adding more money (cost). In the specific context of a university assignment it is often the case that not all of these knowledge areas can be given equal emphasis: while a pressure to follow time management processes such as using a GANNT chart comes seamlessly from given (external to the project, but implied by the university teaching schedule) deadlines such as submissions dates or weekly status reports the modelling of cost into such an environment is not straightforward as the student activities are usually not constrained by a (real) budget and there are no salary costs. We see that already balancing cost against time is difficult to teach in practice.

Scope and quality control are possibly more straightforward to embed into a university assessment. From anecdotal experience we note that students tend to associate the notion of 'good quality of work' with the idea of 'getting good grades'.

Human resources and communication can be covered to a certain extent by allocating the students into groups plus adding an element of self reflection on team performance.

The knowledge area of 'integration' serves to tie

together the various activities to balance the other areas (times, cost, etc.) and can be addressed by exposing the students to an explicit Project Management methodology (such as PRINCE2® at the University of Bedfordshire).

Procurement can be addressed by requiring the project team to interact with an 'external' provider. Here we may distinguish between a true external provider (as can be identified for instance as Linden Labs for our Second Life based assignments) or a "pretend" external provider which is impersonated by the course tutors.

Difficult to incorporate into a university assignment is the knowledge area of risk. Health and safety considerations as well as common sense dictate that students shouldn't be knowingly exposed to 'serious' risk (which is common to real projects) such as damage to health, bankruptcy or other material loss. There is also a perceived or real difference between project risk (that should be professionally managed by the team) and the risk of failing the assessment (which students usually want to avoid at all cost). By definition risk incorporates uncertainty. In a university setting this 'uncertainty' is likely to conflict with a student's desire of clear criteria on how they are expected to perform in their assignment. Therefore an assignment that encompasses risk in a realistic way is not straightforward and need to be crafted carefully so as to provide a good and productive learning experience by embracing certain risks while at the same time addressing the requirements and predictability of a university assignment.

3 SITUATED LEARNING

Conceptually our approach on teaching Project Management follows Wilson (2002) in that "[t]he entire structure of the assessment in this unit was designed as a simulation of an activity that they [the students] were likely to be involved in real life". For this the assignment has been set up to encompass the characteristics of "situated learning" identified by Herrington and Oliver (2000), namely: authentic context, activities and assessment; expert performances; multiple roles and perspectives; collaborative construction of knowledge; reflection and articulation; and finally coaching and scaffolding.

Although very much desirable, assignments following this ideal are often difficult to implement in practice. For instance student experience outside university premises is usually costly and adherence

to health and safety standards requires careful organizing. Activities within the university are constrained by available space and facilities.

Virtual worlds offer here a feasible escape route in so far as it widens the students' experience domain while still being contained in a controlled environment. It allows the pursuit of a real, i.e. authentic, project from within the lab environment of an educational institution. It may be indeed a matter of philosophical dispute in what way a project within a virtual world is a 'simulation' or a 'real project'. While the world in which the students act and interact only exists in a computer (and, indeed within the students brains!), therefore being 'virtual', the task requires the students to build real artefacts in albeit a virtual world. The notion of simulated space and real space blur. In fact, it has been argued that there is no real difference between a 'real' and 'virtual' experience (Conrad et al., 2010). This blurring of 'real' and 'virtual' experience however makes virtual worlds an ideal space to teach 'real' issues in a controlled environment.

There is, however, a caveat: virtualization alone doesn't address all characteristics situated learning requires. Multiple roles, collaboration or scaffolding will need to be added as elements to make the assignment successful and relevant. These features have to be embedded as well. In the scope of this paper we focus on the 'authentic context' aspect of situated learning.

4 VIRTUAL WORLDS IN BEDFORDSHIRE

At the University of Bedfordshire virtual worlds have been used in various forms. The journey started with the University acquiring two islands within Second Life in 2007. In Figure 1 the island "University of Bedfordshire" is visible in the foreground with typical university style buildings while the island of "Bedfordia" in the background shows a more 'open' and creative landscape. Indeed, "Bedfordia" was maintained by Teaching & Learning to be used by educators while the island of "University of Bedfordshire" was used by Marketing to promote the virtual activities to the (virtual as well as real, e.g. during open days) public. The availability of these spaces encouraged the author of this paper to utilize the island for his teaching activities. Figure 2 shows the author in discussion with the Head of Learning Technology in 2009 in front of student work. As it happened and implied by

the large student numbers of up to 800 per cohort to accommodate eventually both islands were used for teaching activities.



Figure 1: The island "Bedfordia" and "University of Bedfordshire" within Second Life, March 2010.



Figure 2: Two University of Bedfordshire educators in front of student work.

