Collaboration and Team Composition in Applied Game Creation Processes

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ABSTRACT
In this explorative study, the collaboration and team composition within applied game creation processes is investigated. Applied games are games that are deployed for purposes like training, education, persuasion, physical exercise etc., i.e. all games that bring about effects that are useful outside the context of the game itself.
Ten Dutch applied game designers were interviewed and asked about the creation process of one recently finished applied game project. There are three tendencies that surfaced from these interviews: 1) a domain expert or Subject Matter Expert (SME) in the field one is making a game for is to be involved when creating an applied game, 2) this SME is typically the client - or working for the client - which can lead to unbalanced games and 3) although one could expect otherwise, there is usually no expert on transfer involved in the applied game creation process. In the final section, topics for further research are suggested.

Keywords
Applied games, design processes, serious games, collaboration, domain experts, SME

INTRODUCTION

The advancement of applied games
The impact of games reaches far beyond mere entertainment. Increasingly, computer games are being adopted for defense, medicine, architecture, education, city planning, and government applications (Smith 2007). A more and more positive message with regard to games is voiced through both literature and media. As influential game theorists point out, (almost) all games involve player learning and thus teach something, although the knowledge and skills acquired while playing a game might not always be useful outside the domain of the game itself (Gee 2003, Juul 2005, Shaffer 2006). It is up to the creators of the game to decide what effects the game brings about (or aims to bring about), which can be desired as well as less desired skills.

Proceedings of DiGRA 2011 Conference: Think Design Play.

A popular term for these games that do not have entertainment, enjoyment or fun as their primary purpose is *serious games* (Michael and Chen 2005). However, we have chosen not to use this term for two reasons. Firstly, the term mainly refers to games that teach or train, whereas we also want to include games that have other goals, such as persuasion, exercise, and (physical) therapy. Another reason is that COTS games (commercial-off-the-shelf games), originally developed just for entertainment goals, have been successfully deployed for goals other than pure entertainment. In other words, it is the way that a game is applied that defines its usefulness outside the context of the game itself, while the term *serious games* implies that it is a category essentially distinct from 'normal' games.

Hence, we choose here to use the term *applied games*. Using this term we want to emphasize the fact that all games have some effect on their player. Instead of merely the out-of-game goal, aspects such as the quality of the game, the game play and game experience should be regarded as the core of the game. *Application* refers to the tactical use and usefulness of (the knowledge and skills acquired during) the game activity outside the domain of the game itself. In other words, application does not so much refer to the game itself, but rather to the way the game is deployed in certain contexts. The term *applied game design* puts emphasis on how designers can connect game design activity, game design principles, methods and processes to a meaningful application in real life.

Recently there has been a growing demand for the creation of applied games. Commercial enterprises, as well as governmental institutions and NGOs ask for tailor made games that can be applied in particular contexts. The high demand is also reflected by the number of game developers; when focusing on the Netherlands, we see that approximately half of the companies in the Dutch games industry (around 75) design and/or develop applied games (iZovator 2011).[1]

Yet, although there are a substantial number of companies that design and develop applied games, creating applied games is by no means an easy and straightforward activity.[2] That is, finding a good balance between the 'fun' and the 'applied' part of the game is often a major challenge (Winn 2009, Bergeron 2006). In addition, the people who work at game companies are mostly not experts in the field they are producing a game for. Also, budgets for producing applied games are typically smaller than for 'traditional' games. These conditions make the process of creating an applied game different from that of a game purely made for entertainment. Although the body of literature about (entertainment) game creation processes is steadily growing, as of yet, less has been published about the applied game creation process.

Winn and Heeter recognize three different perspectives regarding the development of knowledge in relation to applied games: 1) the academic, interested in various academic theories, be they from educational pedagogy, communication theory, and so forth; 2) the content expert, interested in the given subject matter; and 3) the perspective of the game designer, focused on creating engaging and entertaining game play (Winn & Heeter 2006/2007).

The first two perspectives are extensively covered by academic debate and literature (Prensky 2000, Squire and Jenkins 2003, Gee 2005, Michael and Chen 2005, Prensky 2006, Shaffer 2006, Bogost, 2007, Ritterfeld et al 2009). There are far less publications that address the design of applied games from a game design perspective rooted in design

and design research. Exceptions are Bergeron (2006), Winn (2009) and Amanitiadou and Van de Weerd (2009).

