4. Serious gaming and the Holodeck

“Holodeck” is a word that many people will know from the science fiction series Star Trek. According to the online encyclopedia Wikipedia […2], in this series, a “Holodeck” is a room on starships in which a simulated reality is created by means of holographic projections, simulated sounds and smells and a number of less realistic devices such as replicated matter and tractor beams that simulate touchable objects and physical forces. The Holodeck is used for both recreational and training activities in the series.
Although this kind of a simulation environment would be ideal to have there is still a large part of “fiction” in it and therefore the term Holodeck will refer to a more simplistic concept in this text, although still concerned with simulation within a closed environment. In section 4.1, this concept will be explained by discussing the purposes of such an environment and describing a number of examples, after which a clear definition can be established. In section 4.2, the concept of a Holodeck will be combined with that of serious gaming to see what added value serious gaming techniques and elements may provide to a Holodeck andd in section 4.3 the ways in which a Holodeck environment might provide added value to serious games will be dealt with. Finally, the effects the introduction of a Holodeck might have on the possibilities for the assessment of serious games that were identified earlier will be discussed in section 4.4.

4.1 What is a Holodeck?

The concept of a Holodeck was invented by Martin de Haas, a business consultant at GPR (although it was an idea of his colleague John Christiaanse to assign the name “Holodeck” to this concept). De Haas describes a Holodeck as a work environment in which people can experience and experiment with a simulation of a certain “reality”. In the case of GPR, this comes down to an environment in which people can work with a simulation of a process that is supported by an information system. Users can experiment with a simulation or prototype of this information system, often in the role of an end-user, to experiment with the functioning of the system and experience how it supports them in doing their work. The Holodeck that was developed for use during the PoCs for the Belastingdienst for instance, allows a group of people to perform a number of tasks with the new system for “toeslagen” on a number of PCs that have been placed in the Holodeck environment. The room also contains tools for presentations and feedback sessions, so participants can be provided with the necessary background information before experimenting with the system and can reflect on their experiences and provide feedback afterwards.
The concept of a Holodeck will now be illustrated further by explaining the different purposes that a Holodeck might serve and illustrating how these are supported. After that, a more formal definition of the term “Holodeck” shall be given.

4.1.1 Purposes of a Holodeck

The idea of a Holodeck originated from the observation that during the development of IT supported solutions, most of the time seems to be invested in making explicit what a system should do. The people involved may have trouble imagining certain ideas for themselves, have trouble thinking in abstract concepts that are often used during an IT design process, or have different interpretations of these concepts, which means they might be talking about different things without realising they are, because the terms and models they use are the

same. It was believed that by taking similar, existing applications that contain interesting (parts of) possible solutions or working prototypes of possible future applications, it would become a lot easier to make things more explicit and ensure that everyone is talking about the same concepts and interprets them in the same way. This way, miscommunication could be avoided and people who have difficulty with abstract concepts, such as certain end users might have, could also be involved in the development process more effectively. If people can look at and experiment with explicit (prototypes or simulations of) applications, they can determine what works well in these examples, how one could work with such an application, what could be improved and what is still missing. In order to determine these things, a setting will have to be created in which the situation in which the application is actually used can be simulated. This is where the idea for a Holodeck came in.
The possibilities for the use of a Holodeck are not just limited to requirements engineering however, a Holodeck may be used for other purposes as well. Besides this, it is not just limited to the domain of IT, but may be used to find a solution to a complex problem in the form of any kind of process organization or form of collaboration, of which a work process that is supported by an information system is just a single form. In an interview with De Haas, of which the full version can be found in Appendix A, the following purposes that a Holodeck might serve were identified, of which only the first is IT specific:

1. Making the use of applications transparent
2. Supporting strategical decision making
3. Serving as a design instrument
4. Supporting sales
5. Supporting requirements definition
6. Optimizing processes
7. Assigning value
8. Creating a business case
9. Serving as a training instrument
10. Supporting change management

Making the use of applications transparent
Another observation of De Haas was that administrators, responsible for managing an information system and making changes to this system when necessary, often have a very poor idea of what these applications are used for. By simulating a work setting with a Holodeck they can quickly get an explicit idea of what these systems are used for and what they should be able to do, enabling them to aid in the process of finding solutions to problems that arise.

Supporting strategic decision making
Strategic decision making can be supported by visualizing alternative directions for solutions. A Holodeck is intended for use in situations where the nature of the solution to a problem is unknown and different directions will have to be explored and valuated before one of these directions can be further explored.
By representing alternatives in an explicit way, by demonstrating and letting people experiment with excisting solutions of other organizations to similar problems or simulations of promising variations on certain solutions, people will be able to get a quick and clear overview of the possibilities and the advantages and disadvantages of the different solutions.