Also visible in Figure 1 and 2 are the student activities that took place on these two islands. In the foreground of Figure 1, in the upper level are the undergraduate student activities of AY 2009/10. On the lower level underneath, areas have been prepared where the postgraduate students start building soon. Other buildings on the island, including a 'library' building prominently in the middle of "University of Bedfordshire" are unrelated to the assignments but provide (virtual) institutional context. In the upper right corner of Figure 1 the remains of the activities in the AY 2008/09 can still be identified. Figure 2 shows a close up of a typical student showcase developed at that time.

One of the activities given to the students – and indeed the least related to the scope of this paper but mentioned here to set the project management activities into context – was the delivery of a five week course about Event Oriented Programming

(Ferg, 2006) There, the Linden Scripting Language (LSL) was introduced as an example of handling events in an embedded system style environment. Lectures consisted of the theoretical concepts plus material adapted from the Second Life LSL wiki. Students wrote simple scripts that interacted with the virtual scenery. A typical example would be an object that changes its appearance when touched or moved. When the relationship between the University of Bedfordshire and Linden Lab as the Second Life provider discontinued the assignment was first moved to an OSGrid island provided by Dreamland Metaverse (Figure 3) in the Academic Year 2010/11. The following year this activity was moved to Reaction Grid.



Figure 3: LSL activities on an OSGrid island provided by Dreamland Metaverse.

Project Management is taught both at Postgraduate level and Undergraduate level. The postgraduate course runs every spring for 12 weeks while the undergraduate course is year-long unit across 26 weeks from October to May. Students are required to build a showcase using PRINCE2® as the methodology.

Both courses used the space available within Second Life on the university owned islands until 2010. Then the assignment moved over to Reaction Grid as a provider. The differences and challenges implied by this move (which also included a gap year in the use of Virtual Worlds on the undergraduate course in the Academic Year 2010/11 when no virtual world was readily available: in this teaching year the ‘showcase’ requirement was replaced by a rather unspecific requirement to use web 2.0 technology) are documented by Conrad (2011b): for instance the absence of an in-world economy led to a redesign of the ‘cost management’ and ‘procurement’ aspects of the assignment (and had implications on risk too, see Section 6). Indeed students were encouraged to look at example

showcases within Second Life for inspiration while building on the Reaction Grid island; hence utilising in a productive way the similarity between these two worlds.



Figure 4: The island at Reaction Grid, March 2012.

The overall structure of the assignments were similar throughout: students are required to build an in-world presentation (a ‘showcase’) on a topic related to the course of the students.

The more experimental experience from the first year has been published in (Conrad et al., 2009) where the focus was on the suitability of Second Life to be used for an assignment of that kind (which by now can be seen as established, also in view of many other teaching and learning activities within virtual worlds). The main findings identify institutional support as being essential and students mostly do appreciate the use of Second Life in teaching or at least do not object to this. In particular the perceived ‘steep learning curve’ that students have to master in order to get an avatar and to work within Second Life did not seem to constitute an issue for the success of this type of assignment.

The units Social and Professional Project Management (on the undergraduate level) and Professional Project Management (on the postgraduate level) are taught across a number of awards within the field of computing at the University of Bedfordshire. These include awards in Computer Science; Network and Security; Games and Animation; Engineering as well as Business Information Systems. Common to all of these courses is that the students can be expected to be computer literate when they start this course.

The design of the assignment is typically as follows: students are assigned to project teams (the size varies from 3 to 10 or more) and are given a variety of artefacts to be produced, including the showcase within the virtual world. Other artefacts used in the previous years include a PowerPoint presentation, booklets, podcasts or videos. In addition, guidance is given on the use of PRINCE2® as a project management methodology and relevant

templates for essential PRINCE2® documentations such as project brief, highlight reports and risk logs are provided. At certain dates the submission of this type of project documentation is required (such as the project brief in the beginning and highlight reports during the course of the assessment). These documents allow the tutors to provide formative feedback. The students are graded according to their individual contribution to the project team.



Figure 5: Screenshot presented to the AY 11/12 postgraduate students to illustrate the location where to build.

To illustrate this type of assignment we provide in the following an excerpt of the assignment brief that has been given to the postgraduate students in the Academic Year 2011/2012:

“[...] You are working as a group of 10 individuals who need to come together and work as a team. You will be using the PRINCE2 project management methodology to run a real-life project. As part of an educational advisory team you have been asked to create an educational showcase about an emerging technology. The area that you look at must be directly related to the pathway that you are studying, but may cover any aspect of technology within this area. As part of this project you will have to deliver a number of products.

As a team you must produce the following:
[...]

5) An educational showcase about the technology in a virtual world. Land will be provided at the ‘New Bedfordia’ island at ReactionGrid. Please note that familiarization with the underlying technology is part of the project work and therefore must be managed as part of the project work; [...]

