Utrecht University

IO9
Empowering Disadvantaged Groups

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GAMEOLYMPICS
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www.prehealth.eu
1 Introduction

The objective of IO9 is to evaluate how mobile games can be used to empower disadvantaged population. The project aims to promote active citizenship in disadvantaged populations, by using mobile games as interactive mechanisms allowing disadvantaged populations to take a more active role in the design and monitoring of open spaces and increase awareness in how these open spaces can contribute to health and well-being.

Rather than focusing on unemployed people as the disadvantaged group, we have chosen the group of chronically ill children for the following two reasons. First, the PREHealth project aligns well with the Child Health Campus masterplan to redevelop the area at the Utrecht Science Park between the University Medical Center Utrecht, the Wilhelmina Child Hospital, the Princess Maxima Center, the Central Military Hospital, and the Fritz Redle School for chronically ill children. See below for an overview of the area and a possible phasing of the implementation.

Second, the PREHealth project matches well with the Healthy Play, Better Coping hub at Utrecht University and Wilhelmina Child Hospital, https://www.uu.nl/en/research/dynamics-of-youth/research/interdisciplinary-themes/healthy-play-better-coping. One in four children/adolescents/young adults (0-25 years old) has a chronic disease, such as cystic fibrosis, autoimmune diseases and congenital heart disease as well as psychiatric conditions like autism (1.3 million in The Netherlands; Verwey-Jonker, 2019). There are almost twice as many young people with a somatic disorder than with a psychiatric condition (Verwey-Jonker, 2019). This impacts every aspect of their lives, from not being able to play outside with friends, to having to miss classes due to medical appointments (Nijhof et al, 2018). In addition to obvious physical constraints, up to 40% of all chronically ill children suffer from mental and psychosomatic problems, like symptoms of anxiety,
depression and fatigue (Greenham et al., 2015). In the longer run their poor start in the first 25 years of life leads to mental, social and academic impairments, loneliness and reduced quality of life (Pinquart, 2017).

The idea of IO9 thus is that chronically ill children will learn by co-creating and playing a game. We will build upon the expertise of PRISMA, having developed location-based games for teenagers in the context of environmental education. Adding the important feature of user-created games enables the process of game construction to become part of the educational process. PRISMA has published a methodology and a toolkit for this purpose (www.involen.eu). The process of the game design is reported in IO5, the process of the game development will be guided by a student game research of the UU and by stakeholders.

From several interviews held with the stakeholders, it became clear that the main problem these chronically ill children experience is social exclusion. These children at a higher risk of feeling lonely, not being part of a group, and be excluded in social activities. This especially occurs when these ill children want to make contact with non-ill children in a normal environment, like their primary school.

There are several potential reasons (independent variables) which may result in a feeling of social exclusion (dependent variable). The figure below provides a better understanding on what the specific independent and dependent variables are and what independent variables influence the dependent variable. All the independent variables have a negative influence on the social exclusion.

Fig. 1: Potential reasons (independent variables) are leading to social exclusion (dependent variable).

So, by enhancing some of these independent variables the dependent variable might be enhanced as well. Due to the fact that reducing social exclusion is harder to measure, than enhancing social inclusion, the research question is turned around. This will result in the same result in the end, because enhancement of social inclusion will also lead to a reduction of social exclusion. The figure below shows the balance between enhancing social inclusion and reducing social exclusion. More social inclusion will lead to less social exclusion, this also works the other way around.
By preventing or improving some of these independent variables it is hoped to reduce social exclusion and enhance social inclusion. The hypothesis is:

A location-based game can help chronically ill children enhance feelings of social inclusion and connectedness.

This thesis will be a qualitatively research, there may be some quantitative aspects in the results section, but the focus lays on the qualitative research. The data to support this research will mainly come from field research. The location-based game that will be developed will provide the main resource of data. Desk research will be conducted to support statements and enrich the research. After the pilot a questionnaire needs to be filled in by the participants. This data will be analysed afterwards. The main focus in this questionnaire is what the participants think of the game and whether they have an enhanced feeling of social inclusion.

First, an introduction based on existing literature will be given. Next, the tool choice will be discussed. Then some things will be stated about the interviews which have been held. This section will be followed by a section about the target group, goals and requirements of the game. After this, the GameOlympics template and its use for this project will be explained. Next the developed game itself will be explained in the section ‘Game Description’, followed by the in-game route players walk. Then, the methods of testing and the results of the pilot will be stated. Lastly, a conclusion and evaluation will be discussed.
2 Related work

Many commercial games have been released and the amount of players worldwide is increasing every single day. The interest for games in general is rising, which is also mentioned by Duurmsma, Meijer, & De Bot (2017). According to Castellar, Van Looy, Szmalec, & De Marez (2014) children between the age of 8 to 18 play games 50 minutes per day on average. These games are mainly used as leisure activity, by which the game is interactive and can be played alone or together with others (Granic, Lobel, & Engels 2014). But due to the fact that games are a booming business, researchers also gain more and more interest in games as a tool for social problems or other usages in more serious contexts.

2.1 The importance of play

An example of researchers who are trying to use games in a more serious context is the ‘Healthy play, Better Coping’ project. This project tries to address the importance of play for the development of children in health in disease. But what exactly is play. Play can be found in all kind of things in our culture. Huizinga (1938) described play as “a volitional act, within certain limits of space and time, according to voluntarily accepted, but compelling rules, being a goal in itself, accompanied by feelings of excitement and joy, different from everyday life’. With this definition of play we can identify elements of play in sports, role-play, theatre, dance, language, music, competition, games and many other cultural activities.

According to Nijhof et al. (2018), games can be a major tool in helping children, and especially chronically ill children, play and developing social skills. This is important, because play is crucial for social development and is a highly rewarding activity that is abundant in developing children (Ginsburg et al., 2007; Lillard, 2017). As mentioned by historian Johan Huizinga in ‘Homo Ludens: A study of the play-element in culture’ (1938) play is one of the most central activities in flourishing societies. Nijhof et al. (2018) mention that play allows children to experiment with their behavioural and social repertoire and let them practise their physical and communication skills. It is therefore assumed that play is a facilitating factor in development of social and emotional capacities, creativity and problem-solving skills (Bateson, 2015; Erikson, 1977; Ginsburg et al., 2007).

2.2 Play and chronically ill children

So, we can conclude that play is crucial for children to develop certain social and emotional skills. But how does this work for chronically ill children? To answer this question, we first have to answer the question ‘Who do we define as chronically ill children?’ According to Nijhof, S.L., et al. chronically ill children are ‘children who are suffering from a chronic somatic disorder (i.e. cystic fibrosis, auto-immune diseases or congenital heart defect) or who have a (current or previous) condition (e.g. premature birth or childhood cancer) with possible life-long consequences.’. These children with a chronic disease have a significantly higher risk for physical, social, emotional and cognitive problems later in life (Patenaude and Kupst, 2005; Pinquart and Shen, 2011; Pinquart and Teubert, 2012) and also are likely to play reduced or in different forms than non-ill children (Nijhof, S.L., et al., 2018). Differences in play behaviour amongst these children in contradiction to non-ill children have been described through all phases of play development (Naber et al., 2008).

2.3 Games as playing tool

One of the things were play is crucial is games. Games are actually an activity in which play is stimulated or even simulated. By using competition, story-lines, role-playing or even creativity play is stimulated and simulated for players. As mentioned before, the development of games has been
staggering the last few years. New formats and new creative forms of games have been developed and released the last few years. One segment which is increasingly popular amongst scientists and researchers are applied games, or serious games. Today’s “serious games” is serious business. The serious games market is now at $20 million, and digital gaming is a $10 billion per year industry (van Eck, 2006), and the market is expected to grow over the next decade. Michael and Chen (2006) also note that, serious games are also becoming ever more important in the global education and training market, which in 2003 was estimated at $2 trillion.

2.3.1 Games in health care
One of the main domains in which serious games are getting implemented is health care. Games especially are put into practice to promote healthy behaviour in children (Majumdar D, Koch PA, Lee H, Contento IR, Islas-Ramos AD, Fu D, 2013). Due to the constantly evolving gaming domain, new games and possibilities arise to implement in child health care. An example of these new possibilities in the child health care is interactive playing grounds with beamers, which is implemented in several (child) hospitals in Utrecht.

2.3.2 Location-Based Games
Another example of a new area to discover in child health care with regards to serious games are, Location-Based Games (LBG’s). LBG’s are games facilitated by mobile devices in such way that the game activity evolves according to players’ location (Avouris, N. M., & Yiannoutsou, N., 2012). Due to the enormous use of mobile devices worldwide, like smart phones with advanced location sensing capabilities as GPS satellite positioning, LBG’s are a potential sky high area in the gaming domain. LBG’s let players move to certain locations in the real-world, and let players interact with this location. This interaction can be offline (with the real-world) or with an online environment. As mentioned by De Souza., et al. (2006) it is the use of mobile technologies that connects the physical, virtual and game space as interface for game play. With the physical space, we mean moving to a certain location, inspecting things at locations, taking pictures or performing physical actions. With virtual space, we mean that players are interacting with avatars, simulated events or puzzles. The game rules and narrative define the game space, which is supported by the physical and virtual space.

