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Game-Based Learning and its Application in Business Environments

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Abstract

Game-Based Learning (GBL) is a learning method which makes use of game and simulation elements to facilitate the learning process. For decades, game elements have been successfully applied to teach schoolchildren. Several studies have attested the effectiveness of this learning method for any kind of learners, independent of age or gender. However, GBL is not yet an established learning method for adults. In this thesis, we analyse the application of GBL in business environments; available GBL solutions are inspected and forms of use in corporations are analyzed. Since e-learning is common in corporate learning, the focus of this thesis lies on digital GBL solutions, which include digital game elements. A range of up-to-date GBL solutions from vendors such as software producers and learning solution developers have been tested. Additionally, a survey in industry has been conducted in which learning experts of eight mayor companies and institutions based in Switzerland and Germany were interviewed. We found a wide variety of different GBL solutions offered for business application. However, the technical level is by far lower than the one of state-of-the-art video games. The survey results reveal a limited use of digital GBL solutions in the industry. An analysis of the interviews leads towards the definition of four main barriers to GBL, namely "general low acceptance of GBL", "high development costs", "low cooperation between learning companies and gaming industry" and "technology issues". We give recommendations on how to overcome these barriers and how to increase the use of GBL. Although studies and learning experts agree upon the effectiveness of digital GBL, the current level of application in the industry is limited. In order to take digital GBL onward, we propose to launch a showcase GBL project. The desired output of such a project is a digital GBL solution which can be successfully introduced to several businesses and which is able to convince companies of the benefits of games elements in learning.

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Chapter 1

Introduction

Knowledge is getting more and more important these days. Children study for years in school and when people enter companies as employees, learning does not stop. In contrast, companies identify the knowledge of their employees as their most important asset. It is this knowledge that allows companies to gain competitive advantages over others through better products and services. It is also the driver for future prosperity through innovation. Since the creation of knowledge happens very fast, the employees have to steadily adapt and keep up with this process (compare [15]). Additionally, the management has to take care of adequate trainings on all levels of employment. This development is referred to as "lifelong learning" (compare [7]).

Training in companies is important and costly. Depending on the learning method, the costs and the effectiveness vary. Traditional forms of learning include e.g. a coach or trainer who presents the learning content in some form of lecture to the participating employees. The costs for the learning session consist of the fee for the coach and the time the employees have spent in the session while not being working productively. Another conventional form of learning is simply reading. This way there is no need for a trainer, the participants learn the content by themselves and the costs for the coach do not apply. However, the level of understanding by simple reading is often lower than during a lecture of a skilled trainer. To cut costs, there is the attempt to introduce other forms of learning which make it possible to reach a better level of understanding than reading and at the same time do not need 1:1 coaching. One such form of learning is e-learning.

E-learning started in the nineties and a real hype about this new form of learning took place. Promises about deep learning at low costs circulated and a lot of e-learning companies were founded. The peak level was reached during the year 2000, shortly after a stage of disillusion followed. This is mainly because e-learning failed to live up to the high

expectations. E-learning did not disappear, companies still use it for various applications, but learning experts have become more cautious. To further improve the ratio between costs and effectiveness, the search for new learning methods is going on.

Game-Based Learning (GBL) is a form of learning which includes game elements and simulations in order to make learning more effective. The combination of games and learning is nothing new, children play games in kindergarten and school to learn basic skills. As stated in [18], GBL has been widely adopted for children's learning. Pedagogically highly valued products are on the market and have a proved success in the improvement of learning as well as in children's acceptance. Recently, GBL has also been proposed for adult education. Universities and companies are trying to use similar concepts for their training needs. Software products are available which e.g. simulate a whole company. Using this simulation, it allows executives to learn how to make better decisions in the real world (compare [23]). Scott mentions that one fundamental advantage which games have over real life is a reset button.

In this thesis, the current level of application of GBL in business environments is determined. Therefore, the state-of-the-art of digital GBL is analyzed (compare chapter 2). Additionally, the advantages and disadvantages of the use of game elements in learning are identified. Different than in other publications about this subject, GBL is not only analyzed theoretically, but also in real life. Learning experts of different companies have been interviewed to get an accurate image of the level of implementation of GBL solutions in the industry (refer to chapter 3). The findings of the survey are compared to the presentation of GBL in literature and actions are proposed on how to further increase the use of GBL solutions (see chapters 4 and 5).

Chapter 2

GBL and its Promises

In this chapter, GBL and its promises are presented. First the definition of GBL and the formation of this learning method are pointed out. Further on, GBL is discussed more in detail and the promises, the advantages and disadvantages of the learning method are highlighted. The focus of this thesis is on learning in business. Therefore, mainly the aspects that are relevant for corporate learning are treated. Aspects which are mainly important for learning in schools and universities are partly neglected.

2.1 Definition of GBL

In [16], Michael et al. give the following definition, referring to "serious games" instead of GBL: "A serious game is a game in which education (in its various forms) is the primary goal, rather than entertainment". A more concise definition of GBL is not easy to find. Not even in quasi standard literature as Prensky's "Digital Game-Based Learning ([20]) or Gee's "What Video Games Have to Teach Us About Learning and Literacy" ([10]) we find a formal definition. The reason that fore has to do with the fact that the nature of games can vary very much. Depending on the game which is used for learning, totally different kinds of GBL solutions are created. In the following, we give a broad definition which will hold for most research objectives about GBL:

GBL is a learning method in which a game element is used to support the learning process. The main goal of using games in learning methods is to benefit of the engaging nature of games. The game elements used for GBL are designed in order to balance the learning with the game play and the ability of the player to apply knowledge to the real world. GBL uses game elements which allow reaching defined learning outcomes.

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"Serious games" is a term which is often used to describe the combination of game elements and learning. In literature, the term is mostly used as a synonym to GBL. However, it is a relatively new research area. Therefore, specific terms are sometimes used differently.

Important matters for GBL are simulations. For a lot of GBL solutions, a simulation is used as the basis. Simulations can be very motivating, also if there is no additional game element used. Therefore, in this thesis the terms "game element" and "simulations" are often used to describe similar matters.

GBL stands for a far-reaching field of learning methods. This is due to the wide variety of game elements and simulations: In fact, all games, being it card games, board games, video games or role-playing games, can be used in learning. In this thesis we concentrate on digital GBL, but in a broad sense. The reader is asked to understand the game elements as diverse as possible, from very primitive forms of games (e.g. games which are played by the means of emails) up to high fidelity real time computer simulations.

2.2 Formation of GBL

As stated in the last section, GBL is a combination of the two areas learning and gameplay. As we concentrate on digital GBL in this thesis, there is a third field of interest which is computer technology. To introduce this method of learning and to understand its origination, the different areas and all possible combinations of them are shortly presented. The diagram in figure 2.1 graphically illustrates the formation of digital GBL; the three ellipses represent the three areas of interest. The intersections of the ellipses represent the fields which are created if different main areas are combined. By the combination of two ellipses, the fields *e-learning*, *computer games* and *GBL* are created. The combination of all three areas leads to *digital GBL* respectively.

2.2.1 Learning

Learning has always been an important matter and in the information age of today it is not loosing anything of that importance. Not only for education in schools and universities but also in business, learning gets more and more crucial. Companies often value the knowledge of their employees as the most important asset. As stated in [6], companies undertake numerous actions to ensure knowledge transfer and adequate learning and training. These actions can be very costly and learning officers are steadily searching for better and more efficient ways of learning.
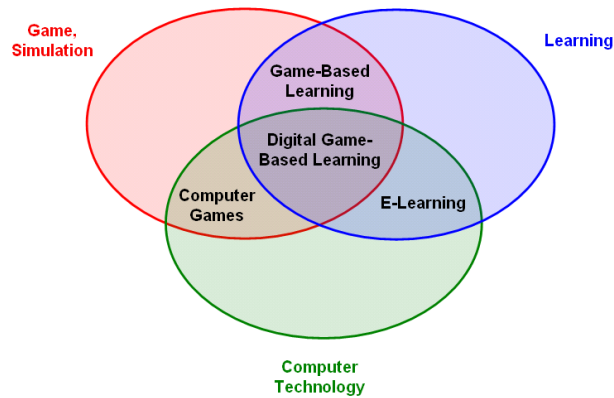
Figure 2.1: Illustration of the three different fields (learning, game and computer technology) which in combination form digital GBL.

There are many different forms of learning: E.g. classroom lectures, reading a book or problem based learning. Education experts are continuously trying to further adapt learning methods to better meet the needs of today's learners. Since the creation of new knowledge happens very fast these days, employees should never stop enhancing their knowledge and skills. Experts refer to this kind of learning as "life long learning".

2.2.2 Game, Simulation

To describe the field of games, first the related action of play is discussed. Play generally describes behavior which has no particular end in itself, but improves performance in similar situations in the future. This is seen in a wide variety of vertebrates besides humans, but is mostly limited to mammals and birds.

When play is subject to clearly defined rules, then this structured play is referred to as a "game". Games enable to define a strict set of rules and goals as guidelines to be followed by the players. People generally like playing games and over time, a lot of different kinds of games have emerged. They range from board games over role-play games to sports. In general it is difficult to define the concepts of game and play (compare [21]).

Simulations are not considered as games per se. However, some simulations tend to have similar effects on participants as games have. Additionally, there are games which can also be considered as simulations. E.g. role-play is actually a simulation of a situation in which people pretend something or to be someone else. As it will be shown in the following section, simulations are important for the discussion of GBL.

2.2.3 Game-Based Learning GBL

One considers a learning method as GBL, when game or simulation elements are implemented to facilitate the learning process. The main reason to do so is to benefit from the engaging nature games exert on people. Further on, one uses simulations not to just assimilate content, but to actually be able to apply knowledge.

Actually, every kind of game can be used for learning purposes. However, if the game is meant mainly for pleasure, the assimilated content may not serve a lot for real life. By the right choice of the game element and by an adequate definition of the game rules its can be made sure the wanted content can be learned during the learning session.

GBL is not a new form of learning. Since decades, professors use games in their classes to bring the students in deeper contact with the learning content. Surprisingly, games are not used very often for adult learners. In University it is rare to play games for experiencing the content which is presented during the lectures. Also in companies, game elements are used only for very specific learning session. In the following sections, GBL will be discussed more in detail.

2.2.4 Computer Technology

The third area which is important for the discussion of digital GBL is computer technology. Compared to the learning and the game area, this is an emerging field. The field is still developing very fast, making computers more powerful and smaller in size at the same time. They have become a versatile machine which can be used for a huge variety of applications.

Soon after the introduction of the personal computer, IT technology has entered into people's everyday lives. With the Internet as a worldwide network, computers have become a new form of communication systems and are getting more numerous each day. In technically developed countries, almost every person owns a computer.

In business, a world without computers would not be imaginable anymore. A lot of tasks are dealt with by the use of computers and at least some basic IT skills are a must-have for most of jobs. As the technology keeps advancing, more and more processes involve computer technology.

2.2.5 E-Learning (Digital Learning)

As mentioned in the last section, computer technology can be used for a lot of different applications. If it is used for learning, the two fields learning and computer technology are

combined. The combination of these two fields is normally referred to as e-learning and leads to the blending of technological, ergonomic and didactic aspects (compare [27]).

When introducing e-learning solutions, learning officers intend to benefit from advantages which computer technology introduces. The main advantages of computers are their versatile utilization, their calculation power and their inter connectivity. Most of employees have their own workstations, so learning is possible for each of them at their desk at any time they want. Since the infrastructure (computer) is already available, it is possible to save costs when using e-learning instead of classroom training sections. A list of more advantages of digital learning can be found in section 2.5.

With the wide distribution of computers in the companies, the e-learning field has grown as well. The expectations were high and soon there were e-learning solutions used for all possible kind of learning content. Unfortunately, some of the produced e-learning solutions did not make use of the possibilities of the new medium. They were not very interactive and participants did rate them as boring. Therefore, the e-learning hype has slowed down in the last few years. However, e-learning is still used for a wide variety of learning issues and the use will further increase.

2.2.6 Computer Games

If the computer technology field is combined with the game and simulation field, the area of computer and video games (throughout this thesis also referred to as computer games) is formed. The history and evolution of computer games is strongly connected to the development computer technology. Since the first computers were available, programmers have started to write programs which were for pure entertainment. Computer games started on a very basic level of technology but are today among the applications which need the most advanced hardware.

Over time, computer games have become a very popular form of gaming and a lot of different genres have been established. In table 2.1, a list of game types as Corti proposes it in [5, p13] is presented. The popularity is attested e.g. by announcements of people who are addicted to computer games, by the popularity of LAN parties and by the number of gamers who are playing massively multiplayer online games (l).

The development of a high end computer game needs a lot of effort and resources. Since there is a high number of potential buyers, the long and costly development of recent game titles is legitimated. However, because of the numerous games which are published, only a few games turn out to be truly successful at the market. More information about the computer game market is found in section 4.1.

Computer Game Genres	
Action-Adventure	Mech (walking mechanical vehicles)
Action-Strategy	Platformer (jump and run)
Arcade	Puzzle
Beat-em-up	Role play
Bemani (music-based games)	RPG (role-playing game)
Driving	Shoot-em-up
Email games	SIM (simulation)
First Person	Sport
Shooter	Strategy

Table 2.1: Common computer game genres.

2.2.7 Digital GBL

Eventually, the combination of all of the three fields leads to digital GBL. Learning is enhanced with game-elements and at the same time it is possible to benefit from the positive aspects of a digitally based solution.

Digital GBL is a modern form of learning. In most cases, the development teams of digital GBL solutions originate from a field which is already a combination of two main fields. That is the e-learning, the computer games or the non-digital GBL field. To produce a successful digital GBL solution, deep knowledge of all the three main fields is required. It is very important to effectively merge all the fields and not leaving one behind. As it will be discussed in sections 2.3 and 4.2.10, this task is not easy to achieve.

In the next section, digital GBL is discussed in more detail. Since the focus of this thesis lies on digital solutions, we concentrate on digital GBL. Throughout the thesis, the term GBL refers to digital GBL.

2.3 Learning with Games?

Why should games be used for learning? What kinds of game elements are used for GBL and what are the advantages of using GBL? These questions are discussed in this section.

Play is an important method of learning and games have a long tradition within pedagogy. Children play with their friends and thereby learn important issues about social behavior. To play enables to apply and train skills to be ready for a real life situation in which certain skills are needed.

The word "game" presents a problem in German speaking countries. "Non-English languages tend to have just one term fro what the English call 'play' and 'game'. The English word 'play' is related to the experience of pleasure. The word 'game' is related to the notion of competition. Games are contests among adversaries (players) operating under constraints (rules) for an objective (winning, victory or pay-off)" [12, p.21].

In the case of digital GBL, computer games are used for learning. When thinking of computer games, people tend to think of action games and ego shooters. Therefore, it is often hard to imagine that this would serve to teach complex content. A study by Green et al. ([11]) detected an improvement of visual selective attention when playing computer games. As shown in section 2.2.6, there is a wide variety of computer games which include other skills than just the agility of thumbs. These include logic thinking, strategy, application of knowledge and more. If computer games are built for the purpose of learning (GBL solution) than it is possible to teach more complex content like interaction with other people or management skills.

An interesting fact about computer games is the absence of manuals. The player of the game is not intended to read a lot of instructions but to learn them on the go during the game. In most cases, a training level is included in which the player learns the basic skills needed for later tasks. As Bopp puts it in [3], game designer have become experts in making teaching fun; the players mostly do not even realize they are learning. To leverage these techniques for education and training is one attempt of GBL.

2.4 Kinds of GBL

The different kinds of GBL differ mostly in the game element or simulation which is used for the specific solution. Over time, a lot of different games and computer games have evolved. Actually, every kind of game is able to teach some kind of content. However, for learning and for corporate learning in companies especially, there are several types of games which are more suited than others.

Game styles which are used for learning as proposed by Prensky in [20] are presented in table 2.2. The list is similar to the list of computer games for entertainment showed in table 2.1. However, the focus of games which are suited for learning purposes clearly shifts towards strategy, logic and problem solving. The game elements proposed for learning include less action, shooting and reflex games. Some new game elements are presented which originate from the learning field: e.g. concentration or flashcard type games.

Kind of GBL Games	
Action/sports games	Mnemonics
Adventure games	Open ended simulations
Building games	Persistent state games
Concentration games	Puzzles
Construction games	Reality testing games
Detective games	Role-play games
Flashcard type games	Strategy games
Game show competitions	Timed/reflex games
Invention games	

Table 2.2: Game elements which are used for GBL solutions.

2.5 Advantages and Disadvantages of GBL

In this section the advantages and disadvantages of the use of GBL will be presented. The aspects discussed are based on research papers about GBL and in chapter 4, these findings will be compared to the experiences which companies gain when implementing GBL solutions. Since GBL is a combination of different areas (compare the upper section in this chapter), the advantages and disadvantages are categorized and matched either with the game element or the digital element. Subsequently, the aspects of individual and group learning in GBL are discussed.

2.5.1 Advantages of GBL Attributed to the Game and Simulation Element

Motivation and Engagement

It is very important to consider the nature of the motivation of the learner (see [13] and [9]). As seen in section 2.2.2, most people are fascinated by games. People can spend hours playing a board game or in front of the computer as well as playing with others or just by themselves. Age does not matter a lot, children as well as grown-ups are motivated through games (e.g. [9] and [8]). They are motivated to solve tasks which mostly have no direct benefit in real life. Games can be really catchy and one main reason and advantage of using games in the learning environment is to motivate the participants in a similar way. This is usually achieved through a compelling storyline, or a challenge presented by the game element (compare section 2.2.2).

Role play is also motivating. It is interesting to experience the situation of others

and to take decisions from another point of view. It helps understand others better and supports team work.

Sometimes there are not even real game elements needed to be motivating: people are also fascinated by open ended simulations which have no predefined problems to solve.

No Impacts on the Real World

Using a simulation of a process enables the participant to experience the system without touching the real world. In some cases it may be too dangerous or too expensive to train directly on the real system. E.g. pilots have to spend a lot of hours training in the simulator before flying a real plane. To train them directly on the plane could cause accidents and endanger a lot of people. A non digital example is e.g. the training of a sales person. The best training for him or her would be to actually talk to clients. However, the client can be disappointed which is a risk for the company. To avoid the risk, the sales person is made talk to a coach who acts as a client.

Simulations can Make Hidden Processes Visible

When simulating a process it is possible to change parameters which can not be influenced in the real world. For instance it is possible to adjust the time and accelerate or decelerate a process. This can be helpful to make processes visible with a duration of only milliseconds or long lasting processes which run for years.

Another parameter often adjusted is the size of a phenomenon or complexity of a system. Simulation of physical phenomenons can make an atom or gas visible or shrink the universe to the size of a computer screen. Similarly, a business simulation simulating a whole company can focus on just a part of the processes, making some important issues and influences become easier to understand.

Experiences Close to Reality

If a simulation is built with effort and care, it can be very close to reality. This helps the participants to adapt fast to a simulation. It allows gathering experiences which are very close to the ones that are made in real life. These experiences can be taken almost one to one to daily situations. If confronted with a similar situation, the trained participant will have the feeling that he has seen this before and does not have to act in surprise.

Adaptiveness and Interactivity

Games and simulations are both context sensitive. A game depends a lot on the actual situation: what has been done by the participant so far? What has been done by the opponent and how strong is he? How much time is left to make a decision? The same is true for simulations: depending on different parameters and logic connecting them, the actual state is obtained. In a lot of simulations the participant is able to change parameters during the simulation to get exactly the result he or she is interested in.

GBL is active learning. The participant can understand a system by experiencing it. Instead of just hearing or reading the content, he understands directly in the game or simulation, how something works and which effects a cause has. Knowledge can be applied actively and direct feedback indicates which strategies have to be used in which situations.

With GBL, traditional linear learning concepts are replaced by circular and more flexible ones. The learning content has not to be gone through book-like from page to page in a predefined order. The learner can choose for himself about which subject and at what point in time he would like to have more information. Sometimes it is even possible for the participant to choose the form in which the content will be presented to him [20, p. 90]. Further, it is possible to adapt the learning pace and the level of difficulty of the task to solve. The adaption of difficulty can be achieved by offering more or less help during the session for example. When it is possible to keep the level of difficulty balanced with the abilities of the participant, this is very motivating.

2.5.2 Disadvantages of GBL Attributed to the Game and Simulation Element

Games are Not Appropriate for All Kinds of Content

Games and therefore GBL methods are not necessarily the best solution for all different kinds of learning content. Game and simulation elements are very useful to apply knowledge and to find out how different things are connected. The participant learns a smaller amount of content, but to a very deep level. To teach a lot of background information about a field, a book or lectures would be more appropriate learning methods.

Games are Not Appropriate for All Kinds of Learners

Games are not per se right for everybody. In studies (e.g. [22]) it has been noted that some learners do not like using simulations or games.

Simulations can Not be Skimmed

A simulation can teach a process very well. Nevertheless, unlike e.g. a book, the simulation has to be experienced in its full and it is not possible to just pick out parts of it and still understand the whole picture about something [1, p. 177]. An advantage of this matter is that for the coach it is relatively easy to know how much the participant has understood. If the participant has worked through a simulation he most likely has experienced and learned the content.

Presence of Coach can Alter Learning Results

If a coach is needed do run a GBL solution, the course of the learning experience is very much depending on him or her. Some participants may be neglected or feel misunderstood. The results of the course will vary each time.

2.5.3 Advantages of GBL Attributed to the Digital Element

Integration of Multimedia Content

Using computer based learning solutions enables to directly include audio, video and other multimedia content. Neither a video player nor a TV set or a beamer has to be organized to show a video sequence. It is also possible to record voice or images of the participant and directly use this information in the session.

Easy Measurement of Learning Process

Since the training session takes place in front of a computer, all the input of the participant is available in digital form. This way, the performance can easily be measured.

Easy Documentation of Learning Process

It is not only possible to measure the input (and therefore the understanding) of the participant. This data may also be stored for documentation and surveillance of the learning process which allows the coach to observe how the participant is doing and where some more input is necessary. It is also possible to adjust the simulation or the learning content if the learning stage (record of a last session) of a participant is readily available.

Learning Objects are Reusable

Due to the fact that the learning elements are digital (mostly objects in software), they can be reused as many times as preferred without wearing off. Thanks to this, it is possible to safe a lot of money if the system simulated is expensive or would be exhausted rapidly in real life.