The aim of this paper

Therefore, the aim of this paper is to gain more insight into the applied game creation process, so as to explore where difficulties occur, and how the process might be improved. The conducted study has an explorative character, investigating the issues involved in applied game creation processes and suggesting subjects for further research.

Researching design and creation processes can be done from many different angles; one can consider the different phases or stages in the process, the tools used during the process, the way team members communicate etc. Since covering all aspects of the applied game process is beyond the scope of this paper, we will here elaborate on the part considering team composition and collaboration. This focus appeared to be an interesting difference between creation processes of mere entertainment games and applied games both from our previous experience with several applied game students projects and consultancy work within our research program. As the first interview also confirmed this was a subject worth asking about, we continued in that direction.

The additional goal and predefined context that make applied games different from entertainment games are likely to have implications. For example, the need for playtesting with the target audience might increase, as testing (also) serves for proving that the game actually meets its goals. Next to that, there are other differences between applied and entertainment games, such as the abovementioned budget difference, which also might influence the creation process. These are interesting themes, but for now will be left out of consideration. Thus, this paper focuses on the effects the addition of a preset out-of-game goal has on team composition and collaboration during the creation process of an applied game.

In the results section we discuss three tendencies that, with regard to this focus, surfaced from interviews held with ten Dutch applied game designers. Firstly, we will show that a person with the role of domain expert or Subject Matter Expert (SME) should be involved throughout the process of creating an applied game. Secondly, applied games typically have a client that initiates the project and who is highly involved in reaching the game's goal. As the SME is usually (working for) this client, we will elaborate on the implications this has for the applied game creation process. Thirdly, we show that, although one might expect otherwise, in most applied game design teams there is no such person as an expert on the effects or transfer of the game to its target audience (e.g. an instructional designer or 'transfer expert'). We conclude with some recommendations for an applied game design creation process. In the final section we will also propose topics for further research, resulting from interesting aspects that arose during the interviews.
In order to place the results within the context of research into design processes, we will firstly briefly elaborate on the existing literature and models concerning game design processes.

THE GAME CREATION PROCESS

The authors of the literature on the game creation process are mostly experienced game designers that describe their best practices and the issues that a game designer might encounter when making a game (e.g. Fullerton et al 2004, Bates 2001, Schell 2008). Kuittinen and Holopainen describe the literature on game design as reflection-on-action,

and claim the books are mostly accounts of the authors' guiding principles (Kuittinen and Holopainen 2009).

Abovementioned authors mostly speak of game design as the core activity, whereas game development is used to indicate the activity of actually building the game. It is however not always clear when game design is a part of game development, i.e. when game development includes game design, or when the two are separate activities, which are juxtaposed; authors have various notions of this matter. In this paper, we use the term game creation, which refers to both the activity of mentally conceiving the game (design) and building the game (development), since the two – as will become clear below – are often intertwined. This is not to say that different people in the team do not have separate roles, a subject that will be elaborated in the results section.

In literature, there is a consensus about most core aspects of the game creation process. First of all, it is often regarded as an iterative process (Fullerton et al 2004, Zimmerman 2003, Costikyan 1994). This means it includes a repetitive cycle of designing, prototyping, evaluating, and modifying the design based on the evaluations. The iterative design process is not limited to the domain of games and is common in the overarching field of design as well (e.g. Gänshirt 2007, Lawson 2005). Within Human-Computer Interaction (HCI) iterative design is the preferred methodology as well, with multiple testing of (paper) prototypes with the target audience as an important component (e.g. Preece et al 1994, Helander et al 1997). Also in the case of games the iterations mainly manifest through prototyping, especially playtesting, which makes it easier for the game designers to evaluate the ideas they have in their heads (Salen and Zimmerman 2006).

Secondly, there is a general consensus on the existence of different phases in the design process, although the number of phases differs. In general, there are at least three phases: the first one is called concept phase, the middle one elaboration phase and the final phase the tuning phase. From this, a very general model can be drawn:

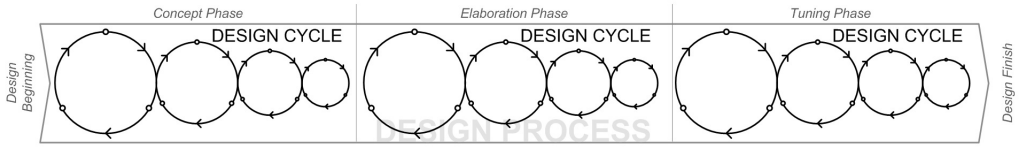

Figure 1: General model of the game creation process (Hrehovcsik, forthcoming)

There is no reason to believe that the creation process of applied games varies from this highly general model, which leaves much space for filling in details. However due to the addition of specific preset goals and the involvement of a whole new field or discipline, it is likely that the details of the applied game creation process are dissimilar from those of pure entertainment game processes. In other words, emphases will differ.