According to Avouris, N. M., & Yiannoutsou, N. (2012) LBG’s can result in learning or developing social skills as a result of stimulated interaction between players, investigation of objects, active search for information, development of new skills, engagement in meaning making activities or solving puzzles.

2.3.3 The importance of narration in a game
LBG’s are often based on a narrative, which is a valuable tool to create meaning, understanding and organize experiences (Sims K., Paul Ricoeur, 2003). A narrative is characterized by the emplotment, which is a synthesis of the heterogeneous elements of a story (Ricoeur, P., 1991). A narrative is basically a means for combining actions and events into a cohesive whole and building the relationships between actions and events. This, in combination with the fact that the reader or player, constructs a new interpretation of the narrative, makes that a narration can be the base of a rich explanation about the game (Avouris, N. M., & Yiannoutsou, N., 2012). Thus, narration is a key in game development, but especially for LBG’s. Due to this fact, there is a lot of focus in this report on narrative building. As described later on, children who are part of the target group, have been consulted to create a suitable narrative, which is rich and appealing for future players. Also children
are used in the testing phase, to check whether the developed game actually is suitable and appealing for the target group.

So, in this report, a LBG will be developed for chronically ill children who are suffering from social exclusion and needs to be more social included. The narrative should support this, but the main focus is on helping these children to feel more socially included and connected to peers. As mentioned by Nijhof, S. L., et al. (2018) play, and especially games, can be a major tool in helping chronically ill children, play and developing social skills. Assumed is that, developing these skills and playing together with peers result in more connectedness and increased feeling of being socially included. In this report, being social included is defined as ‘having the same social skills and possibilities as non-ill children and consciously having this feeling.’. Being socially excluded is exactly the opposite of being socially included and also has connections with feelings of loneliness and ‘being different than others’.

It is important to stimulate social skills and social inclusion because, young adults who grew up with a childhood chronic disease have achieved significantly fewer milestones than their peers. These milestones differ across different domains, such as autonomy, psychosexual and socially (Nijhof, S.L, et al., 2018; Grootenhuis et al., 2003). This divergent development of children with a chronic disease has significant consequences for later functioning and is related to a lower quality of life, as stated by Nijhof, S. L., et al. (2018) and Stam et al., (2006).

2.4 GameOlympics Template

It might be possible that playing a social focused game could support or help these children to develop more social skills and achieve the milestones that could be missed by this group of children. With this research it will be tested whether LBG could be used as tool to enhance social inclusion for chronically ill children. This will be done in co-creation with children who are part of the target group. These children will help in the early stage of development and in the testing phase of the game, which will be described more elaborated later on. In this research the GameOlympics template is also used. This template is created within the PREHealth project and the original unused template can be found in Appendix A. The template consists of four parts, the first part gives a general overview of the developed game and describes the theme, the overall narrative, a short game description and the role of the community forming for the game.

The second part of the template consists of ‘prep work’, which includes thinks as writing a backstory, finding a location to play the game, conducting a brainstorm with domain experts and potential target group audience, determining the guides or trainers for the game and lastly choosing the game developing platform which will be used.

The third part is the actual game development phase. In this part of the template a more elaborated game description is written, the goal and rules of the game are stated. Next the in-game challenges, trainer dialogues and game assets are described within the template.

The last part of the template advices to playtest the game. This part has no specific section within the template, but the playtest phase will be described later on in this report.

This template is used because it gives a clear overview of the game development process. Also the fact that is create for LBG’s in particular makes it a good template to use. The GameOlympics template stimulates it’s users to think about specific LBG tools and locations. As in PREHealth report IO6 – ‘Informal learning and awareness raising tools’, the developer has several opportunities during the game development process to visit real-time locations in the gameplay area of context. This is also stimulated by the template, at the ‘trainer dialogue’ section for example. In this section all
dialogues the players have with the in-game ‘trainer / story leader’ are described. In this section the dialogues should fit in the context of the game at a specific moment in gameplay. This means that the trainer dialogues should fit the story and also the location the players visit at that specific moment. By doing this the template stimulates the developer to think of and visit locations, to let the game interact with, in an early development stage.

Another advantage of the GameOlympics template is that it has a major focus on narration. As mentioned before, narration is a key point in games in general (Sims K., Paul Ricoeur., 2003; Avouris, N. M., & Yiannoutsou, N., 2012), but especially in LBG’s. LBG’s can have rich interaction with the environment in which the game is played. This in combination with a good narration creates a rich game experience for the player. The GameOlympics template stimulates this and is focussed on narration from the beginning. The developer should write a backstory, come up with a game description and write an elaborate trainer dialogue.

Before the template will be described, the methods, the tool choice, expert interviews and target group, goals and requirements will be stated.

3 Method

In this section the whole research process will be described which methods are used to satisfy our goal of enhancing social inclusion for chronically ill children. To test whether LBG’s can enhance social inclusion for chronically ill children a few steps need to be conducted. These steps are: defining a tool to build the LBG with (section Tool choice); conducting in-depth expert interviews to identify the target group and gain more knowledge and advice; stating the final target group, the goals the game should achieve and the requirements needed to create a satisfying LBG which is enhancing social inclusion; developing the LBG with help of the GameOlympics Template, which is an overview of the most important steps for LBG-development. After this, when the game has been developed there are some steps that need to be taken. The developed game should be described, to give an overview of the game and its options and limitations. The in-game routes should be described and explained. Next, the game should be tested with the target group, followed by a section which describes the results.

The tool choice should be made before other steps, because it helps the developer to understand what the advantages and disadvantages of each tool are. These things need to be taken in consideration when interviewing the experts, but especially when stating the goals and requirements. Due to the fact that some LBG building-tools have other functionalities than others, makes that goals and requirements could be influenced by these functionalities. For example, if a tool offers the possibility to have interactive communication with the user, in the sense of sending rich data (photo’s or videos) to the system, a requirement could be ‘the user should send a photo to the system at each new location’. When the tool choice is not made at the beginning of the process, the developer can get stuck later on in the process due to the fact that the developer doesn’t have a clear view on what the possibilities and limitations of each tool are. If the developer assumes that each tool has the requirement described above and this is mentioned in the expert interview, the goals or the requirements, the developer might need to take some steps back later on. Also the experts might answer the questions with a less open-minded view, because they already focussing on in-depth issues. Due to the fact that every tool has its pros and cons it’s advised to make a clear tool choice before taking other steps.
When the tool is chosen, expert interviews are held to gain more understanding and knowledge about games in social health, chronically ill children, the potential target group, potential goals and expert opinions on other matters the developer has questions about.

After the expert interviews, the target group will be determined and described. This should be done as soon as possible to ensure that the developer formulates suiting goals and requirements. Clarification of the target group is also crucial for game development, because the game should be suitable for specific group. Clearly stating the boundaries of your target group ensures a more user-focused view, which will result in a better end result.

Next, the goals and requirements need to be stated. These act as general guidelines during game development. By stating the goals of the game the developer has a clear overview of where the game should lead to. This will also result in a better end result. The requirements form the minimal criteria for the game.

With help of the GameOlympics template the LBG can be developed. The GameOlympics template consists of all necessary action points for developing a LBG. The template forms a clear overview of the game that should be developed. By filling in the template before the actual building of the game, the developer gives itself some handles to seize during the game building. The developer is also stimulated to visit real-time locations which can be used in the LBG. All of this, in combination with the fact that the template as a focus on creating narration, makes it a suiting template to create a LBG and answering the research question.

The first step of this project was making a tool choice. The choice of the tool, with which the location-based game will be made, needs to be determined based on some criteria. These criteria consists of:

- The system requirements
- The platform it operates on
- User-friendliness
- The working functionality for the user who develops the game
- Opinions & experiences of current users of the tool
- Advantages
- Disadvantages
- Costs

The following section discuss the tools evaluated, followed by a conclusion on the evaluations.

### 3.1 Enigmapp

**System Requirements**

Nothing can be found about the system requirements of Enigmapp. An e-mail has been sent to Enigmapp to answer this, but no response is given.

**Platform**

Enigmapp can run on IOS and also on Android. This is an advantage, because a majority of the people has an IOS or Android driven phone, which means that the game can be played by almost anyone.

**User friendliness**

The user friendliness in the developing as playing area are not optimal. Especially in the developing area some user friendliness is missing, because the buttons in the developing area does not work that well always. It may occur that when a certain button is touched, that nothing happens or a
server error pops up. This can be very annoying and also may discourage the developer for using this tool.
In the app, for playing the game, there are some errors. When a player tries to find a suitable game, but there are no games nearby, an error is shown and the user needs to specify its searching criteria. Eventually when a ‘standard’ in game dialog is opened, some interactive questions pop up. However, when a player wants to return to the main menu and clicks on this button, it sometimes does not work or an error is given.

**Functionality for developers**
For developers there are some functionalities built in the Enigmapp tool. It is possible to use default backgrounds, pictures and characters, but it’s also possible to upload own images. The developer also has the option to develop story screens, which basically is one screen in the storyline with some context related content on it.