Integration of Learning Method into the Company Learning Management System (LMS)

A big part of learning in companies is done digitally. Mostly, there is already a learning management system (LMS) installed with which the content and all the learning issues are centrally organized. If a digital GBL solution is used, most likely an interface can be used to use the new solution directly with the LMS of the company.

Participants Learn to use a Computer

All digital learning solutions are computer based. So the participants are forced to use computers and get more comfortable using them. On the other hand this can also be a handicap, because some IT skills are necessary to be able to follow the learning session. Compare section below.

No Physical Presence of Coach

Of course the presence of a coach is not something which should be aimed for. No digital learning solution is replacing a good coach. However, in some aspects the presence of a coach can also be counterproductive. Some examples are presented further down in this section.

- *Repeatability:* Using a digital learning method, a specific situation can be created and later on recreated. A coach acts slightly different every day, also if working together with other participants in a group; it is not possible to recreate a special situation.

- *Just-in-time learning:* If the learning session is not dependent on the presence of a coach, the participant can go through the content whenever he wants to. He does not have to make an appointment with the coach but can initiate a learning session just before actually needing the knowledge.

- *Non judgmental environment:* One advantage computers offer is that they are neutral. Unlike human beings, computers just follow a set of instructions and do neither privilege nor discriminate anybody. If the coach is only monitoring the learning progress but is not physically present, the participant is less influenced and behaves more naturally. [19, p. 16].

Advantages attributed to the Online Element

If using a digital method, there is the possibility to make the method online based. That means that instances of the learning solution are are not only running for themselves on specific workstations. It rather enables the solution to exchange data with other instances running on other workstations. This brings the following advantages.

- *Enabling team work:* If computers are connected, several participants can work with the same program at the same simulation. In a project management simulation for instance it becomes possible to simulate a project and distribute the roles to different participants. All of the team members can now work on the same simulation using their own workstation. Online solutions bring people together also if they are located far away from each other.

- *Actuality of content:* For the solution it might be necessary to access current data like stoke exchange prices or information about running projects. An online solution has the advantage to be able to connect to a server and to make this kind of current data available. This way it is possible to train participants on real data sometimes even in real time.

- *No installation necessary:* Another advantage of online solutions regards the deployment of the software. Somehow the solution has to be set up on the workstations where it is required. If only a handful of computers are used for training reason, it is no problem to use a medium like a CD or DVD. If the specific solution has to be set up on hundreds or thousands of workstations, it can be an enormous effort to install the solution on all of them using storage mediums. If the software is available online, the user can download specific content and start without installing anything.

2.5.4 Disadvantages of GBL Attributed to the Digital Element

Need of a Computer

For all digital learning solutions there is a workstation needed. The computer must meet the performance required to run the learning solution. In addition the software has to be installed and configured on the computer. This asks for a lot of effort to be able to let the participant work through a training session. Either the workstation has to be set up specifically for the participant or the participant has to make his way to a learning center where the system is already set up and running.

Requirement of IT Skills

A minimum level of IT skills is needed to be able to work with digital GBL solutions. The participant has at least to be capable of using a computer and be familiar with an operating system. At least the same skills are necessary for instructors and coaches who assist the participants during the learning session.

Need of Flexibility for New Forms of Learning

With digital learning solutions, the possibility of adding multimedia content directly to the learning method is given. It is also possible to use new forms of learning e.g. by the use of interactive elements. The participants have to get used to these new forms of learning and may encounter some difficulties in the beginning, as long as everything is new form them. It is also a change for the coaches and can be difficult for them to teach with the help of new methods.

Disadvantages Attributed to the Online Element

The bandwidth of Internet connections is scaling up quickly. However, online applications are still running remarkably slower than workstation-based application. Therefore, the high fidelity of online solutions is still low, especially if it comes to real time simulation with high resolution graphics. The latest massively multiplayer online games use a client program which is installed on the workstation. This way it is possible to achieve a relatively high level of high fidelity. However, it is often not possible for employees to install new software on their computers (compare section 4.2.10).

2.5.5 Comparison of Individual Learning to Group Learning

Another dimension having an impact on the effectivity of different learning methods is the number of participants who are together in a group for a learning session. It is not possible to determine an ideal number of participants for GBL methods in general. It depends very much on the game elements used and also on the kind of participants. In fact, every group of people is different and so the ideal number varies with every group. In this section the special case of just one participant (individual learning) is compared to the case where there is more than one participant.

Advantages of Individual Learning

The obvious advantage of individual learning is the possibility to design a learning session especially for one participant: The learning pace can be adapted perfectly to the needs of the participant and the content can be varied. In addition, the difficulty can be chosen adequately and also be varied during the session. If there are different methods available to teach a given content it is even possible to choose the learning method. Not only the learning session but also the evaluation of the learning process for the participant can be tailored. Therefore, individual learning facilitates the determination of the level of knowledge of each participant.

Disadvantages of Individual Learning

For analog individual learning, there is one coach needed for every single participant. It is not possible to afford face-to-face training for all employees, at least not to teach all content which has to be taught in a company. This is only worthwhile for very specific learning issues which are critical to the success of the company.

Digital learning is an enabler for individual learning. This is due to the fact that the same program can be used by different learners simultaneously and therefore one coach is able to supervise more than one participant at a time.

Individual learning bears the risk of social isolation for some participants. E.g. conventional schools are still some of the most important places for socializing. However, digital learning is normally not replacing but used as a supplement to classroom learning.

Advantages of Group Learning

Learning in groups includes an additional social and psychological matter to the learning environment. Suddenly there are other influences than just from the coach and the participant: the members of the group have to respond to the others and find their role in the group.

An advantage of group learning is the fact that this kind of learning is closer to reality than individual learning. Almost in all positions in a company employees have to work together with others, find consensus on certain matters and divide and distribute the workload on the group members. Teamwork can thus already be trained during the learning session. This social interaction can stimulate motivation.

Disadvantages of Group Learning

When divided into groups, the participants slip into different roles. Some of the participants are more dominant than others and therefore take over the lead of the group. It may happen that some participants can not bring in their ideas as they could in individual sessions. It is difficult for the coach not only to work together with the dominant participants but involve all members of the group. For the same reason it is more complex to evaluate the level of knowledge and the learning process of all the members.

In this chapter, GBL has been presented. Additionally, The formation of GBL and the advantages and disadvantages of this learning method have been pointed out. In the following chapter, the results of an industry survey are presented which will be compared thereafter to the findings of chapter 2.

Chapter 3

Survey about GBL in the Industry

To analyze the use of GBL in industry, a survey with learning experts of eight companies has been conducted. In this chapter, the goal of the survey, the methodology used and the most important results are presented. The opinions of the experts give a good understanding about the level of progress of GBL in the industry and touch some issues encountered when running GBL projects. The results are not yet discussed; this is done in chapter 4.

3.1 Goal of the Survey

The goal of the survey was to analyze the state-of-the-art of application of GBL in the industry. With a pre-study, consisting of short interviews with experts, it was found that it is not yet possible to conduct a quantitative research. The reason for that is the lack of a sufficiently high number of conducted GBL projects in the industry. Most often the companies just started to test the first GBL methods with their employees and so very limited experiences have been made so far. Therefore, the goal of the survey was changed to a qualitative one: what is already done in the field of GBL? What are the first findings about the potential of GBL in the industry and why is GBL not yet used more often?

3.2 Methodology

The survey was conducted by means of interviews with L&D representatives of eight major companies, all experts on their field. As Oishi states in[17], it is important to identify the right respondents. Since e-learning and learning management systems (LMS) are mainly implemented in large companies, only companies with several thousand employees were

chosen for the survey. Additionally, the companies were selected in order to obtain a balanced business mix which includes most of mayor industries. The interviews were conducted with the help of a structured questionnaire. The questions were determined according to important aspects of GBL treated literature. To obtain original information and because of the wide variety of possible applications of GBL, open-ended questions were formulated. However, in order to not discriminate less talkative respondents, lists of possible answers were held ready to deliver prompts when necessary (compare [25, p. 122]). By means of test interviews with two L&D experts, the questions were tested, exchanged and the structure of the questionnaire was refined. The structure of the final questionnaire can be found in the appendix. During the conversation, the following items were discussed with the experts; summaries of the interviews can also be found in the appendix.

Introduction Short presentation of the goal of the survey and making sure the the interview partner is the adequate person to talk to.

General questions about learning Understanding the role of learning and knowledge transfer in the company. What was the content and which situations provoked learning sessions? How was the evaluation of the learning process done?

General questions about GBL Find out about the opinion of the experts about GBL. How do they rate the potential of this learning method, what do they think of its effectiveness and which advantages and disadvantages do they see in comparison to other learning methods?

Application of GBL General questions about the current application of GBL in the company. What were the experiences with GBL?

Specific GBL projects To get a deeper insight into the application of GBL, specific projects were discussed in detail. How many participants were trained with the GBL solution, what was the budget for the project and what were the problems encountered?

People typically provide more information in face-to-face interviews than in telephone interviews (compare [26, p. 126]). Therefore, face to face interviews were conducted whenever possible. Only two interviews were held over the phone.

3.3 List of Interviewed Companies

Experts of the following companies have been interviewed for this thesis. To find summaries of the interviews please refer to the sections which are indicated in brackets.

- Bayer, Pharmaceuticals (B.1)

- Bundeswehr Deutschland (German Federal Armed Forces), Defense (B.2)

- Credit Suisse, Financial Services (B.3)

- Insurance Company (name undisclosed, referred to as "Insurance Company" in the further text), Insurance (B.4)

- Siemens Transportation Systems, Engineering (B.5)

- Sulzer, Engineering (B.6)

- Swissmem, Vocational Training for the Swiss Mechanical and Electrical Engineering Industries (B.7)

- SwissRe, Insurance (B.8)

3.4 Opinions of the L&D Representatives

In this section, statements of the company experts to different aspects about learning and GBL are presented. The statements are summarized and arranged as answers to eight different questions.

What is the Potential of GBL in Your Opinion?

This question was asked to get a general impression about how GBL is perceived in the industry.

Bayer: GBL holds a high potential as a future learning method. It will be used more often in the future. GBL enables participants to experience a situation without touching the real world. It is possible to train in a safe environment. In addition it is possible to take participants to their limits e.g. by adding time constraints to a simulation.

Bundeswehr: The development is clearly going towards the direction of GBL. The method is very much action driven. The participants do not have to sit in front of a computer by themselves. It is simple to evaluate the learning process which is an important asset precisely for military use.

Credit Suisse: Good results have been achieved using GBL methods. The area will be further developed with a focus on digital learning solutions. GBL is useful to create

situations which are compelling and enable profound learning. Another advantage of GBL is its reproducibility; it is possible to generate similar situations whereas this is difficult with non digital learning methods.

Insurance Company: GBL bears a very high potential. Game-based approaches allow to put the participants in a mood which is very supportive to assimilate learning content. The whole society should use such methods.

Siemens: Using GBL enables the participants to be active themselves. The own activity is a condition to understand complex learning content.

Sulzer: Through GBL the participants can gain experience in situations which are very close to real life. GBL makes learning fun, almost all people like games. After a few minutes of a simulation, the participants forget the game and behave like in reality.

Swissmem: The potential of GBL is not rated as high anymore. This is mainly because GBL provokes big changes for the coaches and extensive restructuring of the learning content. Fun is not seen only positive in learning: a joke heard for the third time is rather disturbing, not motivating.

SwissRe: -

Surprisingly, in most companies only very few GBL solutions have been implemented. In spite of the missing applications, the overall rating for the potential of GBL is high.

What is Your Opinion about E-Learning?

Since the focus of this thesis lies on digital GBL, it is of interest how the company experts think of digital solutions in learning. Furthermore it was intended to compare the acceptance of e-learning to the acceptance of GBL.

Bayer: E-learning is a reasonable learning method and is often well implemented.

Bundeswehr: Distant learning, a further development of e-learning which is more action driven, is very promising.

Credit Suisse: Positive experiences have been made with e-learning. Negative results arise only if the developed e-learning modules are low-end and boring.

Insurance Company: The trend moves away from instructor led training (ILT) towards web-based training and towards GBL. The content is often poorly adapted for e-learning.

Siemens: Pure e-learning does not show best results because social contacts are missing in the learning session. E-learning as a supporting element is recommendable. It is only possible to teach relatively basic content through e-learning methods.

Sulzer: The e-learning hype has slowed down. It is not possible to learn directly at the workstation in the office because of the disturbance through noise and other employees. In specific learning rooms, e-learning works well. Especially blended learning approaches are promising.

Swissmem: E-learning is often applied; whole learning modules are processed and made accessible to the participants. Social interaction is very important during the learning process, therefore e-learning should not substitute but supplement existing learning methods.

SwissRe: E-learning is especially suitable for the instruction of corporate compliance (e.g. regulations or password security) or similar content.

In most companies, e-learning is implemented to a wide extent. However, there are not only positive impressions about the learning method. The e-learning hype has decreased slightly.

For what Kind of Content is GBL an Appropriate Learning Method?

One goal of the survey was to find out for which content GBL is used successfully in the industry. In chapter 5, the results to this question are used to specify the most adequate content for a show-case implementation of GBL.

Bayer: In fact, GBL is appropriate for any content but it is especially suitable for specific knowledge e.g. of a complex system. It is possible to change behaviors.

Bundeswehr: GBL is suitable for simulating situations which can not be practiced in reality e.g. because it would be too dangerous or because it would be too expensive.

Credit Suisse: In principle it is possible to use GBL for all content, but it is most appropriate for deeper understanding and getting experience in a matter. For basic knowledge transfer, GBL would be too expensive.

Insurance Company: GBL can be used for all kind of content. However, it is more suitable for teaching soft skills than technology skills.

Siemens: To teach complex content (e.g. soft skills), game-based solutions are very appropriate. Such content can only be taught, if the participants get active themselves, which can be achieved by the use of game elements. It is possible to change behavior using GBL.

Sulzer: The more specific the content, the more difficult it gets to use a GBL solution to teach it.

Swissmem: GBL is suitable for experimenting and content which can be processed and experienced by trial and error. E.g. by using simulations which are similar to the computer game "Myst".

SwissRe: -

Surprisingly, half of the experts stated that GBL was appropriate for any content. Most experts who specified the appropriate content more precisely agree that GBL is most appropriate for content as complex systems or soft skills.

For what Kinds of Learners is GBL Appropriate?

This question was asked to find out if GBL is an adequate learning method for everybody or if there are people for whom game elements are not suitable.

Bayer: GBL is appropriate for everybody. Most people like the game elements.

Bundeswehr: GBL is generally suitable for anybody. It depends a lot on the content: either everybody likes the specific solution or everybody finds it boring.

Credit Suisse: It is suitable for everybody except for the people who do not like games at all. However, simulations are often far away from pure games, so it is often also usable for non gamers.

Insurance Company: GBL solutions suit the majority of people. For the ones who dislike the game elements, the content could be provided without the game element.

Siemens: Some intellectual capability, e.g. the ability to abstract, is required to use GBL. Otherwise the solution has to be adapted.

Sulzer: In group games, the individual is supported by the group, therefore there is mostly no problem. When using a single participant solution, there can be an issue with the game element. But basically almost everybody likes games.

Swissmem: GBL is rather appropriate for intelligent participants.

SwissRe: -

Most experts agree that GBL solutions can be used for practically everyone. However, some experts add that there are people existing who do not like games at all. Interestingly, two times it was mentioned that GBL solutions were rather suited for intelligent participants.

How High is the Acceptance of Employees of Your Company towards GBL Solutions?

To get an impression on how different people react to GBL solutions, the experts were asked to rate the acceptance of different stakeholders towards GBL. As different stakeholders, the coaches, the participants and the management were proposed.

Bayer: Widely accepted throughout the company.

Bundeswehr: High acceptance, GBL is used very often.

Credit Suisse: 50% of participants like GBL, the others think it is OK. Especially young participants are easily inspired. There are no differences in acceptance between men and women. Most of the coaches see GBL as a chance. Management is less enthusiastic about GBL.

Insurance Company: Learners like GBL. Coaches are also fond of GBL, but they are biased. It is not possible yet to judge the acceptance of management.

Siemens: Almost all of the participants like GBL, the coaches as well, but they are biased. The acceptance of management varies a lot.

Sulzer: The general acceptance of GBL is high. During group activities, the participants sometimes fear the exposure to others, but after the session the feedback is most often very positive. The higher the management level, the lower the will to play games. Nevertheless, the acceptance to introduce GBL solutions for the training of employees is high.

Swissmem: Some students think the game elements are unnecessary. Good students seem to have a higher acceptance of GBL than weaker ones. Coaches rate the application of GBL more challenging than conventional methods.

SwissRe: The general acceptance of games is very low in the company. This affects also the attitude towards GBL.
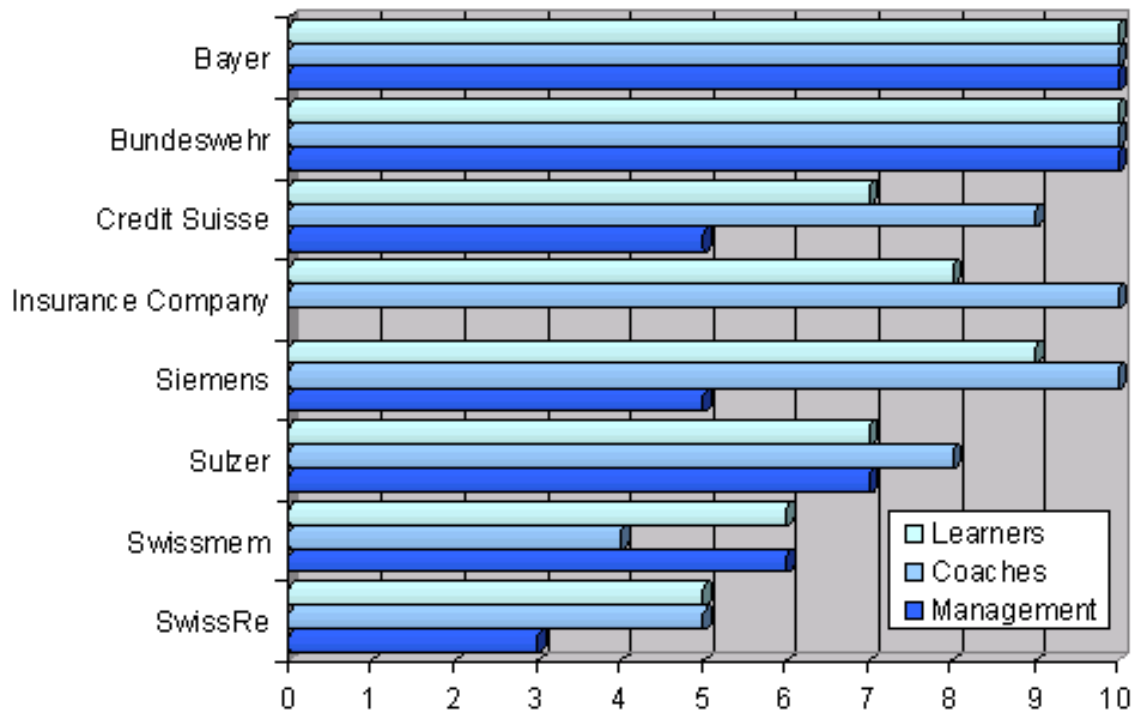
Figure 3.1: Acceptance of GBL of learners, coaches and management of the interviewed companies.

The acceptation of GBL among the different companies varies a lot. As it is shown in figure 3.1, there are companies in which all of the stakeholders totally accept GBL as a learning method. In other companies, skepticism regarding GBL is high. Especially the management is often not convinced about the combination of game elements and learning.

Did the Participants Change in the Last Decades? How did They Change and How did Your Company React to that Change?

Prensky assumes in [20] that the learning generation has changed over the last few decades. He says that conventional ways of learning do often not appeal to the today learners anymore. He argues that people are now used to learn content by watching fast paced television programs and have grown up playing interactive computer games.

Bayer: -

Bundeswehr: -

Credit Suisse: Yes, young people learn differently. The attractiveness of the learning

content must therefore be increased. Development goes towards modular e-learning. On-demand and just-in-time learning get more and more important. To gather close to real life experiences, classroom sessions are replaced by activity-based learning sessions.

Insurance Company: -

Siemens: Participants have become a bit more open towards different learning methods. Motivation did not change much.

Sulzer: Participants have become more active. They do not sit and wait until something is happening at the blackboard but they get active themselves. They now work in groups more often, a close link to real life and interactivity are expected and valued.

Swissmem: They definitely changed. Today one does not assimilate a lot of knowledge in advance, but one rather learns how to develop own knowledge in a field of interest. To achieve this, the learning methods are now more participant-focused and less trainer-focused: classroom sessions are e.g. replaced by project work.

SwissRe: Training did not change a lot, but the learning content has been standardized worldwide. Rapid-learning and learning independent of time and place are getting more important.

The experts agree with Prensky, most of them feel that the learners have gotten more active and that learning methods have to be adapted to this change.

Is the Role of the Coaches Changing if GBL is Used?

If a learning method is replaced by GBL, this evokes changes for all different stakeholders. This question was formulated to find out how the role of the coaches changes.

Bayer: The required abilities of a coach increase because the outcome of the simulation is not defined in the beginning. The coaches have to be very flexible and be able to adapt to unexpected situations rapidly.

Bundeswehr: -

Credit Suisse: The role of the coaches does not change. The instructive part of the learning method does not change if GBL is used.

Insurance Company: The role of the coaches is getting more challenging but also more interesting, when using GBL. The role changes from a trainer task to an actual coach function.

Siemens: The task of a coach is getting more challenging, the level of difficulty of the GBL solution has to be adjusted throughout the session.

Sulzer: It is getting more challenging for the coaches, when switching to GBL. They have to know exactly what behavior of the participants they want to be monitoring.

Swissmem: The role of the coach is getting more difficult. Not only more flexibility is required, but for digital GBL also some IT skills.

SwissRe: -

Most experts agree upon the fact that it requires more abilities of the coaches to use GBL instead of a conventional learning method. The role of the coaches is therefore consequentially changing.

Are There any Barriers to the Development of GBL Solutions?

One of the main goals of the survey was to find out why GBL is not used more often in the industry. If most learning experts agree that GBL is an effective learning method, why do companies not use it to a larger extent?

Bayer: Costs and effort to develop a GBL module are very high. It is only worthwhile if the module will be used for a high number of participants.

Bundeswehr: In the society, the computer games field is often reduced to ego shooter games. This can let GBL appear in a bad light.