Serving as a design instrument
Similar to the use of prototyping in the design of information systems, a Holodeck can be used to let people experiment with early versions of a solution, allowing them to see what is or is not working and what should be improved in the next iteration. In contradiction to prototyping, a Holodeck does not just offer an information system to experiment with, but allows its participants to experiment with all kind of solutions, processess and collaborations not necesarrily including the use of IT.

Supporting sales
The Holodeck can be a tool for the support of sales and marketing in much the same way as it can be a tool for the support of strategic decision making. It can be used to demonstrate alternative directions for solutions and determine feasible ones.

Supporting requirements definition
By letting people work with a simulation at an early stage, they will run into problems that will need to be dealt with in the future solution and may discover other useful features that are desirable. An explicit simulation will allow people to determine what is actually needed.

Optimizing processes
A Holodeck can be used to let people experiment with a simulation of a process and let them determine the best way to work with the tools that are available in the simulation. Areas that leave room for improvements can also be identified in this way.

Assigning value
Assigning value to an IT application is often a difficult issue. According to De Haas, current techniques, such as measuring the number of functionalities, do not measure value in the right way. Having certain functionalities in a system does not mean that they are useful or add value. It says more about the costs to develop such functionalities than it says about the benefits. A Holodeck may be used to give a better indication.
By simulating different setups of a process in a Holodeck environment, these setups can be compared to each other. People can experiment with certain steps in these processes to discover how these steps can be performed better or more efficiently and determine what value these steps add for the customer. This way, a Holodeck can be used for the allocation of value to IT components.

Creating a business case
By developing a small scale, but fully functional prototype within a Holodeck environment it becomes easier to determine the benefits and costs of implementing that system on a larger scale. For example, if an application has been developed that can fully support the work of one single employee working at a call center, it becomes easier to determine the benefits and costs of implementing such an application for all employees at this call center.

Serving as a training instrument
A Holodeck is meant to provide a realistic simulation of a solution and allow people to interact with it in the way it should be used by its end-users. As such, it may also be used to provide these end-users with a clear image of what the solution looks like and how it works and will allow for the simulation of tasks they would have to perform with it in reality, allowing them to practice these tasks in an environment in which mistakes can safely be made. Therefore, the Holodeck may be very suitable as a training environment once a simulation is sufficiently complete and finalized. Possibly, some adaptations will have to be made to a simulation so it may be used in an optimal way for this purpose, but a Holodeck that has been used for other purposes such as design is still likely to provide a good basis.

Supporting change management
A Holodeck can also be used to create support and acceptance for a new solution within the community of users. It can be used to let users experience the future solution themselves and can be used for additional demonstrations and presentations. This way, people get a clear idea of what the changes will look like and get the idea that they are given enough opportunity for input and feedback.

4.1.2 Use of the Holodeck

Some of the purposes described above can be related to each other, such as a process of requirements specification that is followed by a design process, supporting each other to reach the overall goal of finding a solution to a complex problem. A Holodeck can support such a sequence in which it is used for different purposes during a change process. How a Holodeck might be used in this way is illustrated in Figure … and explained further below:

1. The excisting “reality”, the current situation, is analysed to identify the problems that excist in this situation and the changes that are desired. This analysis may be based on real world experiences, or a Holodeck simulation may be developed in which people can experiment with the current situations to identify these problems and desired changes.
   This step may support the goal of supporting *requirements definition* mentioned earlier.
2. A number of alternative directions for solutions are determined and evaluated. A Holodeck can be used to present a number of alternatives, which might consist of solutions other organizations use for similar problems, or demos of variations on excisting solutions, after which the value of these alternatives can be compared.
   This step may support the goal of *supporting strategic decision making* or *supporting sales* mentioned earlier.
3. A Holodeck is created (or adapted) in such a way that it can be used for simulating the reality concerned and allows one to change this simulated reality by implementing (partial) solutions into it. The Holodeck should be able to simulate the new kinds of “realities” that may be expected based on the chosen solution direction.
4. Based on the chosen solution direction, a number of tools are identified that may be necessary to reach such a solution, such as certain functionalities in an information system that could support the process. A distinction is made between tools of which it is sure that they are necessary and tools which might be necessary in order to reach a

solution. Note that such a process is necessary because the exact nature of a solution is unknown for the problems for which a Holodeck is used.

5. One or more tools that were identified as being necessary are developed.
6. The tools that have been developed are integrated into the Holodeck reality, after which participants can experiment with this new reality and evaluate it. This way, participants can determine what implications the use of these tools has on working within the simulated reality and may identify new problems, tools that are required to solve these problems or tools that may improve the current situation. Because of this, step 4, 5 and 6 may be repeated a number of times to gradually improve the situation until a situation is reached that is considered adequate.
   This process may support the goal of *supporting design*, *optimizing processes* or *assigning value*. If the Holodeck reality that has been developed is a small scale version of the actual reality, but has reached completion on this smaller scale, it may be used to support the goal of *developing a business case* as well.
7. Once the development of new tools has led to an improved situation in the Holodeck reality, this solution may be mapped to the real world. This can be done as soon as a tool has been integrated and successfully applied in the Holodeck reality, or once a complete solution has been reached in the Holodeck reality through a number of iterations.
8. After a number of changes, a final solution to the problem has been reached. This solution has an explicit form and is fully functional. That is, the solution may be a small scale version of the actual solution, say for one person, but for this one person, the solution is complete and offers everything that this person requires.
   This may support the goal of supporting design, optimizing processes or assigning value together with the previous two steps.