**Opinions & experiences of current users**
Because Enigmapp is a relatively unknown tool there are almost no opinions or experiences which can be found on the web. There are no experiences shared about how to develop a game with Enigmapp, but also almost no opinions about players of the game.

**Advantages**
The main advantage of Enigmapp is that the tool can be developed for IOS and Android as well. Which makes it available for more people.

**Disadvantages**
Enigmapp also has some disadvantages, the language used for the tool as the app is entirely French. This is not a big problem, but may be a disadvantage in contradiction with other tools which can be used in multiple languages.
Also the tool can be really slow or not optimal working during the developing process. Buttons may not react or loading time can be long. This also is not a big issue, but does certainly not encourage people to use Enigmapp.

**Costs**
The costs of Enigmapp are 85euros per month, but there is a free trial available. Despite of the availability of this information, there is no information available about the duration of the free trial and the advantages of a paid version in contradiction to a free version.

### 3.2 Aris Location-based Games

**System Requirements**
Aris has the following system requirements; IOS 8.0 or higher is needed to play the game in the Aris application. Also Internet connection is needed to load images and other content on the map. To play games on the Aris application 49.7 MB of storage space is needed.

**Platform**
The platform Aris runs on is purely IOS at the moment. There is no information available at the moment whether FieldDay, the organisation behind Aris, is planning to launch an Android version as well.

**User friendliness**
The user friendliness with the Aris tool is better than with Enigmapp because of several reasons. First of all the developing area is better useable and more clearly structured. There are clear buttons and a help button is offered when a developer has questions about possibilities Aris offers within its developing area. Aris also offers online courses, information and an extensive Q&A about the tool...
and its possibilities.
The application for the players of Aris is also user friendly. With a menu with options like ‘nearby games’, ‘popular’ and a search function it offers the possibility for the users of the application to discover the different games in Aris.

Functionality for developers
Aris offers a wide variety of options for developers. The developer of a game with the Aris tool can create the following game types:

- Interactive Stories
- Scavenger Hunts
- Tours
- Data Collection Activities
- GPS

To create these game types a developer can use the following functionalities:

- GPS
- QR Codes
- Bluetooth beacons
- Navigation of the on-screen map
- Entering alphanumeric codes
- Media collection with social interaction possibilities

Opinions & experiences of current users
Aris is developed by the University of Wisconsin – Madison and mostly used by teachers. The first opinions and experiences that were found come from teachers also. On the website of www.commonsense.org/education/website/aris-1 comments of teachers can be found, the comments are divided into three genres. The comments are all anonymously.

Engagement: If a teacher puts in the time to understand creating a game, students will be hooked.

Pedagogy: While the value of ARIS depends on the person who makes the game, a well-designed game has the potential to create an incredible experience where students take an active role in learning.

Support: The developer has a manual and several video tutorials to help teachers get going. ARIS isn’t as complicated as programming, but it will require a lot of effort for most teachers to learn.

Also Chris Thomson, who has worked at universities, colleges and skill providers and now is a Subject Matter Expert in online learning and the digital student experience stated the following things about Aris:

- “It’s just about simple enough for more able school students (and I guess most FE and HE students) to be able to create their own content. You don’t need any web development skills.”
- “The GPS isn’t pinpoint accurate so I had to include a fairly large margin of error (30-40m) on the placing of the objects. Having the game in a built-up environment also created problems for the GPS accuracy. Not insurmountable, but I think these games are likely to work better where they range over a wide area.”
- “I encountered a few server errors and app crashes when testing mine. I was still able to complete my “quest” but it was enough to make me feel jumpy about running this sort of activity with large numbers of students.”
These comments are useful to get information about the practical side of the tool and how easy it is to develop a game with the Aris tool. It also shows some points of attention about the tool which we need to take into consideration for this project. The comments of Chris Thomson can be found on his own website: http://cbthomson.net/methinks/2011/08/making-location-based-activities-with-aris/

Advantages
Aris has some advantages, as mentioned before, they provide online courses for developers. The tool is also available in English, but also Spanish for example is offered. Another advantage of Aris is that it’s free to use up to 100 players monthly. Also ARIS Games is open-source under the MIT license and free to use. The MIT License is a permissive free software license.

Disadvantages
Aris also has some disadvantages, the tool does not support games on Android for example. Also internet connection is needed during the play of the game. Another issue about Aris is that it might have little bugs during the developing process, however these do not occur regularly and Aris is trying to solve those bugs constantly.

Costs
Aris is completely free until your project begins to see more than 100 players monthly. Also if you need help designing or modifying ARIS, a consultation is needed. This also costs some additional money, but this depends on the request.

3.3 Siftr
As stated on their own website, Siftr extends learning beyond your computer, books, and classroom walls - preparing people of all ages to learn in the wild. A tool for teachers and curious people. Siftr supports you as you explore the world.

System Requirements & platform
Siftr can run on IOS and Android. It needs IOS 9.0 or higher or Android 4.1 or higher. On IOS 23MB of storage space needs to be available on the phone to play the game, on Android 9,3MB of storage space is required.

User friendliness
The user friendliness of Siftr is good, the developing area is clear and has a step-by-step plan which the developer need to follow before going further in the developing process. Making a Siftr application is easy and can be done in 5 minutes as the makers say.

Functionality for developers
There is not much creativity in the design of Siftr, some standard options about the map are given. But the developer can use its creativity in the data that needs to be found on the specific point on the map. Questions and photos can be uploaded.

Opinions & experiences of current users
Not much comments or experience about Siftr can be found, but something to point out is that Siftr is a tool to support field research. Which includes sharing observations, photos and field notes. Despite of this, Siftr can be used in creative ways in other topics of interest.

Advantages
Siftr can be used to let ill children get insights in their disease. For example let children search for specific things in the city and make pictures, comments or questions about these things and then map these things. Afterwards the children can look at this map and the things they mapped and learn things about patterns or something with help of an adult. For example, when a child has asthma and
hassles more with this in spring in certain areas/situations. A child can search for these areas/situations on a map, directed by a doctor, and then see whether the asthma symptoms aggravate. When this is the case, the doctor can look at the mapped moments and see which areas a child may need to avoid.

Disadvantages
A disadvantage of Siftr may be that it is not as much a game as Aris for example. Siftr is much more research focused, which might make it less playable/usable for young children especially.

Costs
Siftr is free to use and has no possible future costs to it.

3.4 TaleBlazer
TaleBlazer is an augmented reality (AR) software platform. It’s developed by the MIT Scheller Teacher Education Program (STEP) lab. TaleBlazer allows users to play and make their own location-based mobile games. By putting game elements into the real world, AR games are used to engage people in experiences that combine real landscapes and other aspects of the physical environment with additional digital information supplied to them by smartphones.

System Requirements
At the website of TaleBlazer the system requirements are divided into two categories; Mobile requirements and Editor Requirements.

3.4.1 Mobile Requirements
General
Mobile devices must be equipped with enabled GPS positioning technology. And there must be sufficient storage to cache the game images and videos. At least 50MB is recommended.

IOS
For iOS version 6.0 or higher is required.

Android
For Android version 4.0 or higher is required. Also is it necessary to have the Google Maps API be bundled with Operating System

3.4.2 Editor Requirements
TaleBlazer is expected to work on all modern browsers, but it has been tested on Firefox 9 or later, Safari 5 or later and Google Chrome.

Platform
The platform on which the game can be played is on iOS and Android.

User friendliness
With regards to the user friendliness TaleBlazer is a great tool. The application is clear, explanations about the working of the tool are given. Also the design of the application is clear, structured and this makes it very easy to use, especially in combination with the explanations in the application.

The developing tool can be a bit overwhelming at the beginning. A lot of buttons and menus can be selected. During the developing and the process of trying things it will become clear. TaleBlazer also offers extensive, in-depth tutorials. This helps to get understanding about the tool and its possibilities.

Functionality for developers
TaleBlazer offers a wide range of functionalities in the developing area. Developers can make stories,
add buttons, questions, scores, videos and audio clips into the game. Also indoor games with help of Bluetooth beacons can be made, this might be especially useful for chronically ill children who are still in the WKZ for example.

**Opinions & experiences of current users**
Not much comments or experience about TaleBlazer can be found on the web, but the game is used by universities and organizations like zoos to develop location based games for a specific topic of interest.

**Advantages**
TaleBlazer has some major advantages. First of all the tool is available on iOS and Android, which means that the game can be developed, tested and played by many people. Another advantage is that the user can download the game in the application on forehand. This means that internet connection is not needed when playing the game outside. TaleBlazer also offers a wide range of functionalities and an elaborated tutorial which covers all the different possibilities and options.

**Disadvantages**
The TaleBlazer editor might be a bit overwhelming at the beginning, but this is solved by practicing and using the tutorials.

**Costs**
TaleBlazer is free, the organization behind the tool is funded by external organizations.

3.5 **Conclusion**
Based on this information about the tools, I prefer to use TaleBlazer or Aris. TaleBlazer looks the most complete and support iOS and Android. Aris is more sophisticated and is more constantly developing but only supports iOS, which automatically excludes all Android users. TaleBlazer and Aris both offer a big amount of information about the tool, this will help developers and users to create games. Also both applications on the users’ sides are clear and work properly.