Credit Suisse: Costs are very high. Long time development of GBL solutions can present a problem as well: fast changes in business and in knowledge can make learning content obsolete in short time. Another difficulty presents the shortage of workstations which hold the computational power to process multimedia content.

Insurance Company: Development costs are high. Technology issues including bandwidth can be a barrier: e.g. if a high number of participants want to work on the same learning module at the same time.

Siemens: In some cases the game element in combination with learning is not taken seriously. Management does not want to invest in learning methods which seem fun only.

Sulzer: A GBL project is accompanied by a lot of effort, not only financially but also for personnel and infrastructure. For analog GBL the minimum number of the participants forming a group can be an issue. Furthermore there is more know-how necessary on the side of the coaches. This often makes external staff necessary which results in high costs. Sometimes it is difficult to convince the management of the effectiveness of GBL.

Swissmem: GBL causes high development costs and indicates higher demands concerning the abilities of the coaches. The effort to adapt the learning content to the learning method is also high. Additionally there is a huge gap regarding technology and high fidelity: participants expect game elements to be technically at the same level as the latest computer games, which is impossible to achieve.

SwissRe: Games are rather disliked by the management and there are strict policies concerning games. Therefore it is difficult to apply GBL solutions.

The reasons mentioned by the company experts range from monetary ones over technical to social ones. Most often the development costs were stated.

The main findings of the survey can be summarized the following way: Learning experts agree that GBL is and interesting learning method and that it is effective for most participants. Surprisingly, very few companies actually use digital GBL solutions. A lot of different reasons were mentioned which prevent learning officers from implementing GBL. It is not possible to illustrate the opinions of the learning experts in a matrix representation. This is due to the fact that the experts have different backgrounds concerning GBL and were referring to totally different implementations of GBL.

In the following chapter, the different barriers to GBL are analyzed and categorized. Additionally, in chapter 5 for each barrier a way is presented on how to overcome it.

Chapter 4

Evaluation of Application of GBL in the Industry

In this chapter, we discuss the application of GBL in the industry. Additionally, answers for reasons why one does not use GBL more often are presented. In the first section, we will concentrate on some facts about the market for GBL solutions. This includes a list of the mayor GBL companies, information about the commercially available GBL solutions, some numbers about potential participants and the estimated costs of the development of a GBL solution.

In the second section, the results of the survey presented in chapter 3 are discussed. Do the interviewed experts all have the same opinion or do they differ? Which aspects mentioned in literature are experienced in practice by the experts?

4.1 GBL Market Information

As it will be presented later in this chapter, companies do not yet use GBL very often. Therefore there is no real GBL market and there are no key figures for the GBL market. However, a trend is perceptible and can be highlighted. This will be done by consulting the figures for the computer games market as well as by the presentation of some specific GBL solutions and the companies which produce them.

4.1.1 Computer and Video Games

The computer and video game market has grown very much in the last two centuries. In the US alone, computer games sales grew six percent in 2006 to $7.4 billion. In comparison to $2.6 billion in 1996, sales have almost tripled. Most of the sales have been realized through video games, only 13% of the total stem from sales of computer games. (source: The NPD Group / Point-of-Sale Information)

4.1.2 Who Plays Computer Games?

In some peoples heads there remains the stereotype of person who plays video games (henceforth referred to as "gamer") as a pale, teenage male with poor social skills. As the following list shows, market figures tell us very differently (Source: ESA, Entertainment Software Association)

- The average gamer is 33 years old and has been playing games for 12 years.

- In 2007, 24% of gamers were over the age of 50.

- 38% of all gamers are female. In fact, women over the age of 18 represent a significantly greater portion of the game-playing population (31%) than boys age 17 or younger (20%).

- Only 15% of sold games were rated "mature".

- 51% of most frequent gamers play games online.

- 35% of players of online games have an income of $50k to $100k and 16% take home more than $100k. (Source: ScoreNetworks)

4.1.3 GBL Solutions and GBL Companies

Company Information	Provided Solutions
Aqua Pacific, UK, 1997, www.aqua-pacific.com	Aqua Pacific is a game development company. Besides entertainment games some educational games can be found in the portfolio. Most of them are developed for children. One solution is aimed at students teaching them basic business skills.

Company Information	Provided Solutions
Caspian Learning, UK, 2002, www.caspianlearning.co.uk	Caspian Learning wants to bring the advantages of 3D games to the learning world. They developed a 3D games engine that has instructional design and pedagogy. Using this engine, specific 3D learning environments are created for clients.
Forterra, CA, 1998, www.forterrainc.com	Forterra is specialized in simulations. The product is an engine which enables the client to create his own 3D worlds. Clients are mostly stemming from medical, governmental and military sectors.
Interpretive Software Inc., US, 1986, www.interpretive.com	Interpretive Software Inc. offer marketing and management simulations. No game elements are involved in the solutions. Clients are mostly business schools.
Management Simulations Inc., US, 1985, www.capsim.com	Management Simulations Inc. is strong in business simulations. Their solutions cover strategy and tactics, accounting, marketing, finance, HR, teamwork, leadership and more. It is always a blended learning approach. Clients are schools, universities and corporations.
PIXELearning, UK, 2002, www.pixelearning.com	Pixelearning offers a variety of off-the-shelf GBL solutions covering business games which teach finance, sales and marketing, project management and retail business. Additionally, they have completed many specific projects for customers.
Playgen, UK, 2001, www.playgen.com	Playgen concentrates on 3D simulations and develops solutions for corporations, government and military. One solution was developed to teach innovation strategy development to CEOs of today's leading technology companies.
Simprentis, Faroe Islands, 2000, www.tokni.fo	Simprentis offers business simulations, mostly aimed at students, which teach business skills and project management.
Simulearn, US, 2001, www.simulearn.net	Simulearn was co founded by the simulation guru Clark Aldrich. The latest solution is a virtual 3D role-play simulation which teaches conflict management, collaboration, effective communication, understanding group dynamics and work prioritization. Clients range from corporate to government and academic.

Company Information	Provided Solutions
TPLD, UK, 2001, www.tpld.net	TPLD (Team Play Learning Dynamics) are strong in simulations and offer solutions which improve sales skills performance and working dynamics between team members. They also developed an engine to create new simulations efficiently.
TruSim, UK, 1990, www.trusim.com	TruSim is a division of Blitz Games which is a large European game development company. They offer an interactive trauma trainer which is to be used by field hospital personnel in a conflict zone as a skills refresher for common procedures. It was commissioned by the UK Ministry of Defense as a prototype to demonstrate the potential of serious games for defense medicine applications.
Zapdramatic, CA, 2000, www.zapdramatic.com	Zapdramatic is originating from the film business. They offer interactive simulated adventure games to teach negotiation skills and dispute resolution. Clients include the private and public sector.

Table 4.1: Selection of companies which offer GBL solutions.

In table 4.1, GBL companies and information about their domicile and founding year are listed. Additionally, short descriptions about the learning solutions they offer are presented. It is not a complete list of all existing GBL companies but it gives a good overview over typical GBL companies and the state-of-the-art of currently available GBL solutions. More companies which have core competencies in simulations are listed in [1, p.301].

There are several main types of GBL companies represented in the list. One type are the companies who started in the eighties with business simulations and moved on to GBL naturally. Another type is represented by young companies which started with the vision of bringing the benefits of computer games to the learning field. Actually, most of the GBL companies started this way. The big learning companies have often one simulation in their learning portfolio, but they mostly do not focus on GBL at all and are therefore not listed in table 4.1. Further on there are a few companies which have other backgrounds like the film industry in the case of Zapdramatic.

Concerning the content, there are solutions for school, academic, governmental, military and corporate use. The technical standard for the content of the early adopters like military and medicine is on a very high level. State-of-the-art simulations are used which

require high computational power. The solutions for school and academic research are on a relatively basic level and remind of little computer games which can be played online. Also the solutions for corporate use are mostly on rather basic technical level and can not be compared to current high fidelity computer games. However, the GBL solutions are often better than conventional e-learning and therefore point out the future possibilities of GBL. Corporate content which is most often used for GBL are business skills like project management, marketing, sales, finance and team work. It is mostly implemented using some sort of business simulation.

Some companies offer engines to create 3D worlds. The main interest is to cut down the development costs of GBL solutions. Using the engine, specific content can be mapped into a 3D learning environment with comparable low effort. However, for most customers it is not possible to create learning environments themselves, this has most often still to be done by the GBL company.

4.1.4 Early Adopters

Few companies make extensive use of GBL methods. However, there are some sectors which implement GBL since the very beginning. These are aviation, medicine and military. Flight simulators for pilots have been used since decades and are totally accepted and indispensable for training. Training on real planes would be far more dangerous and more expensive. The same is true for surgeons and other medical scientists; they also train difficult surgeries on virtual applications before moving to real patients. The military is probably the strongest driving force behind simulations and GBL. GBL offers a lot of advantages for specific tasks the military is involved in. As Stone presents in [24], the experiences the soldiers get during training with the simulations can be used almost 1:1 in real missions.

Additionally to these three early adopters, also schools and universities have been using GBL ever since. However, it has mostly been implemented for academic research. It has not been introduced as a common method of learning.

4.2 Discussion of the survey results

After this short market presentation, we further analyze the outcomes of the interviews with the learning experts. This way it is possible to get a deeper understanding of how GBL is implemented nowadays. The survey results are compared to the findings in literature, which were presented in chapter 2.

4.2.1 Potential and advantages of GBL

Almost unanimously, the experts rate the potential of GBL very high. In their eyes, companies will soon develop a lot of GBL solutions and used them to train employees. Only the experts of Swissmem mention that the potential of GBL may be overrated.

Compared to the findings in literature, the company learning experts agree in opinion on a grand scale. Researcher and experts of companies both think that GBL bears a lot of advantages. In the following, the advantages of GBL mentioned by the company experts are listed and discussed. A more complete list with advantages derived from research papers is presented in section 2.5. As in the list in chapter 2, the advantages originate either from the game and simulation element or from the digital element.

Engagement of Participants   The advantage most often stated in practice corresponds to the fact that GBL is a learning method which makes the participant taking over an active role. The expert from Siemens mentioned that in the beginning the participants sometimes smile at the idea of using a game element, but in the end they mostly like it.

Competition   One form of motivation which works well in practice is competition. Several experts achieved good results when giving the participants the chance to measure themselves and compare the own results to others. The expert of Bayer mentioned a digital management simulation game which has been used for more than ten years now. Every year, one hundred teams consisting of four participants go through the simulation. The whole simulation is run as a competition and the best teams are invited to a location to play the last rounds together in real.

The competition does not have to necessarily consist of other participants. It is also possible to introduce time or multitasking constraints which put pressure on the participants. The expert of SwissRe mentions this to be an advantage of GBL.

Safe Environment   GBL lets the participant explore a simulation of a system without affecting the real world. The expert from Bundeswehr put an emphasis on this aspect, because the situations the army is involved in are often critical.

Close to Real Life   Simulations or games can be abstract or very close to reality; both forms can hold its advantages. For the latter case, the expert from Sulzer points out that e.g. in role play, the participants forgot about the game after a short period of time and behave just like in real life. He was involved as an expert in a role playing game where the

participants were managers of a small-sized enterprise. After the session they restructured the teams and rearranged the duties of several managers.

Right Situation and Mood for Learning An advantage which was not found in the literature is mentioned by the expert of an insurance company: games put participants into a good mood which favors the assimilation of the learning content. He has found that sometimes during GBL sessions the participants are so much into the game that they do not realize to be learning at all. The expert thinks that this state of mind is perfect to absorb new content. The reason why this could be seen as an advantage is due to the fact that people often associate bad feelings with learning, e.g. from a frightening experience as a child in school.

A similar point of view shares the expert of Credit Suisse: he found that people learn well in extreme situations. Things we experience e.g. in a close to death situation we will never forget anymore. Reading a book is on the very low end of the extreme-experience range; on the other hand, GBL is in the upper third of this range and can therefore create appropriate situations for deep learning.

Advantages of Digital GBL Solutions The experts of the companies mentioned the following advantages attributed to the digital element: reproducibility. Using digital solutions, it is relatively simple to create the same situation again, compare section 2.5. In addition, the experts referred to the simplicity of the evaluation of the learning process. The expert of SwissRe put on record that the digital element helps a lot to standardize the learning processes in all subsidiary companies all over the world.

The ratings of the company experts concerning the potential and advantages of GBL correspond a lot with the findings which stem from literature. As the main advantages are always indicated the following features: GBL is engaging, it offers close to real life experiences and all of this in a safe environment.

4.2.2 Potential of E-Learning and Experiences with this Learning Method

The experts of the companies attest that e-learning comes with a lot of advantages and is used very often. The experts mention the same digital-element-based advantages which are found in literature (compare chapter 2.5.3). One expert notes that the company is increasing the use of e-learning at the very moment. The change from instructor led training (ILT) towards e-learning allows savings of $300 per capita and day.

However, there are also some statements which point out some negative experiences which have been made using e-learning. What kind of experiences are these and why is e-learning promoted in research papers?

With the entry of computers into the companies and consequentially also into the learning environment, a real boom started. The computer was regarded as an omni-capable tool with which any possible task could be solved. The expert of Credit Suisse added that during this epoch the whole learning field was very much technology driven. Because of this reason, some e-learning solutions were developed rather by technicians than by learning specialists. The educational level of these solutions had therefore often been on a very basic level and the participants were not convinced.

One encountered problem mentioned by the experts is the following: If the digital solution is designed to replace a lecture or a form of group learning, the problem exists that with e-learning the participant is suddenly just by himself. There is no teacher or other participants for interaction, this can lead to frustration. The expert of SwissRe adds that there is the possibility to come by this problem by introducing digital assistants into the e-learning solutions. However, inbuilt assistance is not comparable to the actual interaction with another person.

Another problem is the adaptation of the content: When using some content with e-learning, it has to be adapted to the method. Unfortunately, the content often has just been digitized without integrating some interaction or other forms of media. But the expectations on e-learning are higher than just reading text from a computer screen than from a book. Of course participants do not like such kind of e-learning.

Despite these negative experiences, most of the company experts anticipate a further increase of the percentage of digital learning methods. The responsible person of Credit Suisse argues that bad experiences originate only from badly designed e-learning methods, not from a general disadvantage of e-learning. Well designed e-learning is very effective.

4.2.3 Application of GBL in the Industry

Without exception, all of the interviewed companies use GBL methods. However, the extent and the form of how GBL is used vary very much. For some companies GBL is an accepted learning method and already implemented in a huge variety of ways. In other companies they just tested GBL in a few pilot projects.

Only two companies used GBL methods to a high extent. These are Bundeswehr and Credit Suisse. Both of them employ both analog and digital GBL, the focus is shifting
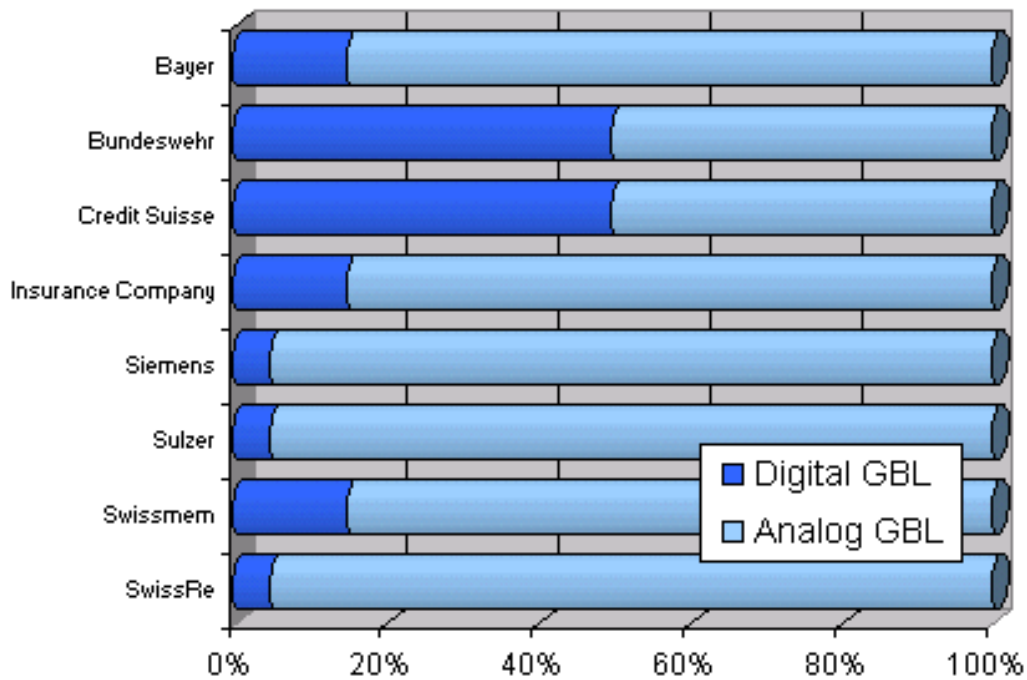
Figure 4.1: Application of digital and analog GBL by the companies.

towards the digital solution because of the advantages in cost and safe environment which comes along with it.

The other six companies have almost all made positive experiences with GBL, but this form of learning plays a subordinate role in corporate learning. In some solutions game elements are used, but the method as such is not called GBL because of the absence of sensitivity in this matter. A fact is that most of these companies rarely use digital GBL solutions; they rather use board games or other analog tools. The main reasons why digital solutions are missing are the high development costs. The solutions are not replacing conventional learning methods but they are used as supplements to back the currently used methods.

In general, the awareness of the company experts about GBL is relatively low. All were familiar with the term and have used at least a couple of game elements. Motivation to implement more GBL solutions is present, but most companies will not put a strong accent on these methods in the near future.

4.2.4 Appropriate Content for GBL that can be Taught using GBL

Due to the fact that GBL is a learning method which teaches the content circularly (compare chapter 2.3), most research papers declare GBL as appropriate for system-like content which can be experienced by trial and error. On the other hand there is content which is best taught linearly, e.g. background facts about a matter are best taught by watching a video or reading a book.

Interestingly, around half of the interviewed company experts identify the GBL method as appropriate for any kind of content. This finding corresponds with the high general potential the experts see in GBL. However, all experts agree with literature in the way that they argue that GBL is best for specific content which can be experienced by going through a simulation or game. The experts of Siemens and an insurance company both argue that soft skills are taught very well using GBL. The experts of Swissmem think GBL is most effective for content which can be put into simulations like the graphic adventure computer game Myst, developed by Rand and Robyn Miller. Other content mentioned as appropriate for GBL has a strong relation to the advantages mentioned by the experts further above in this section: e.g. content which should be experienced in a safe environment and content which should be experienced actively by the participants is mentioned.

One important finding is that not only knowledge can be transferred by the use of GBL but also skills and changes in behavior. In a well designed GBL solution, the participant gets active himself, this means that he is able to apply his knowledge directly on a problem and by doing so he is able to improve his skills and, with time, change behavior. Most of the experts agree that GBL is an appropriate method to change behavior. The expert of Siemens illustrates an example of a GBL solution for the training of team work. In this analog role play solution, the participants find that it is almost impossible to overcome the abuse of confidence in a group. And if confidence in a group is missing, the team can not perform to its maximum.

4.2.5 For which Participants is GBL Suitable?

In literature, GBL solutions mostly are intended and designed for younger people. This means people who have grown up playing computer games. As stated in section 4.1.2, this is not a 14 year old boy but rather a man or woman in their thirties.

By contrast, the company experts do not mention the age of the participants at all. They say that GBL is suitable for all employees, except for people who have a strong aversion towards games. However, as the expert of Credit Suisse puts it, there are GBL solutions which use very few game elements, e.g. pure simulations. These solutions most
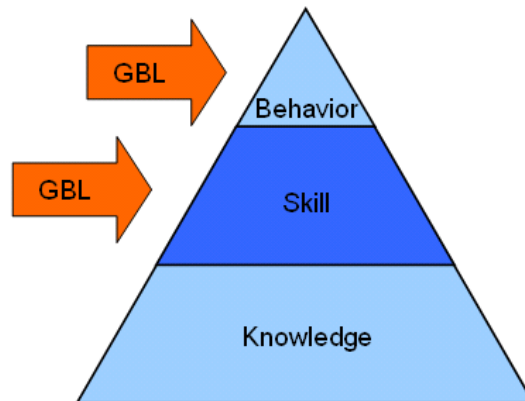
Figure 4.2: The use of GBL solutions facilitates the teaching of skills and makes it possible to change behaviors.

often also work for participants who do not like games. The two experts from Swissmem and Siemens put on record, that in their opinion game elements work better rather for intelligent and more intellectual participants.

When creating GBL solutions, Prensky recommends in [20] to always make the content accessible over two ways; once including the game-element and once without it. The participant can therefore choose for himself, if he wants to learn the content through the game or if he does not want this kind of support. It is also possible to switch at any time from one to the other version. Half of the company experts reckon this to be an ideal solution. However, the expert of Credit Suisse thinks there is no need for a presentation of the content without the game element. If one is considering this option, then GBL might not be the best approach in the first place, he said.

4.2.6 Acceptance of GBL in the Industry

To learn about the acceptance of GBL, the company experts were asked about the re-actions of people when they hear about or participate in GBL solution. To get a broad understanding about the acceptance, the employees are divided into participants, coaches and management. Management is meant to not actively participate in GBL solutions, but to decide about the application of either GBL or other learning methods.

According to the experts, in Bundeswehr and Bayer the acceptance of GBL is high throughout all employees. As Bundeswehr is part of the early adopters (compare section 4.1.4), they are using GBL to a wide extent for all kinds of content. Bayer has started to use GBL and wants to increase the application of such learning methods.

On the other side there are two companies in which the acceptance is not that high, these are Swissmem and SwissRe. Swissmem recently piloted some basic GBL but the teachers and students in this case were not that enthusiastic about it. It now has to be found out if the solution was not designed well enough or if GBL does not work for Swissmem. In SwissRe, management passed regulations which put the use of games to a minimum. The reason for this kind of regulations might originate from a management who has made bad experiences with the existence of games in working environments. Therefore it is difficult at the moment to launch learning projects which include game elements.