METHODOLOGY

For this study, ten Dutch applied game designers were interviewed. The semi-structured interviews of approximately one hour were conducted between September 2009 and February 2011. The questions asked were divided into two parts: firstly, interviewees were asked about their companies (number of employees, founding date etc.) and the sort of games they develop; secondly, they were asked to pick one applied game they had developed recently, of which creation process would be the topic for the rest of the questions. Questions addressed themes like frequency of contact with the client, team

composition and who fulfilled which task, and the sort of research conducted during the process. The games chosen were highly diverse, including educational games as well as corporate training games and awareness games.[3]

Eight out of ten interviewees were CEOs of their company. One of the designers not being a CEO works as an applied game designer in an academic setting. He forms an exception to the other interviewees in the sense that he does not work for a commercial company. The other person not being a CEO was a consultant for his company. Numbers of employees within the companies ranged from 1[4] to 42 Full Time Equivalents (FTEs) and the experience of the designers varied from 2 to 25 years.

In all the interviews there was one interviewer involved, who was the same person in all cases. The interviews were recorded and the data was analyzed by categorizing the answers per theme. The results are presented per theme in the next section.

”DON’T BE THE PROFESSIONAL, TAKE HIM ON BOARD”

As mentioned in the introduction, all games bring about some effects, since a player always has to acquire certain skills, develop qualities, perform activities or learn about the game system in order to play the game properly. However, it seems that when these goals are set beforehand, it is difficult to integrate the content with the game design. This complexity is recognized in literature (Winn 2009, Bergeron 2006) and was confirmed by the interviewees. Five out of ten game designers explicitly stated that there usually is a discrepancy between the content that has to be conveyed and the game play. One of the interviewees illustrated this by saying that at a certain point in the creation process they were faced with the fact that there was a nice game to play, which however did not fulfill its function as an applied game. Two of the interviewees pointed out that the creation of an applied game is usually a ‘tug of war’ between the game design and the content (remarkably they both used the same metaphor). Another interviewee referred to the same issue as ‘doing a split’.

Brian Winn (2009) addresses this problem in his chapter ‘The Design Play and Experience Framework’ as follows:

“Making a *good* game is hard. Making a good serious game is even harder. The reason it is so difficult is that rather than simply trying to optimize the entertainment aspect of the game, or the so-called *fun factor*, one must also optimize to achieve a specific set of serious outcomes.” (Winn 2009)

Thus, it appears that finding the right balance between content and good game play is hard. Even if these two competencies, i.e. game design and content knowledge, would be combined in one person, the task of making a good applied game is not straightforward. However, these two fields are typically not united in one person, as a game designer is specialized in doing exactly that: designing games. Therefore, in most cases s/he does not have expertise in the domain the game is made for. This brings us to the point of team composition: as applied game design is a multidisciplinary activity, in an applied game creation process there is a need to bring in an expert in the field one is creating a game for. This means a domain expert or Subject Matter Expert (SME) is desirable to support the creation process. One interviewee described their way of working with the phrase: “Don’t be the professional, take him on board”.

The role of an SME

In the creation process of an entertainment game, a typical development team includes a project manager, one or several game designers, one or several programmers, one or several artists, and, depending on the genre and size of the game, developers of specialized media such as audio and quality assurance (i.e. testers) (Fullerton et al 2004). The domain expert is thus an addition to the 'traditional' roles of game development.

In sum, eight out of ten interviewees had worked with one or several SMEs in the project addressed during the interview. This domain expert was mostly involved in the creation of the applied game from the very beginning, together with the game designer and project manager, whereas other roles such as programmers and artists only came in later. In most cases, the expert proved to be also the client, an issue that we will elaborate upon in the next section.

One of the two interviewees without an SME had been in a project where he as the game designer had to dive into the content himself, since there was no domain expert available for this project. He stated he would by no means recommend this way of working to other game designers, as he came to the conclusion that in a few months he could never gain the proficiency of somebody who had worked in the field for years. The other project without an SME worked with a so-called content manager, whose role we will further explain at the end of this section.