The fact that Enigmapp is French and has a lack of available opinions or experiences of users is a reason to not use this tool. Enigmapp has a lack of in-depth information, which makes it hard to really understand the options and possibilities of the tool.
Siftr could be useful as well, but the fact that Siftr is mainly developed as research tool and not as game makes that TaleBlazer or Aris might be more useful. Especially because the game must suit children, which can be achieved more easily in TaleBlazer or Aris. A big advantage of Siftr is that it can help children to really gain understanding about their disease for example, but this also can be achieved in a much more playful way with TaleBlazer. Because the fact that TaleBlazer supports iOS and Android and also is nearly or as well as Aris, I prefer to use TaleBlazer. Because the target group is already specific and a niche, it is wishful to not exclude users because they don’t have the right operating system on their phone.
Another reason to use TaleBlazer is because the students of the urban planning project decided to use TaleBlazer as well. For this reason it is also useful to use TaleBlazer because it enables us to really get in-depth about the different games that have been made on the TaleBlazer platform. This will be helpful for the meeting in Darmstadt. TaleBlazer also has a good predefined game development structured, because it enables syntax errors during development, which makes it good to use for non-programmers as well.
4 Expert Interviews

4.1 Scope

In order to design a game based on expert information and find the right target group, interviews with domain experts will be held. These domain experts are employees of the WKZ and Utrecht University who are involved in the HPBC project. There are several things to take into account when the interview is prepared and conducted. A few things need to be clear:

- Who is the target group?
  - Age of the children
  - Functional limitations of the children
    - Due to illness
    - Due to age
    - Due to understanding
    - Due to other matters?
  - The goal of the game for this target group
    - Encourage to sport?
    - Encourage to explore?
    - Encourage to seek contact with non-ill children?
    - Encourage to seek contact with other ill children?
    - Create understanding about their disease?
- The Game Olympics template needs to be explained as boundary rules for the experts to let their thoughts go on the project
- The context of the project needs to be explained to get in contact with the expert & understand the reach and limitations of the project. (Timespan, resources etc.)
- What is the thing I want to measure?
  - Has to do with the goal of the game for the target group
  - Ask experts what they think might be useful to measure
- What do I want to control?
  - What are the expected range of results?
  - What is the boundary of the experiment?

Based on the points above interviews have been held. From this, some requirements for the game have been created, as detailed in the next section.

5 Target group, Goals & Requirements

5.1 Target group

The target group for this game are chronically ill children between 10 and 12 years old with whom the disease is calm and stable. This differentiation is made because for children with physical limitations due to their disease it is really hard to go to locations in the real world on their own. Also it is really difficult to develop a game for children by which the disease is really active. These children first of all need their energy to make their disease stable and calm.

Based on expert opinions from the interviews it is concluded that children, between 10 and 12 years old, are increasingly socially active. The maximum age of 12 is used because children older than 12 have a high change to be in puberty, in this time children start rebelling against things they don’t like. Making a game for the age group 12-18 is harder and is likely to have a higher possibility of failure. According to the interviewed experts it is harder to keep this age group involved and motivated.
The minimum age of 10 is chosen because children younger than 10 are mainly focused on developing physical skills. As stated by Haywood, K., & Getchell, N. (2014) young children are practicing emerging skills and physical movement. This happens in an immature form. The joy of movement is a base for the development of motor skills and goal achievement. Because of this children from the age below 10 often move purely for joy of moving.

In this game the focus lies on social development instead of physical development, because of that the target group is focused at players from the age of 10 to 12 years old.

5.2 Goals

The goals of the game determine the main focus of what the game should accomplish after playing. These goals are key for game development, because they need to be the leading thread through the game. The main goals do not need to be really visible for the player at all times but the challenges, game concepts and avatars should always support the achievement of the main goals. There is one main goal which is an overlaying concept and some sub goals which contribute to achieving the main goal.

5.2.1 Main Goal

The main goal of the game is:

- Enhance social inclusion

This should be stimulated by reaching the sub goals. Enhancing social inclusion by children is important because social isolation may persist to adulthood (Landesman-Dwyer and Berkson, 1984; Parker and Asher, 1987). By enhancing social inclusion, isolation in a later life stage may be prevented. A systematic review that assessed the effectiveness of interventions to promote mental health across childhood, adulthood and old age suggested that mental health promotion interventions for the disadvantaged and for carers were likely to be valuable (Cattan, M., White, M., Bond, J., & Learmouth, A., 2005). This suggest that enhancing social inclusion already during childhood can help mental health later on, which on his own can contribute to less feelings of loneliness.

5.2.2 Sub Goals

- Let chronical-ill children feel less ill or clinical and more ‘normal’;
- Playing together and feel more connected to other players;
- Trigger children to develop their less skilled talents;
- Let the players find their own identity to enhance social inclusion;
  - Create more resilience and empowerment
- Create understanding about what it means to be chronically ill.

5.3 Requirements

Requirements are used in almost every product development loop. A requirement is a documented physical or functional need that a particular design, product or process aims to satisfy. It is commonly used in a formal sense in engineering design, including for example in systems engineering, software engineering, or enterprise engineering. It is a broad concept that states any necessary or desired function, attribute, capability, characteristic, or quality of a system for it to have value and utility to all stakeholders of the product. In this project the focus is on game development, so some critical requirements for the GameOlympics game are stated. The game must at least have the following:

- Freedom in choices for the player
The game must be playable with a group of children
The game must be safe to play
The locations in the game must be safe
A privacy policy is needed
Avoid elements of competition between ill children and non-ill children, this can work discouraging
The game should be fun to play, this can be done with fun challenges, but also with humour.
The location within the game should not be further than a 5 min walk from each other.
Different kind of challenges should be implemented in the game. For example puzzles, physical activities, surprises.
The actors in the game should be socially spread, which means that men, woman and other differences should be presented in the game.

6 GameOlympics template
For the developing process of the game the GameOlympics template, developed within the PREHealth project, is used. This template describes the steps which need to be taken to develop a location-based game which is similar as the game that will be made in this research. Below the template can be found applied to the context of this research.

First the theme, narrative, game concepts and community aspects will be shortly described. These act as a general overview of the game. After this, the template will describe the process of game development and the choices made. At the end the game design is stated, which forms the base for game development.

6.1 Theme
A mystery theme is chosen. Something mysterious happened to one of the athletes who is in the city for the GameOlympics, where people compete in different imaginary Olympic sports like "pavement walking", jogging, cycling, nature-gymnastics etc. and win trophies.

6.2 Narrative
You are challenged to unravel the mystery around the disappearance of one of the most famous athletes of the GameOlympics. Enter your very own detective story around the Olympics in your city. With help of Intel and rumors of locals, you need to unravel the mystery and make sure that one of the biggest GameOlympics athletes is found.

6.3 Game
Each time you complete a part of the mystery or find an item, new information will be given. Try to connect all the missing dots of information and collect all the items which may help to unravel the disappearance.

6.4 Community
The game must be played with multiple players. The focus lays on the chronically ill children, but enhance social inclusion is the goal, so multi-playability is a must of the game. The game will be played with one device, but the challenges need to be solved with multiple players. This way, groups of children can play the game, work together and solve the problems in the game.
### 6.5 GameOlympics Template

<table>
<thead>
<tr>
<th>PREP WORK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before developing content for your game follow the steps below to create a backstory and do some location research for your game.</td>
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</table>

<table>
<thead>
<tr>
<th>STEP 1: WRITE A BACKSTORY</th>
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<tbody>
<tr>
<td>Having an overall backstory will help creating a narrative and characters later on. The backstory is the starting point of the process.</td>
</tr>
<tr>
<td>Your city is hosting the Olympic Games for the first time. How special is it that Utrecht managed to get the hosting for this special event. All athletes have recently arrived in and around Utrecht, they all started their final training period at different places in the city. One of the most famous athletes is in town for a couple of days now and has been seen around the medical centre of Utrecht. But unconfirmed rumours are going around last days. Unravel the mystery around the rumours with help of your friends.</td>
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<tr>
<th>STEP 2: FIND A LOCATION</th>
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<tbody>
<tr>
<td>Identify a location with a minimum of ten spots around that location where people can sign up for challenges. The range between the different spots cannot be longer than 1 kilometre from each other, because the game is for kids. The goal is not to let kids wander around for hours and get far away from the starting location.</td>
</tr>
<tr>
<td>The location of the game will be around the Fritz Redl school at the Uithof. It’s located nearby the WKZ hospital, which is the hospital where chronically ill children are treated. It’s a good location for a first pilot because the environment is suitable for children, there is expertise in the environment and there are (chronically ill) children.</td>
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<thead>
<tr>
<th>STEP 3: BRAINSTORM</th>
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<tbody>
<tr>
<td>The brainstorm session is used to gain game ideas that match the location, backstory and theme of the game.</td>
</tr>
<tr>
<td>Brainstorm has been done by talking to a number of experts from the HPBC project. In combination with creativity and examples from other games a number of ideas are designed which might be useful for the game. Also a session with three children within the target group age has been conducted. With them there was a brainstorm session about interesting themes and storylines for the game. From the combination of all of this the storyline has been developed.</td>
</tr>
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<thead>
<tr>
<th>STEP 4: CHOOSE TRAINERS</th>
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</thead>
<tbody>
<tr>
<td>The trainer/mentor is the in-game character that provides the storyline and helps the children in their journey. The trainer can also be used to encourage or provide feedback to the players.</td>
</tr>
<tr>
<td>The trainers in the game are detectives Bart &amp; Bill. These two characters will give the main instructions to the player and accompany the players along their journey.</td>
</tr>
</tbody>
</table>
STEP 5: CHOOSE A PLATFORM

A platform for the development of the game need to be chosen. A number of factors need to be taken into account for the making of this choice are:

- The system requirements
- The platform it operates on
- User-friendliness
- The working functionality for the user who develops the game
- Opinions & experiences of current users of the tool
- Advantages
- Disadvantages
- Costs

The platform that will be used for this game is TaleBlazer. Why this choice is made and the other options can be found in section 2: ToolChoice.