In the comparison of different stakeholders of GBL projects, the coaches are the most supportive ones. This is mostly because the coaches are at the same time the project leaders of GBL projects. They are the ones who introduce GBL and pilot projects in the companies and are therefore already convinced of the advantages of GBL. Learners sometimes are a bit skeptical when they first hear about the combination of learning and game elements, but after the sessions they are most often in favor of GBL. When it comes to the management, the situation is a bit different. Managers are more conservative regarding GBL. They have to decide about which learning method should be used and about the budget for GBL. Because GBL is a relatively new topic in most companies, management first wants to proof the benefits of this learning method. Unfortunately the development costs are high and so everybody is waiting for others to try it out first.

4.2.7 Did Participants Change? How did Companies React to an Eventual Change?

In literature one finds that new generations are different in learning matters. Young people tend to get bored after a short period of time. They want action and change as often as possible also in learning. Just as if they would watch music television or play a video game. Prensky describes the following problem in [20]. He says that the learner's generation has changed and the teachers have not. Therefore, there is a huge difference between the expectations of the students and the classes they have to attend.

The experts of the companies agree to a high level with literature. Most of them argue that learners have changed. Participants have become more open to different kinds of learning and also want to get active themselves. In a way they have become more demanding, they want to get the most out of a learning session and the content should be applicable directly in daily life. Unlike Prensky, the company experts do not feel a lower motivation from the participants. This may be the case because in a company, different than in school, learning is seen as helpful to be able to cope with the job and to fulfill expectations.

Company	Industry	Acceptance of GBL in Company		
		Learners	Coaches	Management
Bayer	Pharmaceuticals	++	++	+
Bundeswehr	Defense	++	++	++
Credit Suisse	Financial Services	+	+	o
Siemens TS	Transportation Systems	+	++	o
Sulzer	Machinery, Equipment	+	++	o
Swissmem	Education	o	o	o
Swiss Re	Insurance	o	o	-
Zurich	Insurance	+	++	o

Figure 4.3: Acceptance of GBL companies. It is differentiated between learners, coaches and management as different stakeholders of GBL. For the rating, an adapted Likert scale is used, represented by the following symbols: "–": strong refusal, "-": refusal, "o": neutral, "+": acceptance, "++": strong acceptance.

Companies try to close the gap between the demands of the participants and the range of trainings offered. The learning content has come closer to real life situations with a lot of practical experience and examples from real projects. The used methods are more participant-focused and group learning is promoted. A trend towards rapid-learning, just-in-time-learning and learning independent of time and place is noticeable.

4.2.8 Coaches and GBL

Both, literature and company experts, agree that other skills are needed to supervise a GBL session than to hold a lecture or a similar training. Using GBL, there is often not just one possible solution and neither totally right or wrong answers. It is not just interactive for the student but also for the coach. Situations may occur which nobody has thought of in advance. Coaches therefore need to know the topic in depth, they have to be able to react to inputs from participants and they have to be able to lead the group into the right direction without determining the course of the session too much.

A problem arising due to the different skills needed is the following: companies have their learning institutions where coaches are their core resource. These are perfectly trained for teaching using conventional methods. If new skills are needed, the coaches either

have to be trained or new coaches have to be hired. Both possibilities are linked to high investments.

Some coaches are against GBL and e-learning because they are afraid of competition, sometimes even of loosing their job. However, GBL methods are mostly used in combination with conventional learning methods; GBL is not the one and only solution for teaching matters. For linear content, a lecture is much more appropriate and it is neither imaginable nor advisable to replace a good coach by a computer simulation. If digital GBL solutions are used, e.g. the pre- and after-session can be hold using conventional learning methods. Perhaps there is not even the need of a special coach for the GBL session, rather for an IT instructor to help with technical issues.

4.2.9 Evaluation of Learning Processes

Probably the most extensively used method to evaluate training and learning is the model of Donald Kirkpatrick. In his book [14] he presents four different levels of evaluating a learning method. His method is now considered an industry standard across the HR and training communities. For best results in evaluating training, all measuring levels should be implemented. A fifth level extending the model of Kirkpatrick with the measuring of the impact on the ROI was introduced by Jack J. Phillips. In the following table, a short description of the extended five level model is presented.

Almost all of the interviewed companies have levels 1 and 2 implemented (compare figure 4.4). The level of evaluation for Siemens is low (level 1), because they offer GBL as a service to other companies. The evaluation of training is therefore the duty of the costumer companies.

The experts agree that level 3 bears potential and that it is worth striving for. Concerning levels 4 and 5 they are less enthusiastic: They argue that it is very difficult to measure the impact of a training session in relation to the results of conventional management systems. Too many influences play a role in the performance of daily business to be able to extract this information. Thus, it is a very complex task.

4.2.10 Barriers Regarding the Development of GBL Solutions

Despite the advantages of GBL and as presented in this chapter, the application of GBL in industry is very limited. Of course there are negative aspects of GBL and it is not the adequate learning method for every kind of content (compare 2.5.2). Nevertheless, most experts agree, that for a lot of trainings they would like to use GBL solutions. What is

Level	Evaluation Type	Description	Methods, Tool	Time Horizon	Practicability
1	Reaction	Direct feedback of participants, how did they like the training	"Happy sheets", question-naires	Directly after session	Quick and easy to obtain and analyze, low cost
2	Learning	Measurement of knowledge or capability increase	Assessments, tests or interviews	Before the training and after 2 weeks	Easy to set-up, not easy for not quantifiable skill measurement
3	Behavior	Extent of behavior change and implementation in job	Observation, interviews	After 1 to 3 months	Complex, line manager involved, costly
4	Results	Effects/impact on business and environment	Management systems and reporting	After 1 to 2 years	Challenging to relate to individual and training session
5	Results	Impact on Return on investment (ROI)	Management systems and reporting	After 1 to 2 years	Challenging to relate to individual and training session

Table 4.2: Kirkpatricks' extended model of five different levels for the evaluation of learning processes.
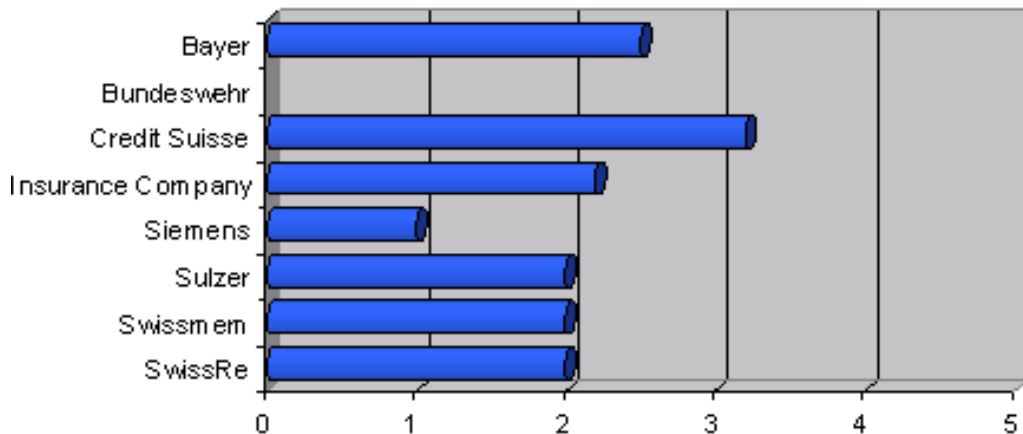
Figure 4.4: Implementation of the Kirkpatrick evaluation levels of the interviewed companies.

the reason why GBL is not implemented more often in the industry? Company experts mention a lot of possible barriers which have to be overcome to apply or develop a GBL solution. In this section, these barriers are summarized and discussed.

Low Acceptance of GBL

If people are confronted with the idea of combining games and learning, they often have doubts about it. This may date from the way computer games are perceived in parts of the society: Thinking of computer games, people tend to reduce the variety to some arcade and ego shooter games. Media is stimulating this body of thought when reporting about games in a similar way. People may agree that it is possible to train eye-hand-coordination or reflexes, but they do not believe that other or more complex content can be taught by the use of games.

For a lot of people learning is a serious business. They would rather relate learning with hard work. Therefore, the introduction of a game element which is related to having fun can be disturbing.

Furthermore, people tend to think that computer games are played by one person only and therefore they consider it as a solely and antisocial activity. The same image can be perceived when thinking of GBL. As stated by the learning experts, interactivity with coaches and with other participants is very important and often a requirement of the learning solutions. As presented in section 4.1.2, reality is different: a lot of games even foster socializing. However, there is still some time needed to change this image of games in society.

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High Effort and Development Costs

The barrier most often mentioned by the experts are the high development costs. This is an aspect originating from the fact that digital game elements are used. As known from the gaming industry, development costs of a game are in the millions of dollars. E.g. the development of the popular game Halo 3 (by Microsoft) is estimated to have cost \$30 million. GBL solutions do not have to meet the same high fidelity standards as the latest game generation, but the development of simulations can be very complex and expensive as well. Furthermore, the number of potential participants is much higher for a computer game than for a learning solution with specialized content.

Because of the fact that not a lot of GBL solutions are implemented, there is often the need of rigorous and costly adaptation for each client. There is no wide variety of solutions readily available to choose from. Furthermore, there is not a lot of knowledge about GBL residing in the companies. Transferring this knowledge to the stakeholders is consequently linked with further expenses.

Digital GBL is a relatively new form of learning, this adds up to a lot of change for the company that wants to use it. There might be new hardware and software required and coaches need to adapt to the new solutions as well. Either they have to be trained to be able to supervise GBL sessions or new coaches have to be hired. Also the content has to be adapted to the new form of learning (compare section 2.5.2)

Another high effort issue is the long period of time which is needed to develop a GBL solution. Often the lifetime of specific content lasts only for a short time; when the solution finally is implemented, the content can already be obsolete.

Low Cooperation Between Learning Companies and Gaming Industry

As seen in section 4.1, the available GBL solutions are still on a very basic level. Often, a very limited amount of content is covered by such solutions. Sometimes the game element is not well combined with the content and the high fidelity of the graphics and simulations are low. Reasons for the absence of sophisticated GBL solutions are the following:

- It is extremely difficult to design a good computer game which does not become boring for the participant after a couple of hours. (compare section 2.2.6)

- It is even more complex to combine a game element with specific learning content. E.g. in some simple GBL solutions the game element has not really something to do with the content. The game is rather a distraction between two sessions of learning.

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As Bruning puts it in [4]: research has repeatedly shown that the application of an extrinsic reward for engagement in a valued activity is likely to decrease the intrinsic attraction of the activity in the eyes of the participant. In other solutions the participant can work his way through a simulation just by trial and error without getting involved much. This is not what GBL stands for.

- To develop a GBL solution, knowledge is needed about computer games and also about learning and training. The circumstance that the current GBL solutions are often developed by a team which is either coming from game designing or from education presents a difficulty; the solution is either technology driven without a good processing of the learning content or vice versa. The situation is comparable to the disappointment experienced with e-learning after the end of the first hype in 2001. Generally, there are not enough educationists in the e-learning business.

Since a lot of the GBL solutions are on a lower sophistication level than expected by the participants, it is difficult to convince people of the benefits of GBL.

Technology Issues

The digital element facilitates a lot of tasks concerning learning and training. Unfortunately, there are also some difficulties arising with digitization.

- The workstations used in companies are configured to meet the requirements of business applications. These requirements are often different from the ones necessary for games and GBL solutions. Company experts mention that in the industry a lot of computers are not really capable of handling multimedia content or complex simulations.

- Another difficulty presents the IT security standards of the companies. Games and simulations need to access hardware as directly as possible to enable high performance. That is exactly what the security systems of big companies are preventing. End-users are not allowed to change settings concerning the operating system or tasks which affect critical processes.

Learning content

The expert of Siemens mentioned another barrier. In his opinion, GBL is very effective to teach soft skills and is often used for that purpose. During difficult times, companies tend

to put less effort on the training of soft skills while e.g. technical skills are regarded as more important. Therefore, the use of GBL is even more limited.

Summary

As found in section 4.1, a lot of different companies have started to produce GBL solutions. However, the technical and educational levels of these solutions are often low. This due to the fact that the creation of a GBL solution is very complex task. It is difficult to bring learning, game and computer technology together in order to benefit of the advantages of all the three individual fields. The low fidelity of current GBL solutions is one reason (barrier) why learning experts do not use it more often.

The discussion of the survey results revealed a very low implementation of GBL in industry. Games are used in analog learning like role-play, but not in digital learning solutions. Company experts agree upon the advantages of e-learning (if it is well designed) and want to do the next step towards GBL in spite of several changes which are introduced by the new learning solutions. These changes affect both participants and coaches.

Additionally to the low fidelity of GBL solutions, more barriers have been identified on the basis of the interviews with the experts. To make a next step in GBL possible, it has to be dealt with these barriers. In chapter 5, the main barriers are listed and ways will be proposed on how to excel each one of them.

Chapter 5

Investigation and Proposition of Potential Applications of GBL

As seen in the last chapter, GBL is not yet widely implemented in the industry. The reasons for this have been mentioned in chapter 4. Now a possible strategy will be developed with which the barriers to GBL can be overcome. Further on a roadmap will be presented on how to go on in the future to bring GBL to a higher level of implementation and successful learning method in industry. To sum up, there will be some futuristic scenarios explained which may become reality in the future and which point out the direction, where GBL is heading to.

5.1 Methodology

In order to develop a strategy for the application of GBL in the industry, the following methodology is used: The most important barriers will be analyzed and for each one, actions will be defined on how to manage and overcome the specific barrier. Possible actions concerning the choice of appropriate learning content will be pointed out as well as the merger of the content with the game element and the choice of the appropriate technology level.

5.2 How to Overcome the GBL Barriers

As presented in section 4.2.10, the most important barriers to GBL are the following. In brackets the interviews which underlay the particular barrier are referenced.

- Barrier 1: Low acceptance of GBL (Interviews: B.2, B.5, B.6, B.7, B.8)

- Barrier 2: High effort and development costs (Interviews: B.1, B.3, B.4, B.6, B.7)

- Barrier 3: Low cooperation between learning companies and gaming industry (Interviews: B.3, B.7)

- Barrier 4: Technology Issues (Interviews: B.3, B.4)

While going through all of the above barriers, the strategy for a potential application of GBL in the industry is developed. By finding ways to deal with these barriers, the strategy is refined step by step.

5.2.1   Barrier 1: Low Acceptance of GBL

As demonstrated in chapter 4, the acceptance of GBL in society is still very low. Few people know about GBL and it is still hard to convince certain managements to fund GBL projects.

A potential strategy to broaden the publicity and the acceptance of GBL can be the following: A GBL solution should be designed which can serve as a showcase implementation. With a well designed solution which thrives in a particular field of learning it can be proved that GBL works. GBL should thus become known and accepted by management and society. A first step towards a showcase GBL solution is the determination of the appropriate kind of learning content. Content has to be chosen for which GBL is very much appropriate and for which it performs better than other learning methods.

In this section, different kinds of content is analyzed in respect of appropriateness for GBL. The main advantages of GBL are extracted and discussed for each form of content. To develop a complete list of content, possible triggers which make learning necessary are explained.

Triggers for Learning

What makes learning necessary in companies? When do employees have more knowledge about a matter? There is always a form of change and adaptation present when companies decide to train their people. As shown in the following, there are different forms of change, e.g. with an internal or external origin. There are also different forms of adaptation or preparation for some kind of change.

Change which can only be reacted on is referred to as "transformation". Such transformations can be external changes, e.g. market changes like new competitors or a change in buying behaviors of customers. Internal transformations are e.g changes of strategy, like a new sales approach, or the introduction of a new product. Other internal transformations can originate by corporate compliance.

Changes which can be reacted to in advance lead to corporate training. Companies try to keep knowledge of their employees on a high level in order to be prepared to different kinds of changes. Trainings are used to transfer specific knowledge. Career planning is also part of the corporate training and enables employees to change their position and to apply their skills to new tasks.

Evaluation of Content for use with GBL

To determine the content which should be used to design a showcase GBL solution, the main advantages of GBL are brought together. The focus will be on advantages which presents GBL in comparison with other e-learning methods. Advantages related to the digital element are less important because e-learning solutions are mostly already in place and the replacement with digital GBL will not bring any further advantages by reason of digitization.

The advantages of GBL compared to conventional e-learning solutions (compare section 2.5) are the following:

- Motivation and engagement

- No impacts on the real world

- Visualization of hidden processes

- Experiences close to reality

- Adaptiveness and interactivity

These advantages of GBL are now analyzed with regard to different kinds of content. In [20], Prensky presents a list of different learning contents (compare table 5.1) which is used for this analysis. For different kinds of content, each of the listed advantages turns out to be more or less important and effective. E.g. since there are no hidden processes in the language content, the advantage of visualization of hidden processes is not important for this content. On the other hand, the visualization of hidden processes can support the

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Content	Examples
Behaviors	Supervising, exercising self-control, setting examples
Communication	Appropriate language, timing, involvement
Creativity	Invention, product design
Facts	Laws, policies, product specifications
Judgment	Management decisions, timing, ethics, hiring
Language	Acronyms, foreign languages, business or professional jargon
Observation	Moods, morale, inefficiencies, problems
Procedure	Assembly, bank teller, legal procedures
Process	Auditing, strategy creation
Reasoning	Strategic and tactical thinking, quality analysis
Skills	Interviewing, teaching, selling, running a machine, project management
System	Health care, markets, refineries
Theories	Marketing rationales, how people learn

Table 5.1: Different learning content and examples of possible usage.

understanding of systems and is therefore an important advantage regarding this kind of content.

In the following part, the alterations and advantages introduced by a replacement of e-learning through GBL will be discussed for every type of content. In figure 5.1, the contribution of every advantage to the different content is rated. The scale ranges from zero to five; zero meaning there is no contribution and five referring to maximum contribution to improvement. The rating is done on personal opinion based on literature research and inputs from the survey with company experts.

Behaviors

In general, changing behaviors is very difficult. Normally people only change their way of being and acting if some mayor experiences have been made. GBL is very appropriate as a learning method to help to change behaviors. This is due to the fact that GBL involves the participant a lot and that experiences can be made which are close to reality. Obviously, it is not possible to change behaviors in one single GBL session. Consequently, there are always several sessions and if possible repetitions necessary.
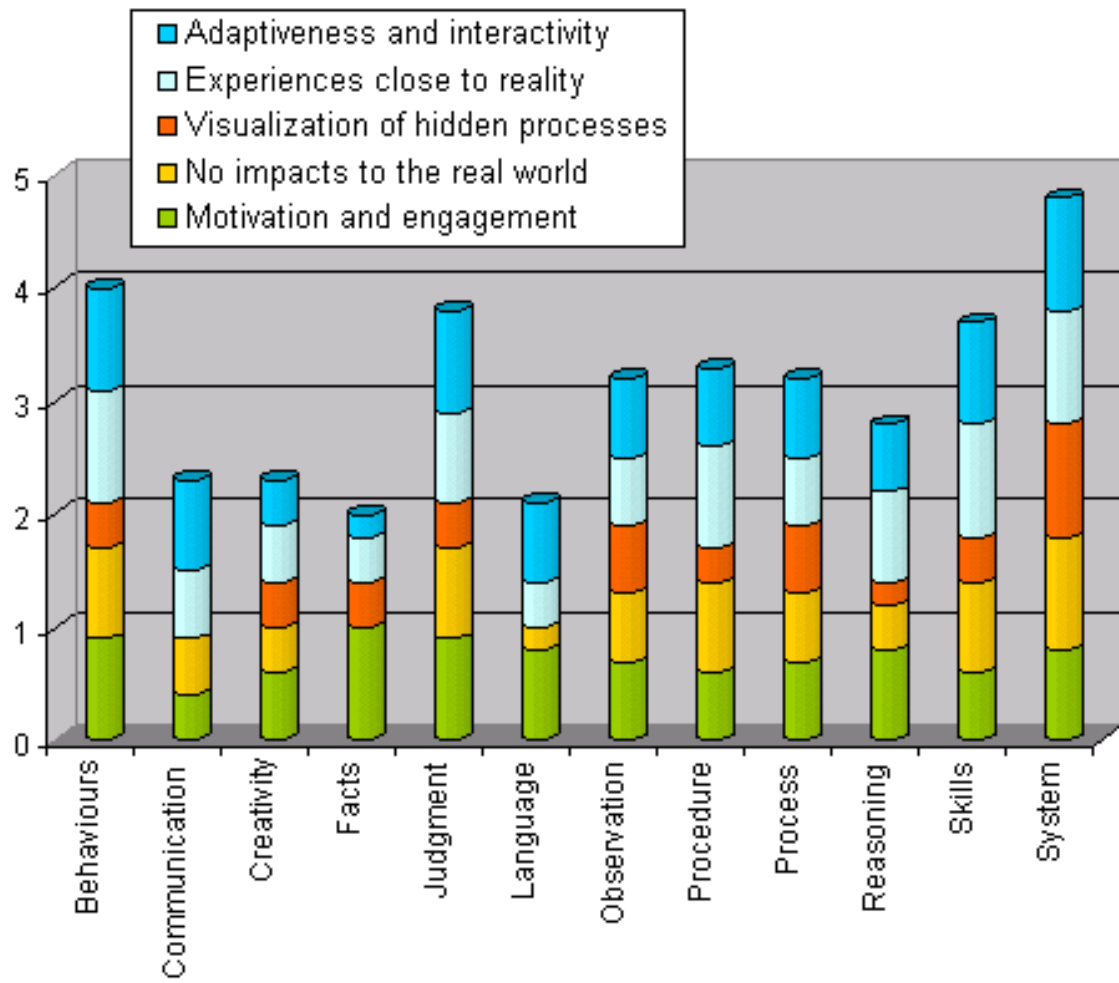
Figure 5.1: Contribution of the five different GBL advantages to the total appropriateness of GBL for each kind of content. The scale ranges from "0": not appropriated to "5": totally appropriated.

Communication

A similar case as for the language content applies for communication. The solutions available are still basic and it is difficult to train real communications with a computer program. It is still the best to go through a sales conversation with a coach who acts as a client and gives feedback to the participant for example.

Creativity

In general, it is very complex to teach creativity. This is mostly and most effectively done in groups of people and through brainstorming where a lot of different ideas come together. It is difficult to build a GBL solution, which is able to stimulate creativity.

Facts

Facts are rather information than knowledge and for a lot of people it is not interesting to learn some facts by heart. A game element could be used to enhance motivation; however, it is difficult to design a game element for a lot of content and facts often come in high quantities. A book or a video document is more appropriate for this kind of content.

Judgment

For GBL training of judgment, situations are presented in which the participant has to take decisions. The decisions alter parameters of a simulation which is running in the background. Through the simulation it is possible for the participant to directly get feedback for his actions and decisions. Judgment is a very adequate form of content for GBL.