Another interviewee illustrated the importance of an SME by indicating he had seen graduating game design students struggle in applied game projects without a domain expert. According to the interviewee, the students did not manage to do the research properly themselves. Since the game design students were educated to design games rather than doing research, they were not able to acquire the information needed to obtain a good insight in the domain.

An SME thus seems to be necessary in an applied game creation project. This is the person who delivers all the content related to the domain the game was made for: none of the ten companies interviewed had a designated researcher in the team and there was hardly any additional research conducted by the game designers or other team members. Likewise, SMEs usually have no particular knowledge of designing games, therefore a good collaboration between the game designer and the content expert is crucial for the success of an applied game.

Knowledge elicitation

One of the interviewees said the SME should have the ability to supply the content, as he phrased it, 'in an angular way' (in Dutch he used the words "hoekig aanleveren"), by which he meant the domain expert had to deliver the content in data translatable to game play. In other words, the SME should be able to turn a possibly 'soft' field (in the example it was project management) into clearly defined categories, e.g. winning conditions, which can in turn be put into game play parameters and ultimately into code.
However, the other interviewees did not expect this skill of delivering content in game parameters to be in the SME, but rather expected it to emerge through communication between designer(s) and SME(s). According to them, the elicitation of the right content from a domain expert is something that should happen between the domain expert and the designer. For instance, three designers pointed out that several meetings between designer and domain expert took place early in the project. In one case, these were especially meant to discover together what is fun about the particular domain, and how this can be

used to make an entertaining game, whereas another interviewee mentioned that together the designer and domain expert made an excel sheet to set game parameters. In both cases the balance/coalescence between fun and content was to emerge in the synergy between the designer and domain expert. According to one of the interviewees, knowledge elicitation, i.e. extracting the relevant and useful knowledge from the domain expert, is an expertise in itself.

One company actually had this expertise of knowledge elicitation embodied in the team. As mentioned briefly above, this company worked with a so-called content manager, whose task it was to elicit the right information and data from the SME. The most important skill for a content manager, according to the interviewee, was an analytic mindset: the content manager should not think in terms of solutions, but rather be able to analyze the field thoroughly. So in this case there is an extra person between game designer and domain expert to make the translation between the content and the game design. The company was one of the larger ones involved, and it is likely that for smaller companies it is financially difficult to hire a separate content manager.

The SME as a full-fledged team member?

It is remarkable that out of eight companies who worked with SMEs, only half considered these experts as part of the team. When asked about the actual composition of the team, only four interviewees mentioned the domain expert explicitly (see table 1).

Team roles	**Number of projects having the role within the team**
Artist	10
Assistant(s) Art & Programming	10
(Functional) Designer	9
Programmer	9
Project manager / Project leader	8
Subject Matter Expert / Domain expert	4
QA / tester	3
Audio / composer	3
Product owners (SCRUM) / 'quality manager'[5]	2
Content manager	1
Target audience expert	1
Media support (video crew)	1
Copywriter	1

Table 1: Team roles mentioned by the interviewees and the number of times they were mentioned.

The other four companies thus regarded the SME as an external consultant rather than a full-fledged team member. In general, it seems that the SME for the interviewees was kind of a borderline case when it comes to the people belonging to the team. This is illustrated by one of the interviewees, who said when asked to enumerate the people that worked on the project: "if I count in the domain expert, there were nine people."

In one of the projects the SME was part of a larger European consortium, with which the company had found funding for developing the game. This SME was situated in Spain, which resulted in rare contact between the actual design and development team and the domain expert. The latter was thus far from being considered a team member. However, the other interviewees indicated that they had more regular contact with the SME. Especially in the early phases of the project, the contact would take place at least once a week, which could be face-to-face, over the telephone or through email.

A possible explanation for the SME only partly belonging to the team is the fact that the SME is often (an employee at) the client. We will go further into this in the next section.

THE CLIENT AS SME

As has become clear, creating an applied game typically requires an expert in the content domain, since game designers are not equipped to acquire this information themselves or obtain a thorough insight into the field by doing their own research. From the interviews it appeared that this expert often is the client - or someone working at the client's company. Within six out of eight projects that involved SMEs, the client fulfilled this role. These six interviewees also indicated that this was a very common phenomenon, i.e. in most other projects they worked this way.