<table>
<thead>
<tr>
<th>GAME DESIGN</th>
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<tbody>
<tr>
<td>After the preparation activities the game should be developed. The development process is done by filling in the boxes below with usage of the preparation activities and creative imagination. In the development process creativity can flow as long as the main goals, requirements and theme is kept in mind.</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>GAME DESCRIPTION</th>
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<tbody>
<tr>
<td>This is what players will see when opening the game. It’s a first description of the game, its goals and theme.</td>
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<tbody>
<tr>
<td>Your city, Utrecht is hosting the Olympic Games for the first time. How special is it that Utrecht managed to get the hosting for this special event. All athletes have recently arrived in and around Utrecht, they all started their final training period at different places in the city. One of the most famous athletes David Vondel is in town for a couple of days now and has been seen around the medical centre of Utrecht. David Vondel has had an enormous amount of media attention in the weeks before the GameOlympics. Recently little information has come from David Vondel and nobody knows how his progressions in preparation of the Olympic Games are going. The only information is an unconfirmed rumour, which started to spread last days. You and your friends are needed to investigate the silence around David Vondel, can you find some information?</td>
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<tbody>
<tr>
<td>Perhaps is his last training place a good way to start, perform the training of David Vondel and you</td>
</tr>
<tr>
<td>GOAL</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>This identifies a clear goal for the game, how a player can win and</td>
</tr>
<tr>
<td>which sub goals need to be achieved in order to win the main goal.</td>
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<table>
<thead>
<tr>
<th>RULES</th>
<th>Operational rules:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The rules identify what the players can and cannot do. Rules mention</td>
<td>- <strong>Players must play the game in groups of 3 of 4 people.</strong></td>
</tr>
<tr>
<td>the boundaries of the game and the possibilities the player has.</td>
<td>This rule is important, because the goal of the game is enhancing social inclusion.</td>
</tr>
<tr>
<td>According to Kapp, K. M. (2012) games would not exist without rules.</td>
<td>This can’t be done without having social contact with other players. Coopera-</td>
</tr>
<tr>
<td>Rules limit the actions of players and keep the game manageable.</td>
<td>ting in groups has a significant increases in acceptance of other peers. (Jacques</td>
</tr>
<tr>
<td>Four types of rules are defined by Kapp.</td>
<td>et al., 1998; Piercy et al., 2002), so that’s why this game rule is stated.</td>
</tr>
<tr>
<td>- Operational rules describe how the game is played.</td>
<td>- <strong>Boundaries of challenges should be followed at anytime</strong></td>
</tr>
<tr>
<td>- Foundational rules describe underlying formal structures which</td>
<td>To make sure that challenges are played correctly, the in-game described bounda-</td>
</tr>
<tr>
<td>dictates the game functionality.</td>
<td>ries should be followed at any time.</td>
</tr>
<tr>
<td>- Implicit rules/behavioural rules: Govern the social contract</td>
<td>- <strong>For each challenge you collect items.</strong></td>
</tr>
<tr>
<td>between two or more players. How should players behave to each</td>
<td>Rewards are key game elements (Kapp, K. M., 2012). By collecting items the play-</td>
</tr>
<tr>
<td>other?</td>
<td>ers are stimulated to gather even more rewards and keep attention to the game.</td>
</tr>
<tr>
<td>- Instructional rules: Rules that you want the player/learner to</td>
<td>- <strong>Stay within the boundaries of the map.</strong></td>
</tr>
<tr>
<td>know and internalize after the game is played.</td>
<td>This rule is important, because you want to tell the players what the boundaries</td>
</tr>
<tr>
<td></td>
<td>of the game are. Staying within the map is crucial for safety issues and to be</td>
</tr>
<tr>
<td></td>
<td>able to play the game.</td>
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</tbody>
</table>

| Foundational rules:                                                | - **Complete all challenges and find all items to solve the mystery**          |
|                                                                     |  This rule describes the game goal for the player. The game can’t be finished  |
|                                                                     |  without the achievement of this rule.                                         |
|                                                                     | - **Work together and be positive to each other**                            |
The game should enhance social inclusion, working together and being nice to other players are key elements to achieve this.

- **Individual challenges should be done individually, but other players can help when needed.**
  The game should encourage players to take action and solve things individually and together. There are specific challenges that should be done by working together, but players should also be stimulated to solve things individually and gain trust and acceptance of other players. Enhancement of social inclusion requires cooperation and social activity, but also trust and acceptance of other players.

### CHALLENGES

In this section the challenges of the game are described. There will be a number of challenges which will be described completely.

In order to make the game challenging, fun to play and engaging in-game challenges should be created. The game has several challenges in it, which all are meant to enhance the feeling of social inclusion. Something to address is the fact that these challenges are conceived within the possibilities that TaleBlazer offers.

The first challenge is:

- **A word-guessing game.**
  A picture is shown to one of the group members. He needs to portray this image to the other members. When he succeeds the next player will portray an image, and so on. After this an overall theme of the images needs to be filled in.

This game is implemented in as first challenge in order to let the group work together to solve the challenge. By letting one of the group members portraying the image and the others guessing it social contact is stimulated. With cooperation the images can be guessed. In order to prevent that one player portrays or guesses all the images roles are switch after each image.

Also puzzles are implemented into the game. Two puzzles are identified. As mentioned by Qin, Z., et al. (1995) cooperation in puzzles has better results than competition. In combination with the fact that it is not advised by the interviewed experts to implement competition elements in the game for...
the chosen target group, makes that the focus on these puzzles is on cooperation.

- Two puzzles:
  - A rebus; The rebus has been chosen, because rebuses are always appealing to children (Danesi, M., 2002). As mentioned, solving this rebus with cooperation ensures a better result than competition. Due to the fact that the testing group can’t handle competition that well, players should cooperate to solve the rebus.
  - A number-letter challenge in which numbers correspond to a certain letter in the alphabet. All the numbers together form a word. This challenge has been implemented to have a factor of individual problem solving. According to Bottger, et al. (1987) group performance can be improved when individual problem solving is trained. The goal of this research is enhancing social inclusion and thus cooperating and working in groups. Due to that it is logical to implement some more individual problem solving oriented puzzles in the game. This is also supported by one of the interviewed experts Janjaap van der Net. He mentioned that stimulating the own identity and individual problem solving of children can have a major positive influence on the feeling of being socially included. Children with an own identity will find same oriented peers sooner, than those who haven’t found a particular own identity.

- A Chase-and-Catch challenge. A Chase-and-Catch challenges as described in the PREHealth report IO6 – ‘Informal learning and awareness raising tools’ is a challenge by which players need to locate a certain virtual moving object. When the object is located they need to catch this object. According to the document, this game-pattern promotes strategy building a physical activity. The pattern can be used in single player games, but can also be really useful in multiplayer gameplay, which is aimed for with the GameOlympics game. As
In this TRAINER section the trainer Urban Blue and Green Infrastructure for Health and Fitness dialogues Promoting Education and Jobs to enhance the Use of are mentioned. Chase-and-Catch games are great in the context of LBG’s. The game FoxHunt is mentioned, which is a typical Chase-and-Catch game. Misund, G., et al. mention that games or challenges are especially useful to be played in groups of four or five players. Chase-and-Catch is even more suitable to implement in a LBG for children due to the fact that Chase-and-Catch games are one of the oldest games played by children, especially in nature (Kaarby, K. M. E., 2005). This is supported by the research of Misund, G., et al. (2009) which concluded that Chase-and-Catch games indeed have a high fun-factor. By letting the group of players chase a virtual object and catching it a fun addition to the LBG is made.

<table>
<thead>
<tr>
<th>TRAINER DIALOGUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>In this section the different trainer dialogues are stated.</td>
</tr>
</tbody>
</table>

1. Your city Utrecht is hosting the Olympic Games for the first time. My name is Bart. I’m a local detective, but currently there is little to do, because no crimes are happening, except one strange story. I’ll come back to that story later. First, how special is it that Utrecht managed to get the hosting for this special event. All athletes have recently arrived in and around Utrecht, they all started their final training period at different places in the city. One of the most famous athletes David Vondel is in town for a couple of days now and has been seen around the medical centre of Utrecht. David Vondel has had an enormous amount of media attention in the weeks before the GameOlympics. Recently little information has come from David Vondel and nobody knows how his progressions in preparation of the Olympic Games are going. The only information is an unconfirmed rumour, which started to spread last days. May this be the reason that nothing has been reported about David Vondel since a couple of days? You and your friends are needed to investigate the silence around David Vondel, can you find some information?