Language

For language, the best form of learning is with a teacher. There are GBL solutions which allow to play exercise games and to talk to a digital person. It is also possible to record spoken words or phrases and let the pronunciation be evaluated directly by the program. Nevertheless, these solutions are still basic and they are far away from being able to simulate a real conversation yet.

Observation

In theory, GBL is an appropriate learning method to teach observation. Nevertheless, the level of simulating social aspects, like moods and moral is still very basic. It is not yet possible to simulate reality adequately enough to bring the participants to a close to reality experience. This might work better in the near future.

Procedure

Procedure is taught well by the use of GBL; not only is the game element motivating to learn some content which seems probably not interesting to the participant, but it is also possible to simulate it well and give the participant a really interactive experience.

Process

Process is more sophisticated content than procedure and it therefore becomes more difficult to build an appropriate simulation. In general, GBL is an appropriate learning solution for processes and will be more so when it becomes possible to simulate complex processes with simulations which are affordable.

Reasoning

GBL can teach and test reasoning, but it is not doing far better than other methods. This can also be achieved by the use of conventional exercises.

Skills

Skills is a term for a wide variety of content and for most skills, GBL is an appropriate learning solution. Skills, people need in business, include interaction with other people or machines. Naturally, it is more difficult to simulate interactions with people.

System

Most of the advantages are very effective for systems. GBL is very appropriate to simulate systems and to make the interrelations of different parameters visible. Participants can alter single parameters and get feedback on how other parts of the system react to the changes.
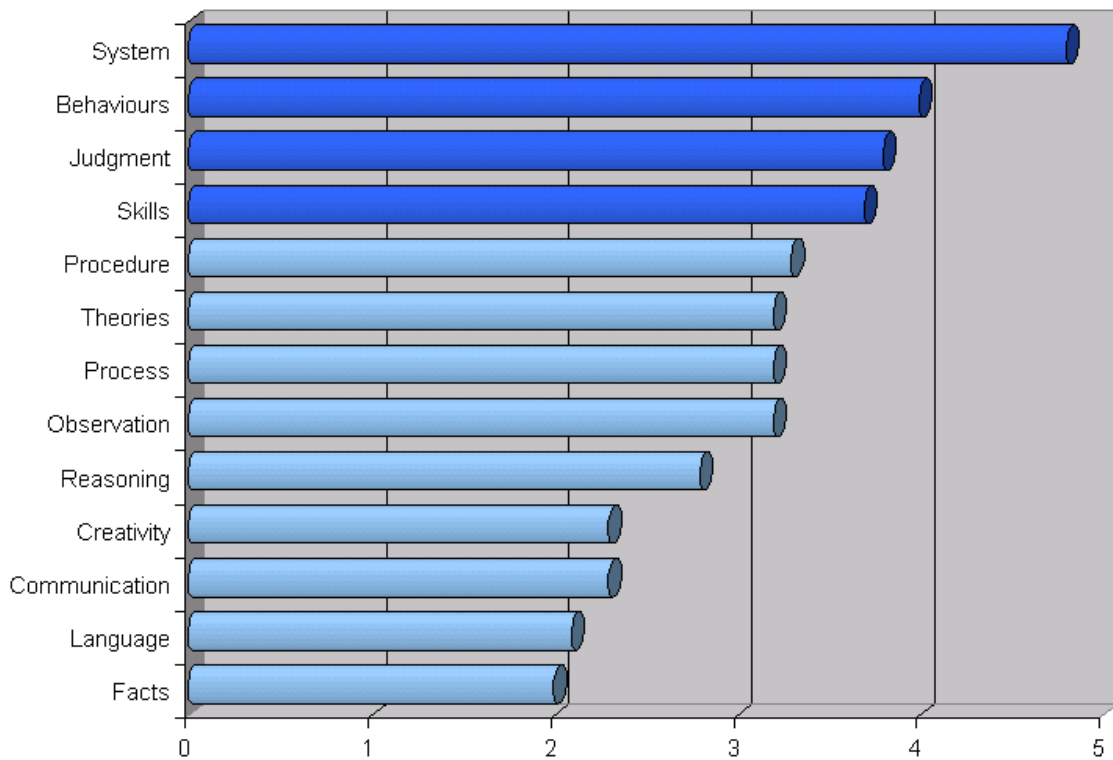
Figure 5.2: Ranking of different learning content regarding the appropriateness for use with GBL. The same scale as in figure 5.1 is used.

Theories

GBL learning is appropriate for the application of theories in practice. However, for the direct teaching of theories there are other learning methods which work well and which are easier to design.

To define the contents for which GBL is most appropriate, the average of all the different contributions of the advantages is calculated. The ranking of different contents obtained by doing so is presented in figure 5.2. The most suitable contents are therefore behaviors, judgment, skills and system.

If a GBL solution is designed for the mentioned content, this is a first step to a successful implementation. Further considerations will follow in the next sections.

5.2.2   Barrier 2: High Effort and Development Costs

For the development of a GBL solution a huge number of people with different skills are necessary. Additionally to the effort of developing the solution, it also has to be deployed, introduced and integrated into the LMS of the company which wants to use the solution. For the operation and the supervision of training sessions, a lot of effort is necessary as well.

To deal with the high effort and development costs, the following actions are proposed to be taken care of: The content should be chosen accordingly in order to make the number of potential participants for the solution as high as possible. Additionally, the content which will not alter very rapidly has to be chosen. A third action would be the search for a cooperation partner who can help with funding and implementing the GBL solution.

Additional Specification of Learning Content

In the last section, appropriate learning content was defined. This choice of content is defined more specifically in this section, meeting other constraints, to make a success of the designed GBL solution as probable as possible.

High Amount of Potential Participants   To make it worth to develop a GBL solution for internal use, company experts mentioned a need for up to 500 participants in the interviews. If it takes a lot of effort to design a GBL solution, it has to be made sure that it is possible to generate sufficient revenue through the selling of the product. One way to do so is to meet the needs of a lot of potential customers. To meet the needs of potential participants, a GBL solution starts with the choice of the content.

The content for the showcase GBL solution has to be as little company specific as possible, e.g. derived from a function like accounting or from HR. Basic functions in companies, which do not depend much on the industry the company is working in, are best suited for generating content. For such functions, appropriate content (behaviors, judgment, skills and system) has to be selected. If done this way, almost all companies are potential customers of such a solution.

Long-Living Content   Another important consideration concerning the content is its aging. This is not only affecting GBL methods but all kind of learning methods which are complex to implement. To keep the incoming stream of revenue running for as long as possible, the content should be chosen to be relevant for a while.

Cooperation with a Partner

Generating enough revenue with the selling of a learning product is not a perfect remedy. Through the early process of developing and promoting the solution, no revenue is generated. To be able to fund the development of a GBL solution, the cooperation with a strong partner can be a good advice. A suitable partner can be found either in the software business, the learning business or in the game development business.

As it will be presented in the next section, there may be knowledge needed from partners in all of the three mentioned businesses. Because of the high development costs and the deep knowledge required, it is most likely not possible for one single company to develop a GBL solution for its needs which can thereafter be used for other companies. A company, which is specialized in learning should do the first step and develop a solution as their core business which is then sold or licensed to customer companies.

5.2.3 Barrier 3: Low Cooperation Between Learning Companies and Gaming industry

As mentioned earlier, it is very complex and costly to develop a computer game. A diversified team is necessary and can include concept artists, voice actors, 3D modelers, simulation logic designers, subject matter experts, texture artists, audio engineers, GUI designers, physics programmers, game programmers, database designers, game designers, level designers, script writers, testers and more. The same is true for learning solutions: a lot of different knowledge and skills are needed to develop an analog or digital learning solution. In the case of digital GBL it is even getting more complex, bringing the two worlds of learning and computer games together.

In the past, the GBL solutions available were often either developed mainly by a learning company or by a gaming company. Whereupon the case of a learning company or a single learning representative of a company taking the effort of building a GBL solution is far more usual. Coming more from one side, it is difficult to keep the focus on both, the learning and the game element. It is difficult to bring the right knowledge and people from the other area into the team.

In order to avoid this barrier, there is actually just one proceeding suggested which states that the learning experts and the computer game industry really have to work together. If one aspect is neglected, the solution gets either too much an e-learning solution or it ends up as a computer game with hardly any teaching ability. Ideally, a project leading team has to be built which includes members with sufficient knowledge of both areas.

For a showcase GBL project, the hierarchy of the different team members should be the following: On the top level there has to be the expert in computer game design followed by the learning expert. On the next level there is the expert for technical issues. During the actual development of the solution, the hierarchy should have minimal influence; all stakeholders have to add their knowledge but at the same time they also have to listen to the inputs of the others. The reason for giving the game element the highest priority is because of the the following reason: The most important message which has to be communicated to everybody is that GBL works. The main difference compared to e-learning is the game element; the game should really be engaging and not just an add-on. Participants have to experience that it is possible to successfully unite game elements with learning.

The most complex task of a GBL project is the consolidation of the game element and the learning content. The difficulty is that the content is totally fix and critical. When designing a computer game, it is possible to alter the content in order to facilitate the matching with the game element. For the game it is most important that it is engaging, the content is less relevant. In contrast, for a GBL solution, the content is given and has to be brought together with the game element in some way. It is a kind of a masterstroke to find the adequate game element for each kind of content. A suggestion on how to make this process of bringing game and content together more efficient can be found in section 5.3.

In the last section it has been proposed to cooperate with a partner when designing a GBL solution. Consequently, the aspect of having different knowledge in the team is important. A partner who is coming from another field should be chosen. If a partner has strong expertise in two areas, e.g. in learning and IT, it is even more favorable.

5.2.4 Barrier 4: Technology Issues

In section 4.2.10, technology has been presented as an enabler but also as a problem generator. Unfortunately, the latest games and simulations need a lot of calculation power. Additionally, the security matters in companies can prevent GBL solutions from being run on corporate workstations.

To overcome the technology issues, several considerations have to be taken into account. The main goal is to develop a showcase GBL solution. Naturally, to obtain a sophisticated solution, there are high costs and a lot of effort necessary. However, to coincide with the actions proposed to overcome barrier two, the development costs should stay as low as possible.

Choosing an Adequate Technology Level

There is a chance to stay relatively low in development costs. This becomes feasible because of the fact that the best possible technology level used for the showcase GBL project is not the latest technology. According to the workarounds for barrier two, it must be possible to run the solution for as many potential participants as possible. Therefore, the technology level for the GBL solution has to be met by a standard corporate workstation.

Not choosing the latest possible standard in technology does not mean that the solution is not sophisticated. Graphical effects do not have to be spectacular, but the game element as well as the learning content have to be on a top level. The gameplay has to be motivating for the participants and it has to become obvious that it is not only fun but that critical content is taught by the GBL solution.

Further on, the solution has to be ease of use. The GBL instructors and the participants have to be able to install and use the software without encountering any problems. To keep it as simple as possible for the end users, an online GBL solution offers advantages. Choosing an online version makes an installation process needless; the solution can be used from any computer which is connected to the Internet. Only a browser, sufficient bandwidth and multimedia support (audio, video) are required. According to the experts from the interviewed companies, most corporate workstations would meet these technical requirements.

Since the computer technology is developing still very fast, the described strategy to overcome the technology issues is only valid for a short period of time. The calculation power of computers will further increase the high fidelity of computer games too. The standard corporate workstations will change to more powerful computers and it will shortly be possible to run very sophisticated simulations on an average corporate workstation. How the strategy can be adjusted over time will be presented in section 5.3.

5.2.5   Social Considerations

Actions to overcome the four most important barriers to GBL have been illustrated. In the interviews with the learning experts, social aspects have often been mentioned. It is important to take this into account when developing any kind of learning solution. In this section, some considerations about social aspects for a possible showcase GBL solution will be presented.

Social Interaction

Most experts mentioned the importance of social contacts in learning. Independent of the used learning method, a lot of learning happens during the interaction with other participants or in dialog with the coaches. In order to achieve some personal interaction when using e-learning or digital GBL solutions, the following methods can be applied.

- Working in pairs; letting two participants work on one simulation which runs on a single workstation.

- Some participants can work individually on the the same learning content and thereafter meet each other to exchange experiences made during the session.

- Another method is to hold a feedback session after every e-learning session in which participants and coaches can exchange experiences.

- Social interaction can also be included by the use of blended learning. The digital learning sessions are completed individually whereas there is social contact during the conventional learning sessions.

- Using digital methods, the possibility for social interaction can be directly integrated into the solutions. Communication tools like chat, voice or video conferences allow the participants to interact with other participants and also with the coaches.

For the GBL showcase solution, not all of the above methods have to be implemented. However, it is advisable to think of some ways of enabling social interactions. This way, the probability of success can be enhanced.

5.3 Roadmap - Application of GBL over Time

In the last section, actions have been defined which allow to overcome the current GBL barriers. Nevertheless, these barriers will change over time and there will also be change in society and development in technology. In this section, the changes of the different parameters are analyzed and recommendations for respective changes in the strategy for the application of GBL are presented.

5.3.1 Situation Today

As found in the interviews, coaches and experts would like to use GBL. The barriers from section 4.2.10 above prevent GBL from being implemented.

Barrier	Proposed action for the showcase GBL solution
1: Low acceptance of GBL	1. Develop a showcase GBL solution 2. Choose learning content for which GBL is the most appropriate learning method

2: High effort and development costs	1. Further specify learning content
	
	    (a) In order to reach a high number of potential participants
	    (b) Choose long-living content
	
	2. Cooperation with a partner

3: Low cooperation between learning companies and gaming industry	1. Carefully choose the GBL project team
	
	    (a) Include experts from the learning, the game and the technology field
	    (b) Set the hierarchy right

4: Technology issues	1. The standard corporate workstation has to meet the technological requirements to run the GBL solution 2. The game element has to be engaging, not on the latest technology level 3. To avoid installation and operation problems, an online solution is appropriate

5: Social considerations	1. Include some way of social interaction
	
	    (a) Directly built-in into the solution
	    (b) Indirectly by proposing feedback sessions or blended learning

Table 5.2: Summary of the different barriers to GBL and suggestions of how to overcome them.

To move GBL to the next level, the strategy mentioned in the last section is implemented: a showcase GBL solution is developed to demonstrate the abilities of GBL. The technical level of this solution is on a basic level in order to use it on standard workstations. The game element is motivating and the learning process is well supported. There is no direct built in social interaction considered, but feedback sessions for social interaction are recommended.

5.3.2 Milestone 1: GBL is More Widely Accepted

Through the GBL showcase solution, the acceptance towards GBL has risen. Managements of different companies are willing to fund other GBL projects. The development costs are still high, but the cooperation between the learning experts and the gaming industry has improved. Progresses in the development of IT technology upgrade the standard of corporate workstations, e.g. broadband connection to the Internet is usually available.

In order to move on in GBL, more extensive GBL projects are run. The learning content of these solutions is still very general and determined for a high number of potential participants. The technology level is adapted to the better workstations in companies, but is still much less sophisticated than the level of state-of-the-art computer games. In respect of social interaction, the solutions now use direct communication. It is possible for the participants to talk to others and there are solutions which allow a group of participants to work on the same simulation, everyone in a different role and with different tasks to fulfill.

5.3.3 Milestone 2: GBL is a Standard Form of Learning

The acceptance of GBL is now not an issue anymore. It is accepted as a special form of e-learning. The cooperation between learning experts and the game industry is close to perfection and new companies are founded which are specialized in the development of GBL solutions. The development of new GBL solutions becomes somewhat less expensive because of the reuse of existing GBL engines. Technology is further developed and companies start to buy powerful workstations especially for GBL purpose.

To further improve the position of GBL, the technology level and therefore the accuracy of simulations compared to reality are raised. GBL solutions will come close to the technology level of computer games. It becomes profitable to not only implement a solution for very general content but to actually build a GBL solutions for specific content, e.g. for the core business of a company. GBL templates will be implemented which allow companies to alter the content themselves. However, this will only be possible for rather

general content, for specific content it will always be necessary to specifically develop a solution.

5.3.4 Milestone 3: There is a GBL Market

GBL companies deliver a wide variety of solutions for all kind of content. All employees run through GBL solutions during part of their trainings. GBL is not only used in business but it is also profitable to use it in schools and universities. The market for GBL reaches a similar size as the market for computer games and keeps growing.

5.4 Outlook - what Learning may Bring in the Future

As IT and communication technology are advancing rapidly, the future might bring totally new forms of learning. In this section a collection of speculations is presented. Some of the ideas are most likely to be implemented soon; others might never become reality or will be used differently than expected. An estimate of the likelihood of an implementation before 2010 is given using a percentage value.

Identification of Participant (60%)

Aldrich proposes a method in [1, p. 298] which avoids cheating. In e-learning it is difficult to make sure which participant is actually using the system at the very moment. To use a password does not prevent a participant of doing the learning session or test for another person. Instead, biometric sensors or web cams should be used to identify the participant.

Mobile Learning (M-Learning) (90%)

The mobile market is growing and thousands of applications for the mobile phones and PDAs are available. The use of mobile gaming is relatively recent (compare [2]). However, the demand for mobile learning applications is high; people want to go through learn sessions independently from time and place. GBL applications for mobile use would perfectly meet today's needs. E.g. Nokia's N-Gage or similar handheld devices would suit perfectly as mobile GBL platforms.

Voice Recognition (30%)

For the simulation of a conversation, it is not the same if the participant has to choose from some possible sentences by clicking on them or if he is able to actually talk to the simulated dialog partner. Combined with mobile learning, there would be solutions possible which do not need a computer but which are used just by talking to the mobile phone.

Modular and Dynamic Learning Content (20%)

The expert of Bundeswehr mentioned the modularization of the learning content. If this could be done to an extensive level, all kinds of learning sessions could be produced on the go. Depending of the needs of the participant, the modules are directly combined and at the best presented as a game on the PDA of the participant.

Content Generated by Participants (20%)

Most of the participants are experts in some areas of knowledge. It would be useful to make this knowledge available to other participants. Similar to the idea of Wikipedia, solutions could be developed which enable the participant to directly alter or add learning content.

Open Source Knowledge Base (10%)

An idea which was mentioned by the expert of an insurance company is the following: all kinds of learning content could be stored in a common pool. In principal everybody has access to the pool, but there are services existing which retrieve and combine the relevant knowledge to a package or to a learning session. It might be possible that these services can not be offered for free. An analogy to this proposal is water: it is generally free, only the treatment is paid for.

Chapter 6

Conclusion

In this thesis we analyzed the application of GBL in business environments. The reason for initiating this thesis was the impression that GBL is not yet widely used in the industry. As found in the survey, this hypothesis proved to be true, at least for digital GBL solutions. To our surprise, some analog GBL solutions have been used since decades in business. Learning experts use them for the training of all kinds of participants, including employees from the bottom line up to the higher management.

Regarding the use of digital GBL, we felt aversion of some learning experts against computers. This may originate on the one hand from negative experiences with badly designed e-learning solutions. Then again, computer games have still a bad reputation in the eyes of some learning experts. They are often perceived as silly enjoyment, antisocial activity or glorification of violence. Generally, the interviewed experts agree with research papers upon the possibilities and advantages of GBL and are keen to implement more game-based solutions in the future.

We are convinced that GBL is an adequate learning method for specific content and all different kinds of people. We believe that the combination of engaging game elements and learning will become widely used in the near future. Within the next five years, companies will reduce skepticism against this form of learning and will apply it for all kind of content. It will become normal to learn by the use of games and within a decade, GBL will be used for the training of a lot of situations of daily life.

Contributions

It was discovered that digital GBL is used far less in the industry than generally expected. Companies use games for learning but these consist mainly of analog role-playing games e.g. for experiencing and improving interactions with other people. The main contribution of this thesis concentrates on the identification of the reasons for the low number of GBL implementations. These are denominated and defined as the four barriers to GBL. In order to enable the next step for GBL towards an accepted and widely used learning method, ways have been conceived to overcome the barriers. These ways or recommended actions have been summarized in a roadmap. The main goal was to design a showcase GBL solution which serves as a demonstration object to convince potential stakeholders of the qualities of GBL. After a successful implementation of the showcase solution, the way should be paved for more GBL solutions to teach all kinds of content.

Shortcomings

A difficulty we experienced was the search for adequate learning experts for the survey. In the end, it was possible to engage a good mix of experts from different industry sectors. However, their experiences and background concerning GBL was totally diverse. Some experts gained experiences mainly with analog GBL solutions (e.g. for team building for small groups of participants) whereas others were talking more about digital business simulations designed as e-learning solutions for individual learning. Due to the diverse backgrounds of the company experts, it was impossible to conduct a quantitative analysis of the survey results. On the other hand, the diversification of the interviewed experts presented a good basis for a qualitative approach.

Future Work

As stated in the last section, the field of candidates for the survey was relatively inhomogeneous. In order to get a more accurate view on the actual needs of the companies, we propose the conductance of a second survey with a more homogeneous field of experts for the interviews. More companies could be included, also from overseas. The experts should ideally all have led several digital GBL projects and worked with the current company for at least two years. This way, it would be possible to collect information which thereafter could be analyzed in a quantitative way. The worldwide level of the application of GBL could be identified with high accuracy. Additionally, it would be possible to precisely

determine the structure of the showcase GBL project in order to satisfy the company?s needs. The likelihood of success of the showcase project could be raised significantly.

After the conduction of the quantitative survey and the analysis of the collected information, we propose to proceed according to the roadmap presented in section 5.3. A showcase GBL solution should be implemented by a diverse team, including experts from the learning, the gaming and the technology field. The content and the technological level should be chosen adequately in order to fit the needs of numerous potential participants. Ideally, the developing company (or a partner) should dispose of sufficient resources to effectively promote the solution and to make it a real success. If it is possible to convince managements by this means, the learning future looks bright for employees and for the society in general.

Appendix A

Template of Questionnaire used for the Industry Survey

Round of introductions, short presentation of agenda

PART 1: GBL activities in your company

1. How would you describe GBL?

2. Do you remember a specific GBL project about which you could give me more information?

3. What kind of project was this?

   (a) Which GBL method has been used, what was the underlying game element?

   (b) What was the content?

   (c) Who were the learners (kind)?

      i. Age

      ii. Function (job description)

   (d) How many participants have been trained using this method? (Switzerland / worldwide)

   (e) Which was the trained department / division?

   (f) How many team members were necessary to run and complete the GBL project?