Once a final solution exists that can be experienced on the Holodeck, this environment may be usable for other purposes as well. It may be used to inform end-users of what changes they might be expecting, allowing them to get a clear picture of what these changes will look like, or the environment may be used for training end-users, teaching them the new way of working. Of course, some changes to the content of the Holodeck experience may be required for this, but an environment in which a new process can be explained, demonstrated and in which people can work with it themselves does not seem to be a bad place for this.

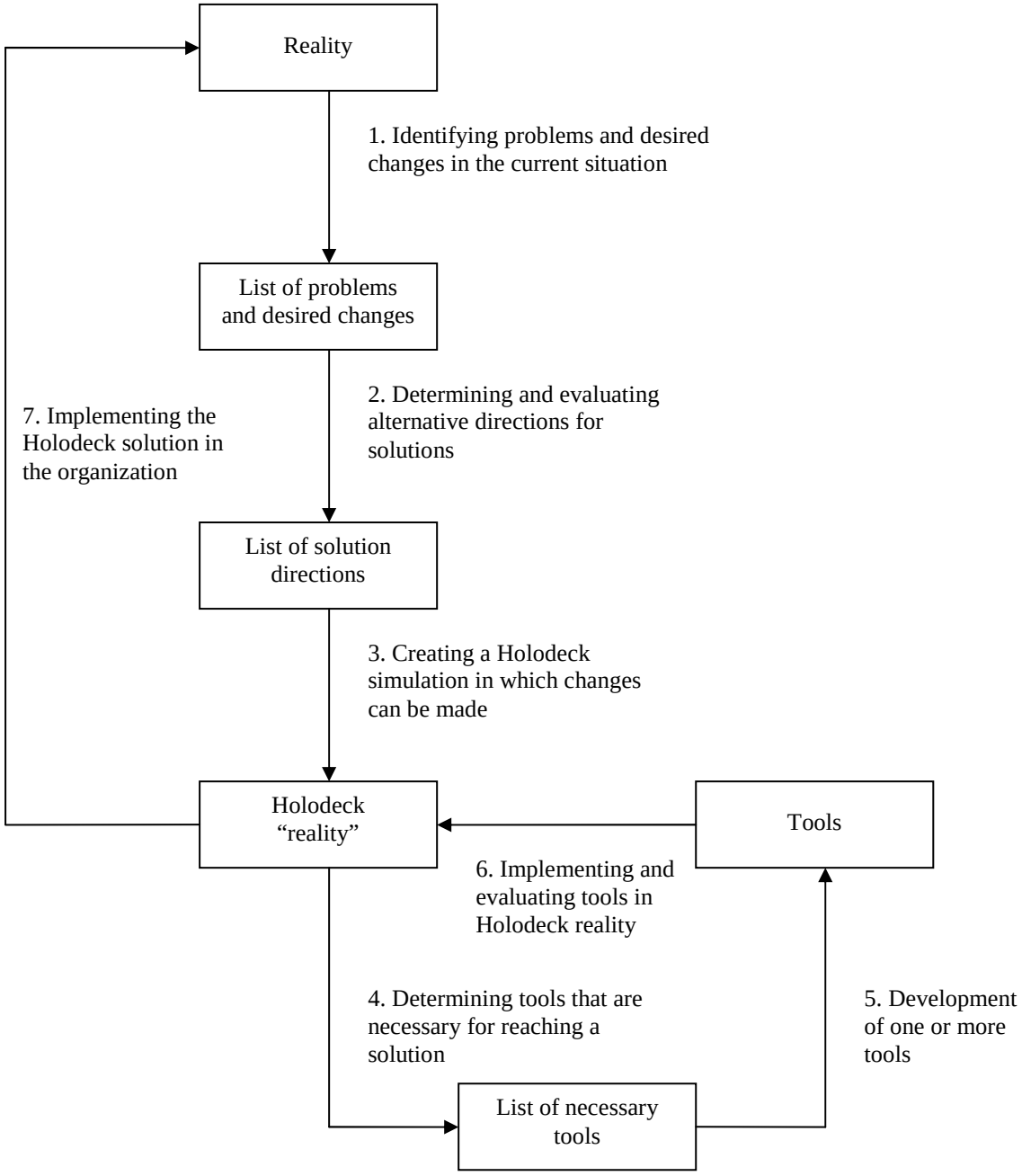

Figure x.x – The way in which a Holodeck may be used to support various goals during a process of adaptation or change.