Perhaps is his last training place a good way to start, perform the training of David Vondel and you may gather some information about what happened and whether the rumours are true?!

2. Good to have you guys helping solving the mystery around David Vondel!
We’re here at the Training grounds, the place where David Vondel is training and was reported for the
last time also. David Vondel is participating in multiple sports. Try to play 'Walk and shout' first.

**Game instructions:**

1. One of you holds the device you’re playing with, the others form a line opposite of the player with the phone.
2. The player with the device sees 4 images which should be invisible for the others.
3. One of the players in the line comes to the player with the device, 1 image is shown. The image needs to be being displayed with gestures to the other players in line. When the word is guessed the next player in line sees an image and so on.
4. For each image the players has 1 minute to guess
5. When all 4 images are guessed correct they form an overall theme. This theme needs to be filled in on the scoresheet which can be found nearby.

Come back to me when you played the game and found the theme!

3. Nice job! Also I just got an hint from a passer-by, he told me that an item of David Vondel has been found nearby the location, because you guys are close now, can you see if you can find anything? It might help us to find out more about the disappearance. I will send the location to you!

4. A letter is found. It says the following: “Hi David Vondel, because we need to keep this secret I wrote a letter instead of reaching out to you by mobile. I may have found something which can help you perform better, stay tuned and meet me at the head entrance of the WKZ hospital. To makes sure nobody will know where it is I made a puzzle.”

5. Good work guys, with the information of the letter and the puzzle in it the next location] is revealed. I think it is useful to check it out over there, see if we can find more information. But due to the fact that nobody should have known about the letter to David Vondel it is wise to keep quiet about the things we know. If someone is asking you anything about the subject, don’t tell more than necessary!

6. Reporter shows up unexpected. “Hi guys. My name is Fred and I’m a reporter of Utrecht-Sports News (U-SN). I’m working on an article about the disappearance of David Vondel and at the moment I’m asking passer-by’s around the last reported location of David Vondel, whether they have seen anything. Can I ask you some questions about it?”

**[Action: choice options]:**

a. “Yes sure, what do you want to know?
b. “No, we haven’t seen anything and want to bypass”

7. [Actor 3: reporter] If answer A then:
   a. “All right, have you seen or heard anything on the training grounds which indicate where David Vondel is?”

   [Action: choice options]:
   a. “No, we were just playing there, but haven’t found or heard anything”
   b. “Yes, we found a letter, brought it to the police and they are now working on it. There was some kind of puzzle in it, but we couldn’t solve it.”

   b. [Reporter]: “Okay, thanks for your time, I guess I have to contact the police to get to know more then. Thanks guys, have a nice day, you can bypass now!”

   If answer B then:
   c. “Okay, thanks for your time, have a nice day. You can walk on now.”

8. Guys, I heard a reporter has approached you! You haven’t said anything about the information we found right? If he comes to me, I’ll handle it. Good to have you at the WKZ. Search in this area to see if you can find anything which may give us more information. If you find an item that may indicate something, collect it! It may be useful to get a bag, to collect the items, first. I marked a location nearby where you can find a bag. After you collected the bag search for items that may indicate something.

9. [Bag seller]: “Hi guys, I’m selling bags. You can have one for free, if you bring me some soda. I’m so thirsty... But I haven’t got time to get it, maybe you can bring me one. Here is some money. You can find a soda at the soda shop.

10. “Hi guys, drop the money on this location and I will give you guys a bottle of soda” [Action: drop money from inventory] Soda added to inventory

11. [Bag shop]: “Hi guys, did you buy a soda for me? Drop it on here and I will give a bag to you. [Action: drop soda from inventory] Bag added to inventory. Thanks so much, glockglockglock, love the fresh soda you brought to me. To thank you here is some extra money, buy something you like from it. money added to inventory”
12. “Have you collected some items and put them in your bag? Now see what items you got. A list with medicines, a sports bag, sport shoes, a fruit basket, a stopwatch. All right, I don’t know what this all means... PiepPiepPiep, oh 1sec, someone is calling me....”

“Okay guys, I got something useful, someone called and told me that a reporter is working on an article about the case. The reporter mentioned something about illegal activities in the group of friends of David Vondel. See what items you have found that may give some information about what kind of illegal activities the friends of David Vondel are conducting.

13. “There are several items in your bag, check them one by one to see if there’s anything suspicious about it.” [Action: Check items in bag] One of the items is a paper with a number of medicines on it.”

14. “Okay, you found a list with medicines on it, the only thing I can think of right now is to go to a doctor to see what things are on it. Go to Doctor Sandra to see if she can help. I’ll inform him that you are coming.”

15. Doctor Sandra “Hi guys, Detective Bill already informed me that you would come to me. I heard you have a list with some medicines on it and you want to know what they are. Let’s see there are some medicines which helps against some diseases but there are also some illegal doping medicines on the list.

I don’t have the time to check the whole list, but I can learn you a trick with which you can discover all the medicines.

16. Challenge: number-letter combination

17. Well done, you have cracked all the codes! Let’s see what words you now have:

CODE 1: Injectienaald - Toedienen
CODE 2: Paracetamol - Pijnstiller
CODE 3: Clenbuterol - Doping
CODE 4: Vitaminen – Weerstand

18. If I’m correct there is a patient number on the list with medicines, check it to find the patient by filling the number in on the computer.

19. [Computer]: The patient number 13498 belongs to a famous athlete, but the information is secret due to privacy reasons.

20. Is the information secret? Let me call Doctor Sandra, she has to give it to me.

21. Yes? Hey? Doctor Sandra? Yes, you speak with Detective Bart. We have a problem. I have been
22. Okay, good work! Doctor Sandra agrees. The name of the patient is David Vondel, this corresponds to the research and so is the medicine list of David Vondel! This is a major breakthrough.

Meanwhile I also know the location of David Vondel, go here and research what the rumours about doping, the medicine list and David Vondel have to do with each other.

23. {Bump David Vondel} final conversation based on players choices. Will be displayed at the game description.

### GAME ASSETS

All assets are added during game development. Game assets used in this game are images of actors or images used in challenges.

The game assets can be found in the section ‘Game Description’. In this section the game and its assets will be described and the assets can also be found in the images in this section.

### PLAYTEST

Once the first version of the game is ready, it needs to be play tested. This will be done with children which fits within the target group. Playtesting is necessary to discover what works and what doesn’t. Knowing this makes it possible to state long and short term improvements for the game.

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**Table 1:** The GameOlympics Template, used for game development and applied in the context of the project.

### 7 Game Description

In this section the game will be explained with images. The text on the images is written in Dutch due to the fact that the pilot will be conducted in Dutch. This section will shortly describe the texts shown on the images. Not all game screens will be shown in this section, only the most relevant parts will be shown.

If it is wished to see all in-game screens then download the Taleblazer application, go to the ‘menu button’ at the top-right corner in the application. Next go to ‘Game Code’ and fill in the following code: `gvtemut`. After this, the game can be downloaded and played. See Figure 3 for a visual explanation for where to find the above.

When the game is started the screen of Figure 4 is shown. In this screen the game theme, and first parts of the storyline are described. Also the first actions the players should take when proceeding are explained.
When proceeding from the screen at the left, Figure 5 will be shown. On this screen the general game map is shown. A text is shown which describes where the tabs at the top are for and what the player should do with the map. Which is walking to the icon on the map and when close enough pressing the icon. This will trigger a conversation with the first actor, detective Bart.

When close enough to detective Bart, the icon can be pressed. This will trigger a message in which detective Bart introduces himself, the mystery and the following actions to take. This following action is; go to my colleague Bill, he’ll have further information. After this conversation the map changes, as can been seen there is again a ‘detective’ icon on the map, but more to the left than earlier (figure 6). The players should walk to this icon and when close enough tap the detective Bill icon. Then the challenge instruction at the Figure 7 will be given, which the word is guessing game described earlier in the GameOlympics Template.
When pressing OK button at the bottom Figure 8 will be shown. To proceed further the players should push the ‘Speel het spel’-button, which can be seen at Figure 8. When this button is pushed the challenge instructions will be shown once again, then the challenge will start. When the challenge is started the items in Figure 9 are shown. One player should gesture the first image. The other players should guess the image within a minute. If they succeed the next player can gesture an image and so on, until all players and images have been guessed. After all the images are guessed, Figure 10 is triggered on the map. The players should come up with an overall theme and fill this in on the scoresheet, which can be found on the map now. When close enough the players can push the icon of the scoresheet and then Figure 11 will pop up. Here the players should fill in the overall theme of the images in the challenge. When this is done correct the scoresheet opens up and can be picked up.