   (g) For how long has the tool been used?

      i. Is it still being used?

ii. How long did it take to develop the GBL solution?

(h) h. Has the tool been further developed?

    i. Improvements of the tool itself, more functionality

    ii. Has it been adapted to work with other content?

    iii. Has it been used in other divisions of the company or other companies?

(i) Has the GBL project been run internally or was there a partner company?

(j) Has a template been used? Which one, form which company?

(k) How high would you rate the level of technology used?

(l) Budget?

(m) Which learning method was used before it was substituted by the GBL solution?

    i. What was the trigger to switch to a GBL method?

    ii. Advantages / Disadvantages compared to the formerly used method?

4. General questions regarding GBL projects

(a) How many GBL projects have been run in the company? (Switzerland / worldwide)

(b) Which GBL methods have been used?

(c) Kind of learning content which is transferred using GBL methods?

(d) Who were the learners?

(e) In which departments has GBL been used?

PART 2: Evaluation of GBL and comparison to other learning methods

1. What is your personal opinion on GBL? What are your expectations?

2. Comparison to other learning methods: advantages / disadvantages of GBL?

3. For what kind of content should GBL be used, is there content it should not be used for?

4. Is it right to motivate learners through game elements? Shouldn't the content be motivation enough to engage the learners?

5. Is it possible to change behaviors using GBL methods? Is it easier to do so than with conventional methods?

6. Are there types of learners for whom the GBL approach is not suitable? What kind would that be? a. In a GBL solution, should there always be the possibility to learn the content without the game element?

7. What's the minimal number of participants needed to take the effort of implementing a GBL solution? (for a complex, computer-based solution)

8. Is the role of trainers changing if GBL is used? How is it changing? Are there higher or lower requirements?

9. Acceptance of GBL by employees in your company

    (a) Is the combination of game and learning a problem?
    (b) Do different people think differently?
          i. Learners
         ii. Coaches / Trainer
        iii. Function (manager, scientist, clerk)
         iv. Department
          v. Age
         vi. Gender

10. What are barriers to GBL projects?

PART 3: General questions regarding learning in your company

1. Have the learners changed? How have they changed? How did you react to this change in your company?

2. How do you motivate learners in your company? How can learners be motivated in general, is there a method?

3. How do you evaluate the success of a learning method in your company? What of the following do you evaluate?

    (a) Direct feedback of participants
    (b) Knowledge
    (c) Behavior change
    (d) Business impact
    (e) Return on investment

4. Is technological progress an enabler?

    (a) Faster hardware

    (b) Internet, better networks, communications

    (c) Web 2.0

5. Can you think of areas in your company in which GBL could help getting better results in learning issues?

    (a) What advantages do you hope for?

    (b) Which learning methods are in use at the moment?

6. General: are there areas in different divisions / companies which are similar enough (respective content and learners) to use the same GBL template for all of them?

    (a) Area, content, learners

    (b) Potential GBL method

    (c) What kind of a such template would you like to obtain?

Appendix B

Completed Questionnaires (in German)

B.1   Bayer AG

Herr Becker, Head of Competence Training

PART 1: Was wird in Ihrer Firma im Bereicht GBL bereits gemacht?

1. Was verstehen sie unter GBL? *Alles von Simulationen, Planspielen bis hin zu Email-Spielen. Bei Bayer wird GBL noch zu wenig eingesetzt, vor allem weil der Aufwand dafür hoch ist. Lohnt sich nur für grosse Zielgruppe. Das ganze muss nicht unbedingt am Computer durchgeführt werden, sie setzen auch Rollen- und Brettspiele (handelsübliche, meist auf Strategiebasis) in den Kursen ein.*

2. Können sie sich an ein konkretes GBL Projekt erinnern? Gibt es Pläne für ein GBL Projekt? *Ja*

3. Was war das für ein Projekt? GBL Methode, welche Spielidee liegt zugrunde? *Internationale Mgmt Simulation, 7 virtuelle Geschäftsjahre werden durchgespielt. Nach jeder Runde müssen die Teilnehmer Entscheidungen treffen. Performance Ranking. Anreiz: Die 4 besten Teams werden nach Leverkusen eingeladen, dort wird die 2. Runde live gespielt inklusive extra Programm.*

    (a) Lerninhalt, was wurde vermittelt? *Vorwiegend BWL Inhalte*
    (b) Wer waren die Lernenden? *Betriebswirtschaftler*

(c) Wie viele Personen wurden damit geschult? *Jedes Jahr 100 Teams a 4 Personen: 400 pro Jahr.*

(d) Wie viele Leute waren im Projektteam um das GBL Projekt durchzuführen? *5 Leute*

(e) Wie lange war das Tool im Einsatz? Ist es noch im Einsatz? *Ja*

(f) Wurde es weiterentwickelt? *Ja*

    i. Verbesserungen am Tool *Laufend weiterentwickelt (seit 10 Jahren). Seit 5 Jahren nun online basiertes Tool. Distribution anfangs mit Disketten, die auf jedem Client einzeln installiert werden mussten.*

    ii. Für anderen Lerninhalt genutzt *Nein*

    iii. Bei anderen Abeilungen / Firmen eingesetzt *Ja*

(g) Wurde das GBL Projekt selber durchgeführt oder extern gegeben? Wer? *Selbst*

(h) Wurde ein Template verwendet? Welches, von welcher Firma? *Nein*

(i) Wie hoch schätzen sie den verwendeten technologischen Level ein? *Tief, hat sich dann etwas gesteigert mit online Version.*

(j) Budget? *5 Leute, 300'000 Euro. Grossteil (10%-15%) in Weiterentwicklung investiert. Insgesamt 500'000 Euro*

4. Zu Projekten allgemein

(a) Welche GBL Methoden wurden eingesetzt? *Planspiele, Email-Spiele, Role-play, Brettspiele*

(b) Wer waren die Lernenden? *Durchs Band*

(c) In welchen Departementen? *In allen, nicht spezifisch.*

PART 2: Evaluation von GBL und Vergleich mit anderen Lernmethoden

1. Was halten sie persönlich von GBL? *Sehr viel, ist zukunftsträchtig. Wird immer häufiger eingesetzt werden.*

2. Vergleich mit anderen Lernmethoden, Vorteile / Nachteile von GBL? *Sandkasten: Man kann System erfahren und lernen ohne grossen Schaden anzurichten. Bsp: Piloten lernen 95% im Simulator und nicht nur noch am Supersimulator (zu teuer) sondern an PCs. Bsp2: Man kann Leute an die Grenzen der Leistungsfähigkeit führen (Erfahrung für Ernstfall): Virtuelle Server aufsetzen. Dann Super GAU üben.*

3. Für welche Lerninhalte soll GBL verwendet werden, für welche nicht? *Es kann fast alles gelehrt werden, wenn man's gut macht. Vor allem Fachqualitäten (für Job) und Methoden. Wenn man zB eine komplexe Anlagenstruktur (Apparate) begreifen soll.*

4. Können mittels GBL Verhaltensänderungen bewirkt werden? Besser als mit herkömmlichen Methoden? *Es ist denkbar, dass es in diese Richtung geht und zumindest unterstützend wirken kann. Lufthansa macht ein spannendes Lernprojekt: Interkulturelle Ausbildung am Schalter, ist ein Erfolg.*

5. Gibt es Lerntypen, für welche GBL nicht geeignet ist? Wer? *Bisher noch keine getroffen. Neugierde wird immer geweckt durch GBL Methoden.*

   (a) Sollte zusätzlich zur GBL Version auch immer eine OHNE Spielelement angeboten werden? *Nein, Spielelemente kommen durchwegs gut an.*

6. Ab wie vielen Teilnehmern lohnt es sich, eine GBL Lösung einzusetzen? *Ca 500, ist aber schwierig eine Zahl zu nennen. Kommt auf alles Mögliche an.*

7. Verändert sich die Rolle der Trainer beim Einsatz von GBL? Und wie? Höhere oder tiefere Anforderungen? *Anforderung an Coaches ist höher, auch schon beim Blended Learning hätten diese zum Teil Mühe. Man muss die Coaches gut "abholen". Sie haben bei GBL nicht einfach ein Heft (Leitfaden) in der Hand, nach welchem sie vorgehen können. Die Lektionen sind nicht so vorgefertigt, man muss viel flexibler sein.*

8. Was sind Barrieren für GBL Projekte? *Entwicklungskosten*

PART 3: Lernen generell in Ihrem Unternehmen

1. Wie testen Sie, wie erfolgreich eine Lernmethode war? Was testen Sie?

   (a) Anklang der Lernsession? *Ja*
   (b) Wissen überprüfen? *Ja*
   (c) Verhaltensänderung? *Ja, Überprüfung durch Mitarbeiter*
   (d) Business impact? *Ansonsten leider nichts. Noch nichts mit ROI messen etc.*
   (e) Return on investment?

2. Akzeptanz von GBL bei Mitarbeitern in Ihrer Firma

   (a) Ist der "Game-Faktor" ein Problem? *Ist kein Problem*

(b) Variiert Akzeptanz bei unterschiedlichen Leuten? *Nein*

3. Generell: Gibt es Bereiche, die in vielen Abteilungen / Firmen so ähnlich sind, dass sie mit ein und demselben GBL Template arbeiten könnten? *Eher nicht, wäre aber interessant. Eventuell in der Produktschulung. Ist halt auch immer stark von den Persönlichkeiten (Coaches und Teilnehmer) abhängig. Kommt immer etwas anders raus. Vielleicht für facts, bei Produktmanagement schwierig. Eventuell ist ein Template pro Fachrichtung standardisierbar.*

B.2   Bundeswehr Deutschland

Herr Thielmann, Referent für moderne Ausbildungstechnik im Führungsstab der Streitkräfte im Bundesverteidigungsministerium

PART 1: Was wird in Ihrer Firma im Bereicht GBL bereits gemacht?

GBL ist bei der Bundeswehr (Bw) noch in Entwicklung, es gibt viele Studienansätze, wissenschaftliche Erkenntnisse und wird jetzt ggf. forciert.

Zeitlicher Anhalt: etwa 2010/2011. Treiber ist dabei die technologiegestützte Ausbildungsform Fernausbildung. Eine Weiterentwicklung von eLearning, welche handlungsorientiert und teletutoriell begleitet ist.

Ziel bei der zukünftigern Inhaltserstellung der Bw ist eine starke Modularisierung: Viele kleine Lerneinheiten sollen nach Bedürfnissen kombinierbar sein. Und dies weltweit und on-demand. (Initiative Dynamischer Content).

Was GBL - oder besser: darauf basierende Simulationsanteile - kann: für die Fernausbildung ist es gut, die Methode ist sehr handlungsorientiert, man sitzt nicht alleine vor dem Rechner. Das Überprüfen der Lernerfolge (ob der Lernende es auch wirklich kann) ist sehr einfach mit GBL. Dies ist von grosser Bedeutung weil man nicht erst in Afghanistan prüfen will, ob es nun funktioniert oder nicht.

Herr Thielmann hat zB gelernt, einen Generator anzumachen, ohne dass er je einen berührt hätte. Ist so gut nachgebildet mit Motorgeräuschen und Pannen etc. So wird es auch überprüft: Klappt es in der Simulation, so hofft man, dass es auch in der Realität klappt.

1. Was verstehen sie unter GBL? *Anwendung von Teilen von Spielgames mit gezielter Didaktik. zB Sims. Module davon um bestimmte Lernziele zu erreichen.*

2. Was war das für ein Projekt?

    (a) Wer waren die Lernenden?

        i. Alter *Kommt mehr aufs Thema als auf das Alter an: Entweder ist es für alle langweilig (zB Recht) oder aber alle interessieren sich dafür (zB Autos). Aufs Alter komme es nicht so an, man muss aber Schnelligkeit und Lernfähigkeit der Person beurteilen (nicht nur vom Alter abhängig.)*

    (b) Wurde das GBL Projekt selber durchgeführt oder extern gegeben? Wer? *Noch kein konkretes Projekt. Viele Leute machen sich Gedanken zum Thema, intern und extern. Z.B. auf dem FA-Kongress der Bw in Hamburg.*

    (c) Wie hoch schätzen sie den verwendeten technologischen Level ein? *Planung sieht die Verwendung einfacher Simulationsanteile vor, die dafür überall abspielbar und schnell einzubringen sind.*

PART 2: Evaluation von GBL und Vergleich mit anderen Lernmethoden

1. Was halten sie persönlich von GBL? *Die Entwicklung geht klar dahin. Man sieht das auch im Internet mit Spielprogrammen wie Sims, Rollenspiele und virtuelle Umgebungen. Weitere Zielgruppen sollten für Games und GBL gewonnen werden (nicht nur die pubertierenden Teenager). 2nd Life und Sims machen das schön vor, die ziehen bereits andere Leute an. In Zukunft sollte es kleine Module geben: Kleine Lebensanleitungen, die den Leuten zeigen wie etwas geht. zB Emergencies, kleine Sequenzen, Fahrschule*

2. Für welche Lerninhalte soll GBL verwendet werden, für welche nicht? *Für Gewaltdarstellungen etc. sollte es nicht gebraucht werden.*

B.3   Credit Suisse

Herr Simon, Leiter eLearning & Technology

PART 1: Was wird in Ihrer Firma im Bereicht GBL bereits gemacht?

1. Was verstehen sie unter GBL? *Jede Form von Lernen bei welcher Game Elemente eingesetzt werden: - Brettspiele - Soap Operas (Retail Banking Providers) - Rollenspiele (mit Schauspielern) - Lego (um Prozesse durchzuspielen) - Simulationsgames*

2. Können sie sich an ein konkretes GBL Projekt erinnern? *An dutzende*

3. Was war das für ein Projekt?

   (a) GBL Methode, welche Spielidee liegt zugrunde? *Bank Simulation*

   (b) Lerninhalt, was wurde vermittelt? *Wird für 2 Gruppen von Lernenden einge-setzt: Graduates: Hauptmechanismen in einer Bank (gerade für Naturwissenschaftler), was passiert wenn man Marketing macht?, wenn man Hypo Zins senkt?, wenn man Ausbildung macht? etc. Middle Mgmt: Ausbildung, um innerhalb der Bank weiter zu denken (Führungsebene)*

   (c) Wer waren die Lernenden?

      i. Alter *Graduates: 25 - 33 Jahre Middle Mgmt: 30 - 40 Jahre*

      ii. Funktion (job description) *Graduates und Middle Mgmt.*

   (d) Wie viele Personen wurden damit geschult? (CH/weltweit) *Grad: 150 - 200 (worldwide), 80 - 100 (CH), pro Jahr MM: 40 - 50*

   (e) Departement / Abteilung *Alles durch, nicht von Abteilung abhängig.*

   (f) Wie viele Leute waren im Projektteam um das GBL Projekt durchzuführen? *Intern 2-3 (Betriebswirtschaftler, eLearning Verantwortlicher, Program Manager) Zusammen mit einer externen Firma.*

   (g) Wie lange war das Tool im Einsatz?

      i. Ist es noch im Einsatz? *Ja, seit 4 Jahren.*

      ii. Wie lange war die Entwicklungszeit? *Insgesamt über ein Jahr (Vorprojekt: alte Excel/Lotus Nots Version, wurde dann weiterentwickelt).*

   (h) Wurde es weiterentwickelt?

      i. Verbesserungen am Tool *Jedes Jahr wurde es verbessert (immer wieder neue Parameter, die man zusätzlich verändern konnte) und an die Wirtschaftssituation angepasst.*

      ii. Für anderen Lerninhalt genutzt *Nein*

      iii. Bei anderen Abeilungen / Firmen eingesetzt *Nein*

   (i) Wurde das GBL Projekt selber durchgeführt oder extern gegeben? Wer? *Mix: Konzeption fand intern statt (bis hin zu Drehbüchern wird das intern gemacht), Umsetzung dann extern (IT Firma).*

   (j) j. Wurde ein Template verwendet? Welches, von welcher Firma? *Nein, aber für GBL häufig mit "Game Solutions" zusammengearbeitet.*

   (k) Wie hoch schätzen sie den verwendeten technologischen Level ein? *Echte Simulationen. Recht hoch.*

   (l) Budget? *Entwicklung: 200'000 CHF*

(m) Welche Lernmethode wurde früher dafür eingesetzt und durch GBL ersetzt? *Die Excel Version der Simulation.*

   i. Was war Auslöser, um GBL einzusetzen? *zB. Graduates: Möglichst schnell müssen diese einen guten Überblick über die Abläufe in einer Bank gewinnen. Games lassen einem sehr schnell etwas erleben, hier liegt der grosse Vorteil von Games.*

4. Zu Projekten allgemein

   (a) Wie viele GBL Projekte wurden in etwa durchgeführt? *Bei der CS gibt's: 1600 Ausbildungskurse (class room), davon etwa 50 GBL 1200 eLearnings (850 davon off-the-shelf, kann man direkt einkaufen), 350 selber entwickelt, 50 GBL, Tendenz steigend.*

PART 2: Evaluation von GBL und Vergleich mit anderen Lernmethoden

1. Was halten sie persönlich von GBL? *Gute Erfahrungen damit gemacht, soll ausgebaut werden, vor allem im eBereich. Spiel ist häufig trial and error (im Positiven), zB wie man mit anderen Menschen diskutiert. Für die Spiele kann man nicht mit echten Kunden arbeiten, deshalb ist die Simulation sehr nützlich. Je genauer die Realität damit abgebildet wird, desto besser. Dinge die man nie mehr vergisst erfährt man in lebensbedrohlichen Situationen. Zuunterst auf dieser Skala ist Lesen, dann kommt Hören etc. GBL ist dabei auf dem obersten Drittel, sehr positiv also um Lerninhalte zu memorisieren. Diejenigen die wegkommen vom eLearning und GBL haben zu einfache und langweilige Module entwickelt.*

2. Vergleich mit anderen Lernmethoden, Vorteile / Nachteile von GBL? *Teuer, wobei die variablen Kosten ungefähr gleich bleiben. Die Wiederholbarkeit/Reproduzierbarkeit ist eine grosse Stärke von DGBL Lösungen. Man kann eine Situation wieder erstellen, bei non digital Spielen ist es sehr stark von der Gruppe und dem Umfeld abhängig, fast unmöglich dort eine Situation nachzustellen. Das Erlebnis ist wichtig, vor allem beim Erwachsenen Lernen ist das Erfahrungen sammeln wichtig.*

3. Für welche Lerninhalte soll GBL verwendet werden, für welche nicht? *Geht prinzipiell für alles. Aber nicht für alles gleich gut geeignet. Für tieferes Verständnis einer Sache ist GBL sensationell. Für reine Wissensvermittlung ist eine GBL Variante zu teuer, ginge aber schon.*

4. Ist es richtig, die Lernenden durch Spielelemente und anderes zu motivieren? Sollte nicht der Stoff per se die Motivation darstellen? *Spiel als Motivator ist ok, man kann*

das Lernen an und für sich sowieso nicht wirklich beeinflussen. Mann kann es aber erleichtern durch geeignete Rahmenbedingungen.

5. Können mittels GBL Verhaltensänderungen bewirkt werden? Besser als mit herkömmlichen Methoden? *Jawohl, indem man Simulationen durchgeht. Es sind Simulationen am Rande vom Game Begriff gemeint, möglichst nah bei der Realität.*

6. Gibt es Lerntypen, für welche GBL nicht geeignet ist? Wer? *Höchstens für Leute die nicht gerne spielen, für diejenigen ist GBL nicht geeignet. Aber Simulationen funktionieren sogar für diese Leute, Simulationen können ja zum Teil weit weg von reinem Game sein.*

    (a) Sollte zusätzlich zur GBL Version auch immer eine OHNE Spielelement angeboten werden? *Nein, wenn man dies in Betracht zieht sollte man sich überlegen, ob GBL die richtige Wahl ist um den Lerninhalt zu vermitteln. Man kann es nie allen recht machen.*

7. Ab wie vielen Teilnehmern lohnt es sich, eine GBL Lösung einzusetzen? (Für eine aufwändige, computerbasierte Implementation.) *Bzgl eLearning bei CS: Wenn es über 100 Teilnehmer pro Jahr sind. Oder aber wenn 100 Teilnehmer verteilt über 3 Jahre hinweg damit ausgebildet werden (bei langlebigem Content).*

8. Verändert sich die Rolle der Trainer beim Einsatz von GBL? Und wie? Höhere oder tiefere Anforderungen? *Nein, der instruktive Aspekt der Lernmethode bleibe gleich.*

9. Akzeptanz von GBL bei Mitarbeitern in Ihrer Firma

    (a) Variiert Akzeptanz bei unterschiedlichen Leuten?
        i. Lernende *50% findet GBL super, der Rest mehr oder weniger.*
        ii. Coaches / Trainer *Finden den Ansatz gut, viele sehen GBL als Chance.*
        iii. Funktion *Bei Managern ist etwas weniger Begeisterung zu spüren.*
        iv. Alter *Bei den Jungen eher einfacher mit GBL, je älter desto konservativer.*
        v. Geschlecht *Kein Unterschied*

10. Was sind Barrieren für GBL Projekte? *Kosten. Schnelle Änderungen (im Umfeld und somit auch des Lerninhaltes). Da die Entwicklungszeit so lange ist, kann Content schon nicht mehr relevant sein wenn GBL Lösung fertig ist. Ein Hindernis ist auch die Technik (multimediafähige Workstations), in grossen Unternehmen sind diese zum Teil nicht verfügbar, oder nicht an allen Standorten.*

PART 3: Lernen generell in Ihrem Unternehmen

1. Haben sich die Lernenden verändert? In wiefern und wie wird darauf reagiert? *Ja, die Jungen haben ein anderes Lernverhalten. Die Attraktivität der Lehrmethoden muss deshalb höher gesetzt werden um auf die Leute wirklich einzugehen. Entwicklungen weisen in Richtung modularisiertes eLearning. Weiter wird on-demand und just-in-time Learning immer wichtiger. Bei Ausbildung hat sich in letzter Zeit bei der CS folgendes geändert: Es war dezentral organisiert (19 Bereiche) und wird nun zentralisiert. Auch mit GBL: Bis anhin sehr dezentralisiert (dh. In einem anderen Land/Schule wird auch ein anderes Spiel eingesetzt). Ist nun aber im Wandel, soll ebenfalls zentralisiert werden. Doziert wird immer weniger, Fokus liegt auf Projektarbeit (um echte Erfahrungen zu sammeln, möglichst berufsnah), mehr Activity-based.*

2. Wie testen Sie, wie erfolgreich eine Lernmethode war? Was testen Sie?

   (a) Anklang der Lernsession? *Evaluation mittels Happy Sheet bei 100% der Lernsessions.*

   (b) Wissen überprüfen? *Zu 70-80% wird das gemacht. Games und Simulationen spielen dabei eine grosse Rolle, denn dort ist es einfach, den Lernerfolg bereits während der Simulation zu messen.*

   (c) Verhaltensänderung? *Mitarbeiter und Vorgesetzte werden befragt*

   (d) Business impact? *Ist sehr schwierig zu messen.*

   (e) Return on investment? *2-3 Pilotprojekte, aber schwierig darauf zu schliessen, wie viel dass die Ausbildung bewirkt hat. Es kommt auch auf den Themenbereich an: Dort wo Ausbildung nur einen kleinen Hebel hat (zB. Hypothekargeschäfte) ist es praktisch nicht messbar. Bei Spezialthemen wie hochkomplexen Produkten spielt die Ausbildung eine sehr grosse Rolle und ein Erfolg dieser kann somit auch besser gemessen werden.*

3. Technischer Fortschritt, was ermöglicht dies im Lernbereich?

   (a) Schnellere Hardware *Es hat mehr Möglichkeiten gegeben. Es ist aber zum Glück nicht mehr so wie zu eBusiness Zeiten, als total technology-driven operiert wurde. Heute werden die die Technologie nur noch "genutzt".*

   (b) Internet, Vernetzung, vereinfachte Kommunikation *Die verbesserte Technik wird dazu genützt, die Konsistenz weltweit zu wahren, ist ein grosser Vorteil.*

   (c) Web 2.0 *Zurzeit wird ein mobile learning Pilot durchgeführt um die Grundakzeptanz abzuchecken. Podcasts sind dabei sehr erfolgreich.*

4. Generell: Gibt es Bereiche (Lerninhalte, Lerner), die in vielen Abteilungen / Firmen so ähnlich sind, dass sie mit ein und demselben GBL Template arbeiten kön-

nten? *Unternehmungsführung, Controlling, Buchhaltung, Projektmanagement, Kommunikation, Marketing, Risk Mgmt, Ausbildung etc. Solche Dinge sind bei vielen Unternehmen ähnlich und können somit gut mittels ähnlichen Lernlmethoden vermittelt werden. Grundsätzlich solche Dinge, die nicht das Kerngeschäft betreffen. Diese können besser firmenübergreifend gelehrt werden. Beim Kerngeschäft kommt natürlich Spezialwissen zum tragen, welches bei jeder Firma einzigartig ist. Branchenunabhängig wäre es zB bei Versicherungen, Banken, Maschinenindustrie. Oder dann gleich für einen ganzen Verband eine Lösung entwickeln: Elektriker, Schreiner, Handwerker usw.*

B.4   Insurance Company

Verantwortlicher L&D, Projects & Quality Management

PART 1: Was wird in Ihrer Firma im Bereicht GBL bereits gemacht?