As an individual you must produce the following [...].”

Detailed instructions and other resources were then given; for instance the screenshot in Figure 5

(which was made available to the students) helped them to identify the space where they should build their showcase within Reaction Grid.

The following explicit constraint was given as well: “The educational showcase must not exceed an area of 8x8 meters and the maximum height is 5 meters [...]. The showcase must be visual appealing.” Figure 6 is a screenshot of the same areas as seen in Figure 5 nearly before the completion of the showcases against the end of the assignment.

Further details on the various educational activities, the nature of the student projects including detailed screenshots are available on the author’s web site: <http://sl.sanfoh.com>.



Figure 6: The same area as in Fig. 5 towards the end of the assignment.

5 RISK MANAGEMENT IN VIRTUAL WORLDS

The Project Management Institute (PMI, 2008) defines risk in the context of project management as an uncertainty that can have a negative or positive effect on meeting the project objectives. In particular those risks with negative effects need to be addressed explicitly using appropriate mechanisms. For instance a “risk register” or “risk log” is standard within project management methodologies and used within virtually all professionally managed projects. In order to address risk management as a learning outcome within a university assignment it is necessary to expose the student groups, i.e. the “project teams” to certain risks that need to be managed by the team. From our experience with virtual worlds at the University of Bedfordshire, in the context of the Virtual World environment (Second Life or Reaction Grid), contingency plans should address at least the following situations:

- Availability of the Virtual World on the client side: there are several risks in this context. The Virtual World may not be available for an

individual team member, e.g. when working from home with a slow Internet connection or with unsuitable hardware. Contingency plans may then include the redistribution of work to other team members, or the use of a public Internet cafe for certain specific tasks. Clearly the availability of suitable client software within university premises should be established by the educators; nevertheless a temporary problem with these needs to be flagged up as risks for the project as well.

- Availability of the service provider: The worst case scenario is obviously an apocalyptic ‘end of the world’ which indeed can happen in our simulated environment: the provider discontinues their service. As a matter of fact Reaction Grid did so for this type of (i.e. OpenSim based) virtual world in 2012 moving their business model onwards to other aspects of virtual world provision. It should be noted however – they did so with plenty of notice and it did not affect the course of our assessments. While these risks need to be flagged up and monitored by the project team the resolution of these cannot be expected by the students (i.e. the project team) but need to be escalated to the project board (i.e. the course tutor) for further action.
- Availability of the building area: There are two risks that need to be managed by the project team: the unavailability because the island is overcrowded, or a temporary unavailability due to maintenance by the owner of the island. Second Life had regular periods when regions were taken down for updates etc. In both cases a contingency plan will require the re-scheduling of in-world activities.
- Interference with other groups: Similar to the risk of non-availability of the building area due to overcrowding is the general risk of interference with other groups. Primitives and objects may be misplaced and impact other groups’ structures. In such events the situation needs to be managed (typically by contacting the owner of the misplaced object) and the action needs to be properly recorded. Communication here can happen both in-world or in the ‘real’ world.

Other risks we observed include the accidental delete of (virtual) objects, the unavailability of the avatar due to lost passwords or problems caused by software bugs in Second Life itself (such as data base problems leading to lost items).

The course team needs to ensure proper

assessment and grading if such risks materialize. For instance proper project management needs to be acknowledged (with the consequence of good grades) even if some desirable features of the showcase are missing as part of a contingency plan that has been put in place to address problems of unavailability of Second Life. This would be evidenced by documentation of a controlled scope change of the project. In contrast, an unfinished structure that cannot be explained by the project team is not acceptable.

It is however not the role of the course tutors to minimize risks other than those that impact the assessment as a whole. Any action by the course team (for instance removing misplaced objects or to eject / restrict avatars from the island to ease overcrowding) should only be addressed as a response to a formal request of the project manager to the project board.

6 LEVELS OF IMMERSION AND RISK MANAGEMENT

Virtual Worlds provide the opportunity of immersion (Cunningham, 2007) to become part of the virtual world, to lead a ‘second life’ in its most literal meaning. Indeed this distinguishes virtual worlds from other social and collaborative places such as chat rooms or discussion forums. Questions of identity may raise the debate about the way such a virtual world can or should be separated from the real life experience (Peachy and Childs, 2011). In a university assignment it is a matter of debate what role immersion has to play: eventually student work is assessed in real life with real grades.

Recent studies conducted in the general context of the assignment indicate that immersion plays a role and that there are notable differences between Second Life and Reaction Grid. For instance Kanamgotov et al. (2012) discuss a quantitative evaluation of immersion based on questionnaires distributed to students. The important role of immersion is as well further confirmed in (Christopoulos and Conrad, 2012) where this aspect is investigated in the context of projects outside the University of Bedfordshire.