Before elaborating further on the role of the client as an SME, let us first explain more about the role of the client in general. One of the interview questions was about perceived differences between developing applied games and developing entertainment games. Next to the abovementioned struggle to interweave content and game play meaningfully, the interviewees mentioned that applied games typically have smaller budgets, more specific target audiences, and that the context in which the game is to be played (e.g. at school, at home, in a therapy session) is defining the design of the game to a great extent. All these things hint at a smaller freedom in the case of creating applied games: there are more stakeholders and other factors to reckon with. One interviewee explicitly mentioned the client as wanting to have more influence on the design of the game and restricting the freedom.

Having a client in the first place is a difference between the business models of applied games and purely entertainment games. The latter are usually financed by publishers, whose primary objective is selling the game. However, in the case of applied games there is always the client with stakes other than merely retailing the game, since they want the game to fulfill a preset out-of-game goal, i.e. a goal that can be applied outside the context of the game itself. In many cases the client will not sell the game, but rather deploy the game to reach another goal, such as the training of their own employees, raising awareness about a subject or helping patients recover, hence the typically smaller budgets.

Whereas in entertainment game creation processes the involvement of the publisher can vary between different kinds of publishers, i.e. there are publishers that only need to be convinced once of the fact that the game is going to sell while others require more control

on the concept, a client in an applied game creation process is usually highly involved and very much concerned with the concept of the game and its outcomes. All the interviewees that had worked with a client in the project addressed,[6] stated that the client was highly committed to the outcome of the project.

So, the client is the one financing and assigning the project, while keeping a close eye on it. The given that the SME is not by all interviewees considered as part of the team relates to the fact that the SME often works for the client's company; this brings about a certain distance. One interviewee illustrated this by saying: "The SME is still your client, you're not going to call them and discuss every trifle." The distance also depends on who exactly takes up the task of SME. In some cases the domain expert is the same person that represents the client to the game developer, e.g. the person that does the briefing to the game company. However, sometimes the SME is someone working for the client but not the primary contact. As one of the interviewees pointed out, the team had more formal contact with the person that made the financial decisions for the client, whereas the SME just 'sat at the coffee table'.

In three cases, contact between the game company and the SME appeared to be somewhat difficult, as the project manager is the one having contact with the client. Consequently, contact between the SME and the game designer needed to be established through the project manager. This also brings about a formal touch to the contact between SME and the game designer, and could be the reason for the SME not being seen as a full-fledged part of the team. In addition, a very practical pitfall with an SME working for a client is that s/he works at another location, with another schedule and also performing other tasks.

In sum, it seems that a frequent and close contact with the SME is necessary in order to create an applied game in which game design and the preset goal are well balanced. Good applied game design, according to the interviewees, happens in the synergy between game designer and domain expert. But this synergy does not happen without effort. As seen above, the SME being the client (or working at the client's company) can avoid this collaboration from being optimal. On the one hand, the SME is for that reason not seen as full-fledged member of the team. On the other hand, the client can make important decisions with regard to the concept of the game design. As the SME is likely to advocate the content part over the game play, chances are that correct content is overemphasized over game play or the entertainment value of the game. This was illustrated by one of the interviewees saying: 'Even very late in the development process, the client would say "This is really not realistic" and then we would adjust the game towards reality.'

One of the largest companies who were interviewed, had hired their own domain expert just before the interview took place (i.e. the project addressed in the interview still had the client as its SME). Since this company produces multiple versions of the same sort of simulation, it is profitable to employ such a person, as many of their projects involve the same domain. The domain expert they hired was someone with a great deal of experience in the particular line of business, and it was for the first time in the seven-year history of the company that they would not draw the content knowledge solely from the client. However, the interviewee indicated that it was very hard to fill the vacancy, since the position offered limited career perspectives for the employee. Hence, although having an in-house SME seems a very good way to have a complete team in which all roles are equally represented, the practical restrictions cause most companies not to have their own SME in most projects. This is both due to the difficulties in finding such an employee and

to the fact that most companies are making many (small) applied games, which would require a new SME for every project.

The abovementioned job of the content manager seems to be a solution to this problem. Since the content manager is working for the game company and dedicated to represent the content part within the team, such a role can be a suitable way to create a well-balanced game. The enterprise with the content manager had learned from experience. The interviewee of this company mentioned a project where they lacked a good content manager, which resulted in a game malfunctioning due to its overemphasis on correct content. They thus decided that someone with a 'neutral' position, who could monitor the balance, was necessary.