1. Was verstehen sie unter GBL? *Jegliche Form von Wissensvermittlung, bei welcher ein Spiel eingesetzt wird.*

2. Können sie sich an ein konkretes GBL Projekt erinnern? *1) Insure Man: 3 tägiges Seminar, aufgebaut wie Monopoly 2) Ökonomikus: Projekt im Bereich Finanzen, von Kundenbetreuung bis hin zu Immobilien, Brettspiel*

3. Zu Projekten allgemein

   (a) Wie viele GBL Projekte wurden in etwa durchgeführt? *2 wovon er weiss. In den 80er Jahren war GBL aktueller, kommt sehr auf CEO und Management an.*

   (b) In welchen Departementen? *Die Firma ist gerade dabei, gesamtes Ausbildungsprogramm durchzugehen. Ziel ist es, vom ILT (instructor lead training) wegzukommen. Bis anhin ist 90% ILT, man möchte dies auf maximal 30% runterschrauben. Ersetzt wird ILT durch eLearning, WBT und wenn möglich GBL. Es wird unterschieden zwischen soft skills und technical skills, wobei gerade für die soft skills GBL methoden angewendet werden sollen. Es sind Einsparungen in der Höhe von ca. CHF 400 pro Teilnehmer und Tag möglich.*

PART 2: Evaluation von GBL und Vergleich mit anderen Lernmethoden

1. Was halten sie persönlich von GBL?

(a) a. Erwartungshaltung? *Er hat die Utopie, dass irgendwann sämtliche Lernin-halte für die gesamte Gesellschaft per spielbasiertem Ansatz vermittelt werden. Wenn keine Spielidee zugrunde liegt, dann soll der Stoff zumindest unterhalt-sam vermittelt werden. Es ist eine andere Art von Lernen, man merkt gar nicht wirklich, dass man Dinge lernt.*

2. Für welche Lerninhalte soll GBL verwendet werden, für welche nicht? *Für möglichst alles.*

3. Gibt es Lerntypen, für welche GBL nicht geeignet ist? Wer? *Kann sein, ja*

    (a) Sollte zusätzlich zur GBL Version auch immer eine OHNE Spielelement ange-boten werden? *Ja, gute Idee*

4. Verändert sich die Rolle der Trainer beim Einsatz von GBL? Und wie? Höhere oder tiefere Anforderungen? *Ja, es wird anspruchsvoller, aber auch interessanter. Der Schritt vom Trainer (Lehrer, der seinen Stoff präsentiert) zum Coach muss gemacht werden. Ein Coach teilt nur mit, wo der Lernende am Ende landen muss, dann lässt er den Lernenden arbeiten und gibt ihm Unterstützung und Leitplanken. Der Coach kann muss alle möglichen Wege kennen, nicht nur den, den der Trainer präsentiert.*

5. Was sind Barrieren für GBL Projekte? *Geld, Technologie (zB Bandbreite, die Legal and Compliance Regeln bzgl Geldwäsche müssen jedes Jahr allen beigebracht werden, das heisst dass an einem Tag ev. 1000 Leute die gleichen Lerninhalten bearbeiten wollen)*

PART 3: Lernen generell in Ihrem Unternehmen

1. Wie testen Sie, wie erfolgreich eine Lernmethode war? Was testen Sie?

    (a) Anklang der Lernsession? *Wird immer gemacht.*

    (b) Wissen überprüfen? *Vortest - Nachtest: Bereits vor der Lernsession wird Wis-sen überprüft. So kann gut gemessen werden, was neu gelernt wurde.*

    (c) Verhaltensänderung? *Für einen ganz spezifischen Lehrgang im 2006 gemacht. Für Einsteiger wird's auch gemacht, mittels Assessments, Verhaltensänderung wird dann beurteilt.*

    (d) Business impact? *Nichts / in Planung*

    (e) Return on investment? *Nichts / in Planung*

2. Technischer Fortschritt, was ermöglicht dies im Lernbereich? *Eigentlich hat sich nicht viel verändert in den letzten 10 Jahren. Ob alles etwas schneller läuft oder nicht ist egal. Die Systeme sind labiler als früher. Die Inhalte und die delivery methods sind die gleichen geblieben. Ein Trend hin zu WBT ist aber deutlich spürbar. Der WBT Content ist zum Teil schlecht, das heisst die Lerninhalte wurden einfach online zugänglich gemacht (zB direkt eine PPT Präsentation hochgeladen). Das Wichtige ist, dass das Lernmaterial für die Methode aufbereitet wird und somit die Stärken der Methode genutzt werden können.*

3. Sehen Sie in Ihrem Unternehmen Bereiche, in denen gut mit GBL gearbeitet werden könnte? *Grundausbildung, Weiterbildung (das ist bei der Firma strikte durchorganisiert, wie ein Studiengang). Anwendungen von GBL sind aber nicht limitiert.*

   (a) Welche Methoden wurden bis anhin eingesetzt? *GBL soll die anderen Methoden nicht komplett ersetzen, nur die Menge an ILT soll reduziert werden zu Gunsten von eLearning. Reines Vortragen soll so selten als möglich eingesetzt werden.*

4. Akzeptanz von GBL bei Mitarbeitern in Ihrer Firma

   (a) Variiert Akzeptanz bei unterschiedlichen Leuten?

       i. Lernende *Die finden es toll*

       ii. Coaches / Trainer *Bis anhin nur eine Person, ist ihr Werk.*

       iii. Funktion *Management: Dutzende Mio Franken werden für Lernaktivitäten eingesetzt, von dem her gut. Bzgl. GBL kann noch keine Aussage gemacht werden, muss erst noch herausgefunden werden.*

5. Generell: Gibt es Bereiche, die in vielen Abteilungen / Firmen so ähnlich sind, dass sie mit ein und demselben GBL Template arbeiten könnten? *Er denkt, dass es solche Bereiche gibt. Es wäre gut, wenn folgende Standards definiert würden: 1. Für Lernende: Zielgruppe analysieren (wer ist wie stark, Mathe oder Musik etc.), nicht nur Lerntyp, sondern auch Vorwissen der Zielgruppe, Freiheitsgrad den sie schätzen etc. 2. Das gleiche soll gemacht werden für Lerninhalte. Dann diese Standards matchen. Kurzfassung: Mit welchen Methoden soll man auf welche Zielgruppen zugehen.*

Brainstorming: *Viel Unterstützung beim Lernen könnten auch Kommunikationsmittel bieten: - Telko - Screencast (wie Screenshot aber Video) - Video Pods - mLearning (lerninhalte aufs Handy oder PDA)*

Interaktive Videos: Für DGBL (zB bei Persönlichkeitsschulung im Verkauf) könnte man das Engagement und die Echtheit noch steigern, indem man nicht mit Comic Figuren

spricht, sondern mit Personen in Video Sequenzen (Schauspieler). Es müsste für eine Szene 5 verschiedene Videos geben, so dass es nicht repetitiv wirkt. Diese werden per Zufall ausgewählt. Führt zu umfangreichem Storyboard.

Wie kommuniziert man mit der Software? Schön wäre eine Lösung mit Spracherkennung: Lernende müssten nicht am Computer arbeiten. Man könnte per Telefon operieren und auf der anderen Seite einen simulierten Kunden schalten. Es gibt schon Games, bei welchen man seine Telefonnummer angibt und das Programm dann Anrufe darauf tätigt.

Vielleicht werden Lerninhalte bald freeware/open source? Es wäre möglich, dass es einfach einen Pool von Wissen gäbe (ähnlich wie Wikipedia) und dass man für Services bezahlt, welche einem dieses Wissen zusammenstellen und aufbereiten. Unterschiedliche Inhalte könnten zusammengeführt werden etc.

B.5   Siemens Transportation Systems

Herr Zehnder, Ausbildungsleiter

PART 1: Was wird in Ihrer Firma im Bereicht GBL bereits gemacht?

1. Was verstehen sie unter GBL? *eLearning auf eine gescheite Art gemacht, spielerisches Lernen, Planspiele etc.*

2. Können sie sich an ein konkretes GBL Projekt erinnern? *Extern: Planspiele BWL: apple and oranges Intern: Planspiel "Mensch und Prozesse" (Modelleisenbahn) mit Lernziel: Grenzen der Prozessdefinitionen und Teamlernen sowie Planspiel "building bridges" (Brückenspiel) mit Lernziel Systemtheorie, Verhalten im Team und die Macht des Vertrauens.*

3. Was war das für ein Projekt?

   (a) GBL Methode, welche Spielidee liegt zugrunde? *Die Teilnehmer müssen Brücken aus Elementen (Metallkugeln und magnetischen Stäbchen) bauen. Der Mensch wird als System betrachtet. Und wie dieses mit anderen zusammenarbeitet/umgeht. Es kann im Grunde irgendwas verwendet werden (Spiel, Problem) um damit zu schulen, es muss aber einen gewissen komplexitätsgrad haben. Lego wäre zu einfach.*

   (b) b. Lerninhalt, was wurde vermittelt? *Soziale Kompetenz, Aspekte von Vertrauen*

(c) c. Wer waren die Lernenden?

    i. Alter *Durchs Band*

    ii. Funktion (job description) *Neuen Mitarbeiter mit Hochschulabschluss (in etwa)*

(d) Wie viele Personen wurden damit geschult? (CH/weltweit) *Gruppen a 15 Personen, Dynamik in der Gruppe ist wichtig, darum geht's.*

(e) Departement / Abteilung *Nicht auf Abteilung beschränkt.*

(f) Wie viele Leute waren im Projektteam um das GBL Projekt durchzuführen? *1 Person intern, 1 extern beim Kunden*

(g) Wie lange war das Tool im Einsatz?

    i. Ist es noch im Einsatz? *Ja*

    ii. Wie lange war die Entwicklungszeit? *Für die Entwicklung eines Kurstages rechnet man 10 Tage. Bei einen Planspiel kann dies aber schnell zu einem Verhältnis 1:20 anwachsen. Die Theorie für den Kurs war schon vorhanden. 20 Mannstage wurden investiert.*

(h) Wurde es weiterentwickelt?

    i. Verbesserungen am Tool *Ja, mittels ersten Runden wurde getestet, ob Spiel funktioniert (ob Schwierigkeitslevel ok etc.). Ab der 3. Spielrunde lief Spiel gut.*

    ii. Für anderen Lerninhalt genutzt *Nein*

    iii. Bei anderen Abeilungen / Firmen eingesetzt *Noch nicht*

(i) Wurde das GBL Projekt selber durchgeführt oder extern gegeben? Wer? *Selber für und mit Externen.*

(j) Wurde ein Template verwendet? Welches, von welcher Firma? *Nein, from Scratch.*

(k) Wie hoch schätzen sie den verwendeten technologischen Level ein? *Low tech, nicht mit Computer.*

(l) Budget? *20 Mannstage, dh. Ca 30'000 CHF*

(m) Welche Lernmethode wurde früher dafür eingesetzt und durch GBL ersetzt?

    i. Was war Auslöser, um GBL einzusetzen? *Ist zusätzlich hinzugekommen, die andere Methode wurde nicht ersetzt.*

4. Zu Projekten allgemein

(a) Wie viele GBL Projekte wurden in etwa durchgeführt? *Siemens TS hat in den letzten 5 Jahren insgesamt etwa 20 Planspiele durchgeführt.*

(b) Welche GBL Methoden wurden eingesetzt? *Planspiele*

PART 2: Evaluation von GBL und Vergleich mit anderen Lernmethoden

1. Was halten sie persönlich von GBL? *GBL ist super, aber Herr Zehnder würde von reinem eLearning abraten. Spielerisches Lernen braucht soziale Kontakte, darum funktioniert das eLearning zum Teil so schlecht. Viel passiert während der Diskussion zwischen Lernenden und natürlich auch zwischen Trainer und Lernenden. Im Diskurs heisst es nicht einfach richtig oder falsch. Manchmal gibt's gar kein richtig oder falsch. Reines eLearning sollte nur für einfache Dinge angewendet werden (zB für Theorieprüfung beim Autofahren). Weiter braucht man eine grosse Zielgruppe. Anspruch ans Lernen darf nicht hoch sein. Computer als Tool sei ok, aber in Gruppen einsetzen. Vielleicht ist es besser, wenn man etwas anfassen kann. Mit Materialien ist es einfach, am PC eventuell zu kompliziert. Gut geeignet sind Probleme, die einfach scheinen, es aber nicht sind.*

2. Für welche Lerninhalte soll GBL verwendet werden, für welche nicht? *Für komplexe Lerninhalte sollen Spiele verwendet werden. Komplexe Dinge können nur vermittelt werden, wenn die Lernenden aktiv werden: Mit Spielen kann man diese gut abholen und ihnen Emotionen entlocken. Sie sollten das Gefühl haben, Aktien am eigenen Lernen zu besitzen. Das Spiel ist eine vereinfachte Abbildung der realen Lernsituation, ist die reale Lernsituation bereits einfach, macht die Simulation durch das Spiel keinen Sinn mehr.*

3. Ist es richtig, die Lernenden durch Spielelemente und anderes zu motivieren? Sollte nicht der Stoff per se die Motivation darstellen? *Der Ansporn etwas zu lernen ist bei Businessleuten normalerweise relativ hoch, bisher nicht anders erlebt. Teilnehmer wollen, dass ihnen etwas geboten wird. Sie haben ja schliesslich dafür bezahlt.*

4. Können mittels GBL Verhaltensänderungen bewirkt werden? Besser als mit herkömmlichen Methoden? *Aha-Erlebnisse zu erzeugen ist das Ziel: "das hätte ich nicht gedacht" etc. Vertrauensmissbrauch zB bringt man nicht mehr aus einer Gruppe raus, sehr eindrücklich veranschaulichbar.*

5. Gibt es Lerntypen, für welche GBL nicht geeignet ist? Wer? *Eine gewisse intellektuelle Leistung (Abstraktionsvermögen) ist Voraussetzung. Teilnehmende müssen die Erkenntnisse aus dem Spiel in die Realität transformieren können, dies erforderte eine intellektuelle Leistung der Teilnehmenden. Vielleicht muss unterschieden werden welche Tools man einsetzt: Leute aus Banken und Versicherungen ticken anders: Die sind stärker interessiert an Business Spielen, wogegen die Ingenieure gerne Dinge zum Anfassen haben. Für Banker ist also vielleicht ein Spiel am PC ganz gut.*

6. Ab wie vielen Teilnehmern lohnt es sich, eine GBL Lösung einzusetzen? (Für eine aufwändige, computerbasierte Implementation.) *So ab 4 bis 5 Runden mit 15 Personen beginnt es sich zu lohnen.*

7. Verändert sich die Rolle der Trainer beim Einsatz von GBL? Und wie? Höhere oder tiefere Anforderungen? *Ja, sie wird anspruchsvoller. Es sollten mindestens 2 Personen coachen. Trainer müssen Level des Spiels anpassen: Gegebenenfalls Störungen entfernen oder einbauen (wenn Spiel zu schwierig oder einfach). Wobei das Wegnehmen von Störungen viel einfacher ist als das Hinzufügen. Spieler sind sehr schnell alle gegen Spielleitung und finden neue Regeln unfair. Messen kann man die Schwierigkeit an den Anzahl Fehler die die Teilnehmer begehen.*

8. Was sind Barrieren für GBL Projekte? *Der Spielhintergrund wird manchmal belächelt. Das Management möchte nicht für etwas unseriöses Geld locker machen. Dabei sind die Ansprüche sehr hoch, GBL ist kein gemütlicher Kurs für die Teilnehmer, die werden gefordert. Eine weitere Barriere ist, dass die Welt auch weiter läuft wenn an den Soft Skills nicht gefeilt wird. GBL ist gerade für die Vermittlung von Soft Skills prädestiniert. Hintergrund: In Krisen wird oft fehlinvestiert: 80% vom Erfolg kommt von Personalentwicklung, nur 20% von Technikkursen. In Krisen wird aber schnell auf Personalentwicklung verzichtet.*

PART 3: Lernen generell in Ihrem Unternehmen

1. Haben sich die Lernenden verändert? In wiefern und wie wird darauf reagiert? *Die Lernenden (professionals) seien etwas offener, frecher geworden, hätten sich aber von der Motivation her etc. nicht gross verändert.*

2. Wie werden die Lernenden in Ihrem Unternehmen motiviert? Wie könnten Lernende motiviert werden, Rezept? *Durch periodische Zielvereinbarungen*

3. Wie testen Sie, wie erfolgreich eine Lernmethode war? Was testen Sie?

   (a) Anklang der Lernsession? *Happy Sheet*
   (b) Wissen überprüfen? *Das muss dann das Unternehmen (Kunde) machen. Lernverantwortung bleibt den Mitarbeitenden, diese Verantwortung kann nicht an eine Ausbildungsabteilung delegiert werden.*
   (c) Verhaltensänderung?
   (d) Business impact? *Die Veränderung von solchen Grössen sind so dynamisch und komplex und hängen noch von so vielen anderen Parametern ab, dass eine Korrelation zu spezifischen Kursen nicht nachgewiesen werden kann. v. Return on investment, nach 1-2 Jahren*

(e) Return on investment?

4. Akzeptanz von GBL bei Mitarbeitern in Ihrer Firma

   (a) Variiert Akzeptanz bei unterschiedlichen Leuten?

      i. Lernende *Am Eisenbahn Spiel haben bereits 200 Leute teilgenommen und 95% davon sind begeistert.*

      ii. Coaches / Trainer *Ausbildner mit didaktischem Wissen stehen GBL positiv gegenüber.*

      iii. Funktion *Bei Manager variiert die Akzeptanz.*

5. Generell: Gibt es Bereiche (Lerninhalte, Lerner), die in vielen Abteilungen / Firmen so ähnlich sind, dass sie mit ein und demselben GBL Template arbeiten könnten? *Allgemeine Themen, vor allem Soft Skills. Die sind bei vielen Unternehmen ähnlich. zB um zu lernen, dass für Innovation eine gewisse Routine im Team hinderlich ist.*

B.6   Sulzer AG

Herr Thalmann, Head L&D (Vorher 9 Jahre bei der CSS)

PART 1: Was wird in Ihrer Firma im Bereicht GBL bereits gemacht?