In the following we discuss how the notion and implementation of risk management is different depending on the direct virtual environment in which the assignment is conducted. Following Conrad (2011b) we distinguish between: the main stream provider (i.e. Second Life), a dedicated

provider, an OSgrid based provider, an institutional hosted virtual world and a virtual world hosted by the student him or herself. The first two scenarios are deduced from our direct experience at the University of Bedfordshire when running the assignments while the alternatives were actively considered in preparation for them.

Main stream provider (Second Life): In our experience and following the research cited above Second Life offers the highest degree of immersion compared to the other solutions. The whole concept and marketing strategy appears to be based around the idea of escaping from the ‘real world’ and the various amenities including shops and party spaces underline this. Project risks may appear from interference of random visitors to the project islands or instabilities of the virtual world itself. Risk management strategies will include interaction with other avatars, possibly even avatars unrelated to the university who visit the university island.

Dedicated provider (e.g. Reaction Grid): While similar to Second Life on the technological level a dedicated provider does not provide the same level of immersion (Kanamgotov et al., 2012) or context (Christopoulos and Conrad, 2013). Risk management might here include interaction with the technical support team of Reaction Grid via their ticketing system. In-world support is unlikely to be encountered due to the sparse population in this world and a low presence of technical support in the form of avatars.

OSgrid provider (e.g. Dreamland Metaverse): The configuration of the OSgrid environment allows the possibility to teleport to various places including those not hosted by the provider of the university island. Promoted as an open source alternative to Second Life many amenities are mirrored within the OSgrid environment. Risk management might here include getting help in user forums and help pages, i.e. by utilizing sources from the Internet but outside the virtual world or to identify available resources within the Hypergrid.

Institutional Virtual World host: The degree of perceived immersion will depend on how the virtual world is set up. It can easily be envisaged (and might even become the norm in the distant future) that university owned ‘virtual space’ becomes normal within a university similar to ‘real’ spaces. Facilities such as library, lecture theatres, student union as well as prayer rooms could have a virtual equivalent and being populated with student avatars. Running the assignment in this context would possibly be similar to running the assignment in the context of dedicated spaces within the university. Risk

management in this setting would be confined to interaction within university context. While this might be preferable in order to control the assignment it would also take away the interesting aspect of interaction with ‘external’ stakeholders.

Students host their own Virtual World: Many virtual worlds (one for each student) would co-exist independently from each other. Risk would be very much managed as with other student owned resources. The data on which the world works needs backup and software problems would be escalated to relevant experts or solved DIY style. From all options this seems to be the least desirable as the aforementioned ‘situated learning’ aspect would be effectively non-existent.

In summary there seems to be a shift from a ‘real risk’ situation as experienced within Second Life to a ‘student risk’ situation when moving from Second Life to other providers. The experience of immersion or lack thereof appears to impact the perspective from which risk is perceived. Further research to underpin this observation with solid data would be needed.

7 CONCLUSIONS

Virtual Worlds offer new possibilities in the educational sector and they can certainly help to teach students the essential concepts of Project Management. Indeed areas that are difficult to address in ‘conventional’ assignments, such as risk are addressed in a more natural way within such a multi user virtual environment.

As demonstrated, the experience at the University of Bedfordshire in the recent years shows that Project Management in general and risk in particular can be experienced within the safety of a virtual world. Various aspects of risk management are addressed in this type of assignment. We then argued that the nature of the virtual world, for instance if it is hosted within the institution, by a dedicated provider, or by the students play a significant role and imply differences on how risk is perceived by the students. Indeed an assignment that has started within Second Life cannot be moved so easily to a different provider – even if the technology that supports it is the same – as the difference in environment and hence immersion will change the nature of the students’ perception and hence the ‘situation’ in which the students find themselves.

While the work presented here focuses on the development at the University of Bedfordshire the

observations are relevant in a wider context. Situated learning is not only useful to Project Management but also to other disciplines with vocational learning goals. Even more, in view of the various Virtual World implementations interviews with educators from other institutions (Christopoulos and Conrad, 2013) do not identify a clear preference but seem rather ambiguous. Further research (including experimentation and a systematic student evaluation) is needed to identify how future Virtual Worlds should look like in order to provide an optimal environment for students to achieve a relevant learning experience.

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LINKS TO SOFTWARE

- Second Life: <http://secondlife.com>
Reaction Grid : <http://reactiongrid.net>
OSgrid: <http://www.osgrid.org>
Dreamland Metaverse: <http://www.dreamlandmetaverse.com>
OpenSim: http://opensimulator.org/wiki/Main_Page