THE LACK OF A TRANSFER EXPERT

Next to an SME, one can think of another person in an applied game creation team. Winn's model of the heart of serious game design (figure 2) shows that a good serious game places itself not only on the overlapping area between content and game design, but also takes into account theory, which involves the vision of transfer according to which a game was created. In the end, the player can acquire skills, gain knowledge or be persuaded of something that is applicable *inside* the game, but the final goal is obviously that these things translate to a context *outside* of the game.
Winn thus regards a theory on transfer as equal to content and game play, which is something that might seem logical but was not perceived likewise by the interviewees.

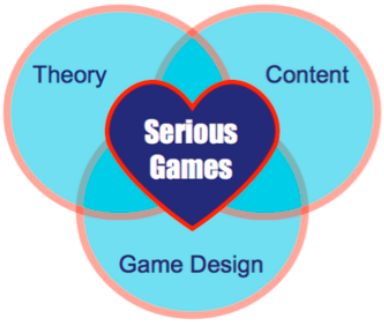

Figure 2: Winn's model of serious game design (Winn 2009)

While the interviewees had explicitly experienced a tension between content and game design, most of them had not given as much thought to the incorporation of a didactical or pedagogical vision. There was one interviewee who indicated that the company took a constructivist stance on learning. Another interviewee showed a matrix of what types of game play suited which learning goals. The company used this before designing an applied game. However, the other interviewees were less precise about their vision. When asked about their views of how transfer from the game to the actual domain takes place, they had trouble formulating this in detail. According to the interviewees, the transfer theory was not something they defined per game, but something in the back of their heads while designing the game. For instance, one of the interviewees mentioned that there were certain types of content more suitable for conveyance through a game than others, indicating models as more suitable than factual knowledge, because models could be simulated. Another interviewee had a similar vision: a game lends itself best for capturing processes and models. Since the game designers felt their view on how to learn through

games was the reason for them to start creating applied games in the first place, they did not feel the need to formulate this per single game.

In accordance with that, most of the interviewees had never worked with someone in the team specialized in this field, such as an educational expert or a pedagogical expert. As becomes clear from table 1, in the addressed projects none of the interviewees mentioned a pedagogical expert as part of the team.[7] In some cases, especially the educational games, the client/SME was someone with a pedagogical background. For instance, in the case of the game about conflict resolution for primary school students, the SME/client had written several educational books about the topic for the same target audience. So he was someone with pedagogical expertise, but not necessarily specialized in how to convey meaning through games.

In a visualization of the serious game development process made by Purdue University (2007) the team members are visualized (see figure 3). According to this scheme there are six people/roles working on the game, one of which is an Instructional designer.

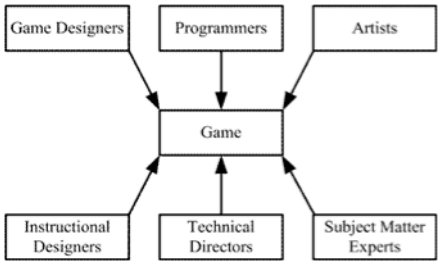

Figure 3: Team composition according to Purdue University (Purdue University 2007)

The instructional designer is "responsible for taking the content identified by the SME and coming up with a strategy to place it in the game in a way that maximizes its instructional effectiveness. In most scenarios the SME is an expert within in their field but not an expert in educational theory" (Purdue University 2007). As mentioned, most of the interviewees had never worked with a separate instructional designer, although one of them indicated they had employees with some pedagogical expertise. It is plausible to think that some of the companies were too small to hire a person specialized in this subject. However, when this possible role was mentioned in the interviews, none of the interviewees indicated they would hire a suchlike employee if they would have the budget for it.

Winn's heart of serious game design parallels a framework developed in the field of Educational Technology, called the TPCK model (Mishra and Koehler 2006). TPCK stands for *Technological Pedagogical Content Knowledge*, designating knowledge on the conjunction of technology, pedagogy and content, which is crucial for designing educational technology. This shows that within the field of Educational Technology the pedagogical part is regarded at least as equally important to content and the medium carrying that content. This is not surprising considering that Educational Technology has its roots in education and training and, therefore, the pedagogical aspect and the teacher as a person are central to this field. As the applied game companies have different backgrounds, of which most are in game design or interaction design, this element is not so obviously essential.