1. Was verstehen sie unter GBL? *Nicht in erster Linie eLearning. GBL bringt lernende in Situationen, die nah beim Alltag sind, oder bei welchen Erfahrungen gemacht werden, die nah bei Alltagssituationen liegen. Verhalten und Wissen kann reflektiert werden und der Transfer ebenfalls.*

2. Können sie sich an ein konkretes GBL Projekt erinnern? *1) Im Rahmen der Führungskräfteentwicklung werden bei Sulzer zwei Spiele eingesetzt: zum Thema Lean Management, (Geld, Leute und Maschinen sollen bestmöglich eingesetzt werden, wobei die Prozesse ständig überwacht und verbessert werden). Spiel wurde intern von einer Person entwickelt. Weiter ein Spiel zum Thema Financial Implication of Organic Growth. Das Spiel heisst "Oeconomicus" von game solution (www.gamesolution.ch). 2) CSS hat mit TargetSim ein Spiel zum Thema "Unternehmenssimulation" während eines i Entwicklungs-Assessment von Führungskräften durchgeführt. 3) Für die Analyse von Gruppenprozessen, der Zusammenarbeit in Gruppen erwarb die CSS bei TargetSim ein Spiel, das Aspekte von Markt- und Produktionsprozessen mit Teamentwicklung verbindet. Dazu die weiteren Ausführungen:*

3. Was war das für ein Projekt?

   (a) a. GBL Methode, welche Spielidee liegt zugrunde? *Marktspiel, bei welchem Tangramme gebaut werden aus Einzelteilen (die erst gekauft werden müssen). Fertige Tangramme können anschliessend verkauft werden. Nur eine Person pro Team darf die Silhouette (Bauplan) des Tangrams anschauen gehen (Marktbeobachter).*

   (b) b. Lerninhalt, was wurde vermittelt? *Zusammenarbeit im Team hinterfragen. Verständnis der Rolle der Mitglieder soll geschult werden. Organisation im Team, effektiv und effizient im Team arbeiten, Arbeitsteilung, Führung im Team.*

   (c) c. Wer waren die Lernenden?

       i. Alter 20 - *35 Jahre*
       ii. Funktion (job description) *Teamleiter, durchs Band, nicht nur aus einem Bereich des Unternehmens.*

   (d) Wie viele Personen wurden damit geschult? (CH/weltweit) *Schwierig zu sagen, eher auf Abruf. Ca. 100 - 150 Leute wurden bisher geschult. Die Gruppen für eine Spielrunde müssen eine gewisse Grösse haben, sonst klappt's nicht (Minimum liegt bei 16 Personen).*

   (e) Departement / Abteilung *Alle Leute mit Teamverantwortung, bei welchen das Resultat des Teams wichtig ist.*

   (f) Wie viele Leute waren im Projektteam um das GBL Projekt durchzuführen? *1 Person hat Spiel eingekauft. Als Beobachter werden häufig Vorgesetze der Abteilung eingesetzt.*

   (g) Wie lange war das Tool im Einsatz?

       i. Ist es noch im Einsatz? *Ja*

   (h) Wurde das GBL Projekt selber durchgeführt oder extern gegeben? Wer? *Extern*

   (i) Wurde ein Template verwendet? Welches, von welcher Firma? *targetsim*

   (j) Wie hoch schätzen sie den verwendeten technologischen Level ein? *Low tech, Es werden Holzteile und Vorlagen benötigt. Als Kapital wird richtiges Geld eingesetzt.*

   (k) Budget? *Schwierig zu sagen: Betrachtet man nur das Spiel als solches, dann sind es ein paar tausend Franken. Die Betreuung kostet auch wieder, kann aber intern gemacht werden. Dann ist es einfach die Zeit der Leute die kostet.*

   (l) Welche Lernmethode wurde früher dafür eingesetzt und durch GBL ersetzt? *Klassische Seminare. Diese wurden erweitert mit dem Spiel, nicht ersetzt.*

i. Vorteile / Nachteile zur alten Methode? *Das Verhalten von Leuten während der Simulation ist sehr Nahe bei dem Verhalten in der Realität. Persönliches sowie "prozessionales" Verhalten.*

4. Zu Projekten allgemein

   (a) Wie viele GBL Projekte wurden in etwa durchgeführt? *Wenige, das waren auch keine Projekte. Die Spiele werden einfach ergänzend eingesetzt. Sie sind Teil von Lehrgängen für Führungskräfte. Die Spiele werden als methodische und didaktische Lernvarianten gesehen.*

PART 2: Evaluation von GBL und Vergleich mit anderen Lernmethoden

1. Was halten sie persönlich von GBL? *Nach 15 Minuten vergessen die Teilnehmer das Spiel, es wird sofort sehr ernst. Das Verhalten ist 1:1 wie in der Realität, niemand kann sich verstellen. Bsp: Herr Thalmann wurde von einem KMU angefragt um das Spiel durchzuführen (Tangram). Anschliessend wurden die Leute neu auf die Aufgaben verteilt. Es wurde klar, dass gewisse Leute nicht in einem Team arbeiten sollten oder an der falschen Stelle waren: zB ein sehr rational denkender Mensch in einer Funktion in welcher grosse Kreativität gefragt ist. GBL ist lustbetont, jeder Mensch spielt gerne. Nachteil: Aufwand recht hoch, zB weil die Gruppen für die Spiele recht gross sein müssen, weiter wird viel Know-how benötigt, um die Simulationen durchzuführen. In dieser Hinsicht unflexibel. Es sollte nie nur ein Spiel alleine eingesetzt werden, sondern eher blended learning: Vor dem Spiel sollte Stoff erarbeitet werden und anschliessend das Verhalten/Spielverlauf auch reflektiert werden. Ein Spiel ist dann wertvoll, wenn verschiedene Wege/Ansätze zu unterschiedlichen Ergebnissen führen. Wenn sich zwei Teams unterschiedlich verhalten, soll die Schere aufgehen, Deltas sind wichtig. So fragen sich die Teilnehmer, warum es bei der einen Gruppe besser geklappt hat als bei der anderen: Das ist Lernen.*

2. Vergleich mit anderen Lernmethoden, Vorteile / Nachteile von GBL? *Spiele setzen hohe Kompetenzen in der Moderation voraus. Es ist schwierig, Schlussfolgerungen aus dem Verhalten der Teilnehmer zu ziehen. Somit müssen häufig Externe Coaches eingesetzt werden, was zu hohen Kosten führt.*

3. Für welche Lerninhalte soll GBL verwendet werden, für welche nicht? *Je mehr es rein um fachspezifische Inhalte geht, desto schwieriger wird es, diese mit einem reinen Spiel abzudecken. zB ist es schwierig ein Spiel aufzusetzen, mittels welchem man das Lesen einer Bilanz üben kann.*

4. Ist es richtig, die Lernenden durch Spielelemente und anderes zu motivieren? Sollte nicht der Stoff per se die Motivation darstellen? *Es ist ok wenn man durch ein Spiel motiviert wird. Lernen passiert meist erst bei der Analyse: Was ist während dem Spiel passiert, Resultat kritisch anschauen.*

5. Können mittels GBL Verhaltensänderungen bewirkt werden? Besser als mit herkömmlichen Methoden? *Ja, auf jeden Fall. Natürlich nicht unmittelbar. Aber sie sind Anstoss. Der Prozess der Veränderung muss in irgend einer Form begleitet sein.*

6. Gibt es Lerntypen, für welche GBL nicht geeignet ist? Wer? *Sie haben die Spiele immer in Teams durchgeführt, somit wird der Einzelne vom Team getragen. Wenn nur eine Person an einem Spiel teilnimmt, dann ev. eher ein Problem, aber eigentlich liegt Spielen in uns allen drin.*

7. Ab wie vielen Teilnehmern lohnt es sich, eine GBL Lösung einzusetzen? (Für eine aufwändige, computerbasierte Implementation.) *Kostenrechnung: Kommt darauf an wie viel das Spiel kostet und was sonst für Aufwände nötig sind (Trainer, Zeit, Organisation, etc.).*

8. Verändert sich die Rolle der Trainer beim Einsatz von GBL? Und wie? Höhere oder tiefere Anforderungen? *Diese wird anspruchsvoller, man muss sich genau im Klaren darüber sein, was man eigentlich beobachten möchte. Auf 15 Spieler sollten nicht mehr als 3 Trainer kommen, sonst ist der Aufwand zu gross.*

9. Akzeptanz von GBL bei Mitarbeitern in Ihrer Firma

    (a) Ist der "Game-Faktor" ein Problem? *Kein Problem, weder bei CSS noch bei Sulzer.*

    (b) Variiert Akzeptanz bei unterschiedlichen Leuten?

        i. Lernende *Anfänglich etwas Resistenz, manche haben Angst sich blosszustellen in der Gruppe. Aber die die es erlebt haben sind meistens sehr positiv gegenüber GBL eingestellt.*

        ii. Coaches / Trainer *Sowieso vorbelastet (positiv gegenüber GBL).*

        iii. Funktion (Manager, Wissenschaftler, Sachbearbeiter) *Je höher das man kommt, desto fremder wird es, das ist bei allen Lernthemen so. GL möchte Inputs, Spiele sind auf hoher Hierarchieebene nicht unbedingt passend. Aber sie finden es gut, dass Spiele für die Mitarbeiter eingesetzt werden. Letztlich ist es auch eine Frage der verfügbaren Lernzeit und der Prioritäten in der Lernmethodik*

10. Was sind Barrieren für GBL Projekte? *Manchmal ist es schwierig, das Management zu überzeugen. Aufwand ist hoch, sowohl an Personal wie auch Infrastruktur.*

PART 3: Lernen generell in Ihrem Unternehmen

1. Haben sich die Lernenden verändert? In wiefern und wie wird darauf reagiert? *Das Lernen hat sich in dieser Hinsicht verändert, dass es kollegialer geworden ist. Es wird viel häufiger in Gruppen gearbeitet. Die Teilnehmer bringen selber Fälle ein und die anderen machen sich Gedanken darüber. Nahe bei Praxis. Interaktivität wird verlangt und geschätzt. Die Lernenden sind zugänglicher geworden. Sie haben keine Mühe ihre Fälle einzuspeisen und bearbeiten zu lassen. Sie warten nicht mehr bis vorne etwas passiert, sondern werden selber schneller aktiv.*

2. Wie testen Sie, wie erfolgreich eine Lernmethode war? Was testen Sie? *Auf CSS bezogen:*

   (a) Anklang der Lernsession? *Feedback: Hinterfragen ob die Lernziele (die den Teilnehmern versprochen wurden) auch erreicht wurden. Kein happy sheet.*

   (b) Wissen überprüfen? *Ein halbes Jahr später nochmals Umfrage bei Teilnehmern direkt: "Was ziehst du für einen Nutzen für die tägliche Arbeit aus dem Kurs"?*

   (c) Verhaltensänderung? *Wir noch nicht gemacht, bei CSS damit angefangen. Es ist aber schwierig Änderungen zu finden, die sich nur auf den einen Kurs zurückführen lassen. Zu viele Einflüsse (Umfeld, etc.) wirken auf die Mitarbeiter ein um das machen zu können.*

   (d) Business impact?

   (e) Return on investment?

3. Technischer Fortschritt, was ermöglicht dies im Lernbereich? *Der blended Learning Ansatz ist relativ neu und gut. Bzgl. eLearning: Es ist eine Illusion zu glauben, das Lernen finde am Arbeitsplatz statt. Es ist viel zu laut und gibt zu viel Ablenkung. In einem ruhigen Einzelzimmer in welchem man sich konzentrieren kann ist es aber möglich. Man ist in dieser Hinsicht bei eLearning etwas auf den Boden zurückgekommen.*

4. Sehen Sie in Ihrem Unternehmen Bereiche, in denen gut mit GBL gearbeitet werden könnte? *- Lean Management - Grundlagen der Finanzen, Grundlagen zu gewissen Themen (gerade Finanzen sei sehr gut) können gut mittels GBL erarbeitet werden. Wenn es aber weiter ins Detail geht (zb bei Lean Mgmt: Wie muss Arbeitsplatz aussehen, dass lean mgmt möglich ist oder wie liest man einen Geschäftsbericht) dann geht das nicht mehr mit Spielen.*

5. Generell: Gibt es Bereiche (Lerninhalte, Lerner), die in vielen Abteilungen / Firmen so ähnlich sind, dass sie mit ein und demselben GBL Template arbeiten könnten? *Finance ist wirklich breit, fast für alle Bereiche einsetzbar (fast jeder braucht ein bischen Finance Kenntnisse, nur schon die Basics dass wenn irgendwo investiert wird auch ein Rückfluss an Geld oder Nutzen stattfinden muss etc.)*

B.7   Swissmem Berufsbildung

Herr Krebser, Projektleiter / Herr Mouret, Projektleiter

PART 1: Was wird in Ihrer Firma im Bereicht GBL bereits gemacht?

1. Können sie sich an ein konkretes GBL Projekt erinnern? *- eLearning: (online, mit Lizenzsystem, zum Teil selber entwickelt, zum Teil eingekauft) "Top Design" für technisches Zeichnen. 3D Animationen ergänzend zum Lehrmittel um 2D Zeichnungen besser zu verstehen. Es ist aber nicht interaktiv - Sind nun daran, weitere Dinge abzubilden, zB Schweissanlage mit Schweisser: Schüler muss die Flaschen richtig anschliessen, richtige Abfolgen von Öffnen der verschiedenen Hahnen, Einstellung des Brenners etc. Anschliessend Fragen die beantwortet werden müssen bevor Schüler an die echte Schweissanlage darf. - Für kaufmännischen Bereich: Brettspiele und Unternehmensplanspiele (www.stuckitools.ch, www.the-next-step.ch und "metalog" www.targetsim.com) auch Team Learning etc. Soziale Interaktion ist das Wichtigste dabei, diese Interaktion 1 bis 2 Stufen runterholen auf Spielebene. Gewinnen / Verlieren ist ebenfalls wichtig. - Zusammen mit FH Nordwestschweiz etwas im mLearning Bereich erarbeitet. Spielerisch, Faktenwissen, Prüfungsfragen LAP aufs Handy laden, so wie Flipkärtli. Problem: Screen sehr klein. Nur einfache Dinge möglich. Spielstand etc. kann auf PC abgespeichert werden. - Keller Software: Simulation von Werkstatt. CNC Fräsmaschine wird simuliert, virtuelles Fräsen. Wenn man will kann man die gleichen Daten dann auch 1:1 an echte Maschine schicken.*

PART 2: Evaluation von GBL und Vergleich mit anderen Lernmethoden

1. Was halten sie persönlich von GBL? *Sind das Thema sehr motiviert angegangen, nun aber etwas ernüchtert. Koste einfach sehr viel, weiter ist es eine grosse Umstellung für die Coaches. Diese sind nicht so begeistert. Auch Schüler finden zum Teil: "Spielen könnten sie zu Hause".*

2. Für welche Lerninhalte soll GBL verwendet werden, für welche nicht? *Dinge, bei welchen man ausprobieren und experimentieren kann, sind geeignet. Sprich Simulationen, so wie Myst.*

3. Gibt es Lerntypen, für welche GBL nicht geeignet ist? Wer? *Es gibt schon Unterschiede, sie haben den Eindruck, dass die besseren Schüler mehr Spass daran hätten.*

4. Verändert sich die Rolle der Trainer beim Einsatz von GBL? Und wie? Höhere oder tiefere Anforderungen? *Ja, sie müssen mehr IT Kompetenz haben. Es ist zum Teil ein Problem, dass die Schüler in einem Bereich (IT) mehr verstehen/können als die Coaches.*

5. Was sind Barrieren für GBL Projekte? *Für Coaches: Total viel Umstellung und dazu noch Kosten. Stoff muss anders aufbereitet werden, kann nicht 1:1 in GBL Module übernommen werden.*

PART 3: Lernen generell in Ihrem Unternehmen

1. Haben sich die Lernenden verändert? In wiefern und wie wird darauf reagiert? *Ja, definitiv. Darum grosse Reform und auf der Suche nach neuen Ausbildungsmitteln. Früher war das Wissen die Basis: Man hat total viele Dinge ausgebildet, erst später wurde klar, wofür man das gelernt hatte. (Um Digitaltechnik zu verstehen musste man erst Transistor verstehen und darum auch p-n Übergang usw.) Heute eher nicht auf Vorrat lernen, sondern vermitteln, wie man sich Wissen aneignen kann. Heute kann man eine Blackbox akzeptieren im System, auch wenn man nicht genau weiss, was drin abgeht. Sie wollen weniger Stoff vermitteln, dafür die Zusammenhänge der Gebiete erklären. Die Studenten haben vor lauter Bäumen den Wald nicht mehr gesehen. Auch liegt der Fokus nun mehr auf Projektarbeit, nicht mehr nur Frontalunterricht, mehr schülerzentriert als lehrerzentriert.*

2. Wie werden die Lernenden in Ihrem Unternehmen motiviert? Wie könnten Lernende motiviert werden, Rezept? *Die Schüler haben die Nase voll von der Schule, wollen Praxis. Sie sind aber motiviert wenn sie sehen, was das zu Lernende ihnen im Job bringen kann (Sinn). Was gut funktioniert ist die Drohung mit der Lehrabschlussprüfung. Simulationen sollten besser gemacht werden und in sich stimmig sein. Einfach etwas lustig nützt nichts, kann sogar kontraproduktiv sein. Bsp: Die Comics im neuen Lehrmittel kommen bei den Coaches nicht so gut an, lenkt die Schüler fast zu stark ab. Die Schüler finden die Comics gut.*

B.8 Swiss Re

Herr Steinmetz, Vice President Communications & HR

PART 1: Was wird in Ihrer Firma im Bereicht GBL bereits gemacht?

Es wurde erst wenig gemacht im Bereich GBL, dieser steckt noch in den Kinderschuhen. Etwas mit GBL zu tun bei Simulationen im Risikobereich: Wenn's zB darum geht das Risiko abzuschätzen wenn mit Simulationen gelernt wurde (Ausbildung von Piloten, Chirurgen [life and health] etc.) Für die interne Ausbildung wird nicht mit GBL gearbeitet. Generell ist SwissRe gegenüber Games nicht positiv eingestellt.

1. Was verstehen sie unter GBL? *1) Simulationen 2) Virtual communities wie 2nd Life die man für Rollenspiele brauchen kann 3) Systemische Zusammenhänge (wiederum Simulationen), zB was bewirkt Veränderung des Meeresspiegels oder Ähnliches 4) Non digital: Spiele um zB Logistik-Abläufe zu verstehen*

2. Können sie sich an ein konkretes GBL Projekt erinnern? *1) Negotiating Rollenspiel, face to face, grundlegende Mechanismen der Verhandlungstechnik. Theoretischer Teil ist ein Skriptum mit dem Rollenspiel, der Trainer baut während der Session Störungen ein. Anschliessend wird evaluiert und es gibt ein Debriefing. 2) eLearning Kurs: Umgang mit Entwicklerteam in Indien*

3. Zu Projekten allgemein

    (a) Wie viele GBL Projekte wurden in etwa durchgeführt? *GBL Projekte spielen eine sehr untergeordnete Rolle.*

PART 2: Evaluation von GBL und Vergleich mit anderen Lernmethoden

1. Für welche Lerninhalte soll GBL verwendet werden, für welche nicht? *Wofür eLearning gut eingesetzt werden kann: 1) Compliance (Regulatorien, Password Security, etc.) 2) Applications im weitesten Sinne (Client Information System wo Performance des Kunden etc. eingesehen werden kann, SAP, etc.) 3) Blended Learning.*

2. Können mittels GBL Verhaltensänderungen bewirkt werden? Besser als mit herkömmlichen Methoden? *Eindeutig*

3. Akzeptanz von GBL bei Mitarbeitern in Ihrer Firma

(a) Variiert Akzeptanz bei unterschiedlichen Leuten?

    i. Funktion *Code of conduct. Wenn das Spielelement auffällig ist, muss Methode bewilligt werden.*

PART 3: Lernen generell in Ihrem Unternehmen

1. Haben sich die Lernenden verändert? In wiefern und wie wird darauf reagiert? *Ausbildung hat sich nicht stark verändert. Ausbildung hat einen sehr hohen Stellenwert, sie sind ein Experten Unternehmen, viel Wertschöpfung ist wissensbasiert. Was sich verändert hat: Wissen ist standardisiert worden, globaler. Delivering passiert aber vor Ort (Kurse werden meist vor Ort angeboten). Rapid Learning wird immer wichtiger (in 20min etwas lernen). In diese Richtung geht auch just in time und on demand. Das Ganze soll immer unabhängiger werden von Zeit und Ort. Gibt viele Anfragen dazu, sind genau die Vorteile von eLearning.*

2. Wie werden die Lernenden in Ihrem Unternehmen motiviert?

(a) Wie könnten Lernende motiviert werden, Rezept? *Wird über Intranet gepusht. Es wird ein LMS eingesetzt, in welchem Status etc. pro Mitarbeiter festgehalten ist. Falls ein Modul zu lange nicht bearbeitet wird, wird Mahnung verschickt. Schwierigkeiten in diesem System: Wenn sich Dinge ändern, passieren manchmal Fehler. Wenn zB Leute schon gelernt haben und dann Content ändert, wird flag wieder zurückgesetzt und Modul muss erneut bearbeitet werden. Bei eLearning soll jetzt eine stärkere emotionale Komponente eingebaut werden. Dies wird mittels Avatars gemacht (guides on the side) die Unterstützung geben. Es sind keine Simulationen sondern echte Personen.*

3. Wie testen Sie, wie erfolgreich eine Lernmethode war.

(a) Was testen Sie?

    i. Anklang der Lernsession (Feedback von Teilnehmern), nach 1 *Tag Lerner werden in den Business Case miteinbezogen. Die Lernziele werden klar definiert und es wird dafür geschaut, dass Stoff verstanden ist.*

    ii. Wissen überprüfen (Prüfung), nach 2 Wochen *Wird gemacht*

    iii. Verhaltensänderung? (Vorgesetze, Mitarbeiter), nach 1-3 Monaten *Wird noch nicht gemacht. Es wird nicht wirklich zurückevaluiert, ob es besser läuft nach dem Training. Hier liegt noch Potential.*

    iv. Business impact, nach 1-2 Jahren

    v. Return on investment, nach 1-2 Jahren

4. Technischer Fortschritt, was ermöglicht dies im Lernbereich?

   (a) Schnellere Hardware *In Technologie ist Firma konservativ. Erst bei der 2. Welle wird auf System umgestiegen. Wenn es aber eingesetzt wird, dann auf einem sehr hohen Standard. Es wird kein Open Source verwendet, gibt Schwierigkeiten mit Intellectual Property.*

   (b) Internet, Vernetzung, vereinfachte Kommunikation

   (c) Web 2.0

5. Sehen Sie in Ihrem Unternehmen Bereiche, in denen gut mit GBL gearbeitet werden könnte? *Es gibt schon mögliche Anwendungsbereiche. Gerade bei der Verknüpfung von technischen Fertigkeiten und soft skills. Unterschiedliche Dinge können mittels GBL gut zusammen vermischt werden: zB etwas das gelernt wurde anschliessend unter Druck (Zeit, sonst was) machen.*

6. Generell: Gibt es Bereiche (Lerninhalte, Lerner), die in vielen Abteilungen / Firmen so ähnlich sind, dass sie mit ein und demselben GBL Template arbeiten könnten? *Austausch mit der CS was Ausbildung anbelangt. Aber natürlich nicht mit Unternehmen, die in direkter Konkurrenz stehen. Ausbildung ist vor allem inhouse, weil es als competitive advantage gesehen wird. Weiter ist Ausbildung ein Marketing Tool: Kunden werden auch damit geschult, durch eLearning, aber auch durch Kurse vor Ort.*

List of Figures

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