When pressing OK button at the bottom Figure 8 will be shown. To proceed further the players should push the ‘Speel het spel’-button, which can be seen at Figure 8. When this button is pushed the challenge instructions will be shown once again, then the challenge will start. When the challenge is started the items in Figure 9 are shown. One player should gesture the first image. The other players should guess the image within a minute. If they succeed the next player can gesture an image and so on, until all players and images have been guessed. After all the images are guessed, Figure 10 is triggered on the map. The players should come up with an overall theme and fill this in on the scoresheet, which can be found on the map now. When close enough the players can push the icon of the scoresheet and then Figure 11 will pop up. Here the players should fill in the overall theme of the images in the challenge. When this is done correct the scoresheet opens up and can be picked up.

The players should then walk back to detective Bill. When they bump him a new button will be visible. The ‘game played?’-button. When this button is pushed a reward will be dropped on the map which the players can walk to and then pick up. This reward is a magnifying glass. Also the next icon for the storyline will be placed on the map. This is a piece of paper, but to unlock it something needs to be filled in on it. To discover what should be filled in on the piece of paper, the players should again go to detective Bill. A button with “here is a hint” is shown when detective Bill is bumped again. When the players push this button, a new icon will be placed on the map. This will result in the situation shown on Figure 12. This new icon can be tapped when close enough, which result in Figure 13. It’s a mysterious letter with a rebus puzzle in it, the answer from this puzzle should be filled in on the piece of paper. The answer of the rebus is ‘Go to the main entrance of the WKZ’ (in-game answer is Dutch). So now the player knows where to go next. To make sure the players follow a safe route, detective Bart is shown on the map. In the section ‘Route explanation’ the whole route can be found, as well as more elaborated explanations. The players should walk to him and trigger the conversation with him. When this is done detective Bart will say that they should go to the main entrance of the WKZ and also tell the players that they should buy a bag and shouldn’t tell anything to the stranger they encounter in the game.
When the players walk to the WKZ a reporter will pop up, followed by a conversation with multiple options. This can be seen in Figure 14. The options in answering vary from ‘Yes we can answer some questions’, which is followed by some in-depth questions from the reporter. To ‘No, we haven’t seen anything’, which immediately results in the ending of the conversations. When the conversation is ended, the bag seller will be placed on the map. This is near the WKZ and the next place the players should go to. The bag seller is thirsty and can give the players a free bag if they manage to get him a drink. So the players receive some money from the bag seller and the soda shop will be placed on the map where the players can buy a drink (Figure 15). At the soda shop the players can give the shop some money in return for a fresh soda. Then the players should return to the bag seller to trade the soda for a bag. When this is done, the items can be found in the inventory which is called ‘Voorwerp’ in the game.
As soon as the bag is in the inventory several items will pop-up at the map. These are mysterious items which the players should collect and investigate. The locations and items can be found in Figure 16.

![Figure 15: The thirsty bag seller, the location of the soda shop and the buy drink button at the soda shop.](image)

![Figure 16: The locations of the mysterious items. A stopwatch, a medicine list, a sports bag, a fruit basket and a sport shoe.](image)
In Figure 16, five items can be found. These items are a stopwatch, a medicine list, a sports bag, a fruit basket and a sport shoe. All of those items can be collected in the inventory. When all items are collected, detective Bill will show up and look at the items the players have collected. After a call he receives from a stranger about the reporter who is making an article about the disappearance of David Vondel, his advice the players to look in the inventory and take a closer look at the collected items (Figure 17). It turns out that the medicine list is suspicious to detective Bill. There is a button which makes it possible for the players to let detective have a closer look.

![Image of soda shop and buy drink button](Figure 17: Thirsty bag seller, the location of the soda shop and the 'buy drink' button at the soda shop.)

After the list is given to detective Bill he will advise the players to go to Doctor Sandra, so her location is marked on the map at that moment. When Doctor Sandra is triggered she will explain that she is able to help the players learn the encryption trick. In the third image of Figure 18 the challenge is explained, followed by a game of 'Rock, Paper, Scissor' to determine which player has to solve which code. After the encrypting the code the words need to be filled in. When filled in correct the next player can start encrypting.

The players can only pass this challenge by all solving one of the four puzzles. When this is done doctor Sandra will show up again. She will repeat the encrypted words, followed by a message in which she gives different options on what the words on the medicine list could mean.

After that she advises the players to search for the patient number on the medicine list and fill this in on the computer (Figure 19). Which is on the map after this message. The players should walk to the computer. But once there, they still need to find the patient number. So the players again should go to the inventory, look at the medicine list. The patient number can be found there in bold text. Next the players push the button 'return to map', which ensures that the player can trigger the computer next. After filling in the patient number the computer is unlocked.
After unlocking the computer detective Bart will show up once again. He will have a conversation with the players and with Doctor Sandra to discover to whom the patient number belongs. After this conversation, David Vondel the disappeared athlete, will show up on the map. But he won’t be as easy to walk to as the other agents. David Vondel is moving on the map, so the players now start in a ‘Chase & Catch’ challenge. As can been seen in Figure 20, David Vondel moves to another location every now and then. The players should walk to the location and try to catch David Vondel. The exclamation mark on the maps is the icon of David Vondel.
As soon as the players manage to catch David Vondel, a conversation with him will be started. In this conversation the players have numerous answering options. But they will need to answer all questions to get to know the whole story behind the strange disappearance of David Vondel. At the end David Vondel will explain why he disappeared and where the rumours came from. It turns out that David Vondel is chronically ill, he’ll explain some of his feelings regarding to this. This feelings are explained to give the players some understanding about being chronically ill. After this, David Vondel will congratulate and thank the players for helping solve the mystery and a final screen will be shown. At Figure 21 the conversation with David Vondel and the final screen are shown.

8 Route explanation
In every location-based game there is a certain area in which the game is played in the real world. Mostly there is also a specific route in this area that the game follows. In the case of the GameOlympics game this route is especially important. Due to the fact that the game is played by young children and that it is wished that these kids should be able to play the game without supervision of adults. The in-game routes in the real world environment must be safe and have certain restrictions in where players can come and where they can’t. The route in the GameOlympics game have been developed with help of a document about the ‘Child Health Campus’ (CHC). They are trying to create a safe child health area around the different hospital buildings. In this ‘campus’
children should be challenged to play. But most important it should provide some children-proof areas around the WKZ. In the CHC certain focus-areas around the hospital are pointed out. The selection of this areas are the first step in CHC being reality in the future. Some of those routes are implemented in the GameOlympics game. By doing this a first step in creating a safe, child-friendly environment has been taken hopefully. The routes of the CHC can be seen below in Figure 22.

![Figure 22: Child Health Campus, possible routes. The blue lines are the routes, the red figures are important places 'playing areas' in and around the campus. The grey boxes visualize the different routes and their phasing for starting of the CHC in the future. The orange oval visualize the buildings of the Fritz Redlschool.](image)

The routes that have been implemented in the GameOlympics Game are referred on the image as ‘fase 4’ and ‘fase 1’. The area boxed in ‘fase 4’ is almost completely in the game and used as an important area. The main reason for this area is because it is the closest to the Fritz Redlschool, the school which helps with testing the pilot of the game. The Fritz Redlschool is visualized by the orange oval.

Also ‘fase’ 1 is used in the GameOlympics game, but this area is not used completely. The main reason for this is that the children of the Fritz Redlschool, who are participating in the test of the game, aren’t allowed to go too far from the Fritz Redlschool. Despite the fact that during the testing of the game an adult will always will be going with a group of kids, the school still asked if the test could be as close as possible to their school. The part of the ‘fase 1’ area that is in the game can be seen on Figure 23, which shows the game play area of the GameOlympics game.

As shown in Figure 23, all agents are within the ‘fase 1’ and ‘fase 4’ routes of the CHC. The orange oval represents the Fritz Redlschool, which is where the game starts. Then the game area will shift into the ‘fase 4’ area, although not all of this area is used. Then next the game shifts towards the ‘fase 1’ area. This area is located around the WKZ hospital, which are the buildings shown in Figure 23. Most agents are located in the bottom of the ‘fase 1 area’, which actually is a lawn in front of an entrance of the WKZ. One agent, at the top, is located in the courtyard of the WKZ.

This route has been chosen because it is close to the starting point of the game, the Fritz Redlschool. This is needed because the testing of the game is been held with help of the Fritz Redlschool as said.
The other areas in the game, referred as ‘fase 1’ and ‘fase 4’, already provides some safe walking routes, they aren’t create specially for children, but are already safe enough to play a location-based game. Also the fact that these areas are stated as potential useful for the CHC makes it proper areas to locate and play the GameOlympics game.

For a clearer view of the precise route that the players will walk in the game, see Figure 24. The yellow circle shows the starting location of the game end the green circles are the areas where the game may end. Due to the fact that the last challenge is a ‘chase & catch’ game with David Vondel the precise finishing location can vary.