There is thus a lot to gain in this particular part of designing applied games. Also, having an instructional designer or a transfer expert in the team could help to bring the domain expert and the game designer closer together. In the end, an optimal integration of content and game play would benefit the transfer effects of the game, and thereby help the game reach its preset goals.

CONCLUSION

It has become clear that the process of creating an applied game brings about some new challenges compared to the creation process of a game made purely for entertainment purposes. First of all, an extra person is needed to deliver the content, and this domain expert or SME has to work closely with the game designer in order to fulfill the difficult task of finding the right balance between content and game play. As this person is 1) not always seen as a full-fledged member of the design and development team and 2) often works for the client, accomplishing an optimal synergy between SME and designer becomes even harder.

A possible solution for this can be to have a content manager working at the game company: this person distills the relevant knowledge from the SME and advocates the content part in the design process. As this person still works for the game company instead of for the client (who can take final decisions on the game concept), it is less likely that content will prevail in the game design. Furthermore, next to the SME, someone in the team that has knowledge of how to transfer skills, knowledge, awareness, etc. from the game to the player takes place can be beneficial when designing an applied game.

Suggestions for further research

This study had an explorative nature: the ten designers were asked open questions and there was room to elaborate on emerging topics. Next to that, the projects analyzed in this study were highly diverse and thereby not comparable on all fronts. Thus, although we discovered some interesting tendencies, in order to draw firmer conclusions, additional research - on a broader scale and with more focused questions - is needed.

For instance, it could be interesting to investigate the exact role of SMEs in applied game creation processes as compared to the role of a domain expert in other design fields where another discipline typically has to be involved, such as HCI or Usability. To what extent does the fact that within applied game creation one is first and foremost designing game play instead of e.g. a user-friendly and functional piece of software, bring about a different role of the SME? Therefore, it is useful to look further into the exact activity of designing applied game mechanics. In other words, we would like to zoom in on the interplay between game designer and SME and analyze what is exactly happening there. One could then also investigate the relation between the game creation process and the success of the game.

Next to gaining more insight into the exact mechanisms at work in applied game creation teams with regard to team composition and collaboration, a further investigation of other topics is desirable as well. For instance, the role of testing was a topic emerging in several interviews. As the target audiences of applied games often lie outside the common gamers audience, the need for testing seems to increase. Also, by testing early on in the process, the game designer can make sure the required goals are met. This can prevent that, at the end of the process, the final game is tested in terms of effectiveness and

appears to fall short of expectations. A few of the interviewees indicated that theoretically they were very much in favor of multiple testing sessions during a project, but in practice this was done only scantly due to time and money constraints. It would be interesting to investigate if this occurs with more companies and look for possible solutions to this difficulty.

Another interesting topic for further research is the exact role a transfer expert would take in the applied game creation process. When having a pedagogical or didactical expert in the team next to the designer and the SME, how does this work? What consequences does it have? Furthermore, what kind of companies would be able to hire such a person, as currently the means to hire an SME are limited. All in all, there is still a huge field to explore when it comes to effectively creating applied games.

ACKNOWLEDGMENTS

We would like to thank Niels Keetels and Micah Hrehovcsik for their contributions to this paper. Furthermore, we are grateful to the ten interviewees that gave a very open insight into their working methods.

ENDNOTES

[1] Most of these companies do not only create applied games, but also create entertainment games and/or other products.

[2] That is, as said above: applying refers to the way a game is applied only after creating it. However, since clients often ask for games to be applied in predefined contexts, one can nevertheless speak of creating applied games as a process different from an entertainment game creation process.

[3] The precise projects chosen were: 1) an educational game teaching physics to high school students 2) an educational game teaching primary school students about conflict resolution 3) a project management game 4) a ship simulation game 5) a corporate training game for employees of a bank 6) a health game for children with diabetes 7) an awareness game about energy for high school students 8) an educational game teaching about crime investigation 9) a corporate game to improve insight in a specific department of the company 10) a rehabilitation game for children with cerebral palsy by means of a balance system.

[4] The person who was alone was hired by other companies to participate in a game creation team, so none of them actually worked alone

[5] In Dutch: conceptbewaker

[6] In two of the game creation processes addressed in the interviews, there were no clear clients, as the applied games were developed with money from larger projects, one of which was a European subsidy project and one a large Dutch research project.

[7] One could regard the target audience expert as being related to a pedagogical expert, because this person knows how to address the target audience in an effective way and thereby how to maximize the transfer.

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