9 Testing the game

9.1 Testing partner
As mentioned before, the testing of the game will be conducted with help of the Fritz Redl school. The Fritz Redl school is a school for chronically ill children. The school is part of a bigger organisation, called the Fritz Redl Foundation, which focuses on mental health and wellbeing of chronically ill children. In the Fritz Redl school there are children from primary school age. Most kids have psychological illnesses, but there also children with more physical chronically illness. This school is especially good as partner for testing the game because the teachers have expertise in dealing with the chronically ill children. Also the chronically ill children, the target group for this game, are present. Those two points in combination with the presence of the WKZ hospital and the future development of the Child Health Campus makes that the Fritz Redl school is chosen as partner for testing the game. The Fritz Redl school have been approached with help of some experts who are part of the HPBC project.

9.2 Testing Method
The GameOlympics game has been tested with 6 children, divided into two groups. The game should be played in groups of 3 to 4 children. For the testing two iPads been arranged. An aspect to take into
consideration when using an iPad with the TaleBlazer application, is that the iPad should have GPS on it. Some tablets don’t have this. The iPad that is used in the testing has GPS and is fully loaded, to make sure the game can’t crash as result of an empty battery. Some iPads need a Wi-Fi connection to establish a proper GPS connection. To ensure this a phone that can act as a Wi-Fi hotspot is available during testing, to make sure the iPad’s work properly. See Figure 25 for a photo impression.

![Figure 25: Play testing with chronically ill children at the Fritz Redle school.](Image)

The game can also be tested with mobile phones, which is more realistic for the future. Also phones have better GPS than an iPad, but is harder to use in groups, because the screens might be too small for usage in groups. Also the testing group consists of children’s with psychic problems, which may result faster in aggression. To prevent discussions about that not all players can read what is on the phone, iPads are used.

On both the iPads the TaleBlazer application is installed and the GameOlympics game has been downloaded on beforehand. This should be done if there isn’t an internet connection available at the testing site. In this case the GameOlympics game has been downloaded on both devices to make sure no adversities with regards to the lack of internet can occur. But, in case there are problems with the GPS, a back-up phone that can act as hotspot is available.

Before the research, a permission form is sent to the parents of the children participating in the research. This has to be filled in and given back to the Fritz Redl school. When the children arrive at the Fritz Redl school, they will be informed about the testing of the game. They need to read and fill in a permission form in which they declare that they want to participate in the research. When this is filled in and the parents have given permission about the participation of their children with the research, they are allowed to participate. The children are be divided into two groups. Both groups receive an iPad to play the game with. During the test there will be four adults who can help the groups during playing. When the game is started the groups can start playing the game, walk the route, complete all
challenges, collect all items and solve the in-game mystery. When the game has been played the children’s are asked to fill in a questionnaire, which is filled in completely anonymous. The answers of the survey will form the results for the research afterwards.

10 Results

After conducting the pilot of the GameOlympics game, some results were derived from the survey the participants have filled in. In this section the overall pilot will be described, which includes stating what things occurred and what the results of the pilot are.

The pilot has been conducted by 6 participants, which all fall into the target group for this game, chronically ill children between the age of 10 and 12 years old. Two groups of 3 children have been made, both groups with two adult mentors. These mentors could assist the groups if necessary and ensured a safe game play. Despite the fact that the gameplay was adapted to the target group, by for example making the walking distances not longer than 5 minutes from each other, it couldn’t prevent that one participant dropped out of the pilot. So the results of this participant are left out of the results, because not all feedback was given back by this participant.

The iPads were connected to a mobile phone which acts as a Wi-Fi hotspot to ensure a proper GPS connection. Unfortunately, the navigation arrow wasn’t as accurate as hoped for. Despite this issue the game could still be played. The storyline and challenges were clear to the participants and no issues occurred regarding to this. This is also confirmed by the survey which the participants filled in. On the question ‘If you have to give a grade about the story of the game, what would it be?’, which could be answered on a 1 to 10 scale with 10 as the highest mark, an average of 8,8 and a standard deviation of 1,1402 was given. The lowest score was a 7 at this question. Also, the fact that users answered the question ‘What did you think of the assignments in the game?’ an average answer of 3,833 was given, which is somewhere between ‘neutral’ and ‘nice’ on a five-point Likert Scale, indicates that the challenges were liked by the participants. This, in combination with the fact that no issues occurred during the playing of the in-game challenges indicates that the challenges were clear to the participants.

Important thing to address here is that one of the participants filled in ‘not fun at all’, which may affect the average a lot. Due to the fact that the pilot was conducted with chronically ill children, which may act in a different way mentally due to mental disorders or aggression problems, this was a risk which could occur during the pilot. There also was an issue with one of the iPads during the pilot. The game had a death end on one of the iPads. Which is strange because both groups followed the same chronological story in the game and executed the same in-game actions. There might have gone something wrong during downloading the game in the TaleBlazer application on this iPad. What the exact problem was isn’t discovered, but strange fact is that the other iPad did work as it should be. Because of this problem the groups were joined together to ensure that all participants could proceed the game. From this point the participants played the game in one group and they managed to solve the in-game mystery. The game was played further as expected. With one group of five participants it was a bit harder for the participants to keep focussed during the remaining of the pilot. The mentors needed to pay more attention on keeping the participants focussed in the last stage of the pilot.

Despite of the issue as a result of the crashing of the game on one iPad, the pilot was conducted by 5 participants, who all filled in the questionnaire afterwards. The participants were also asked to fill in some open questions. On the question what participants think of the game in general one participant answered ‘I don’t like it that the groups had to join together due to technical issues’. This indicates that the technical issues might affected this
participant’s opinion on the game. However, the other players didn’t mentioned this issue as a problem, they answered the same questions with answers as ‘the game was fun the play and informative’, ‘The game was fun’ and ‘The story was good’. Another asked question was ‘Why is it enjoyable / not enjoyable to play this game with friends?’ answers as ‘It is enjoyable because you become smart of this game’ and ‘It is not enjoyable because it was cold outside and puzzles should be played inside’ were given.

![Figure 26: A five-point Likert Scale which shows how badly participants would recommend the game to others.](image)

Despite the technical issues the participants were enthusiastic about advising the GameOlympics game to others. Figure 26 shows that more than half of the participants would absolutely recommend the GameOlympics game to others, an average of 4 out of 5 and a standard deviation of 1.4 were the results of this question.

The initial goal of this research was to see whether a Location-Based game could enhance the feelings of social inclusion by chronically ill children. This is tested with the following hypothesis:

A location-based game can help chronically ill children enhance feelings of social inclusion and connectedness.

By conducting a descriptive analysis on the question ‘Do you feel more connected to your group members?’ with the answers on a five-point Likert scale (1= 'I feel much less connected' to 5= 'I feel much more connected'). An average of 4 out of 5 was given with a standard deviation of exactly 1. The lowest score at this question was 3 out of 5. This indicates that all players at least feel as connected as before with their group members and 3 out of 5 participants feel even more connected to their group members, they answered the question with a 4 or higher on the Likert scale.

A thing that wasn’t supported by the results, but was mentioned by the mentors during the pilot was that children love to work together and be challenged as a group, but some challenges were too elaborated or similar as other challenges. This resulted in the decreasing of attention of certain individuals.

An informal pilot was performed during the ‘Week of the Game’ at Utrecht University, 13 May 2019, see [https://www.uu.nl/en/events/games-and-lectures-during-week-of-the-game](https://www.uu.nl/en/events/games-and-lectures-during-week-of-the-game) for the
announcement, and https://www.rtvutrecht.nl/nieuws/1924273/ for reporting in the media. Twenty participants played the game, see Figure 27 for a photo impression.

![Figure 27: playing the GameOlympics LBG near Wilhelmina Child Hospital.](image)

### 11 Discussion

The research question to what extent can a location-based game help chronically ill children to feel more enhanced, has some conditions and limitations to it. To answer this question, these conditions and limitations need to be taken into account. An example of this, is the mental or social health of the participants who tested the game. How social included did they feel before the experiment? How is it known with certainty that it is the LBG that enhances the social inclusion and not something else? These things haven’t been taken into account during the testing of the game. Future research should consider these things when testing the game.

Another condition of this question is the answer you expect when answering this question. In this report it has been chosen to use ‘more connectedness with peers’ as proof for enhancement of social inclusion. But a questions remains how to proof that social inclusion is enhanced, what must be measured? This is something to take into consideration for future research, define the things that should be measured as clearly as possible and explain why these measurements proof that social inclusion is enhanced.

Some results of this research may have been different if technical issues didn’t occur. When both iPads would have worked as expected from beginning to ending, some results would have been more positive, because certain participants wouldn’t be able to mention the crashing of the iPad as a problem.

The results were measured with a questionnaire. Because the pilot was conducted with help of children, who also have a psychological chronically illness, makes it hard to estimate whether the results are completely valid. These children might react differently and more emotional on certain situations that peers who haven’t got a chronical disease. Therefore it is advised for future research that the game has more possibilities to measure certain things during gameplay, instead of with a questionnaire afterwards. The answers to questions which were about the beginning of the pilot could have been affected by situations which occurred later on in the pilot. However, in the research
time and resources of this project and the tool which was used, it wasn’t possible to implement such measuring’s or questions during gameplay.

This research was useful to create understanding in the development of location-based games for chronically ill children. The game shows that it is possible to make fun, enjoyable and informative experiences with and for chronically ill children between the ages of 10 to 12 years old. Especially when children of the target group age are asked to help thinking about specific themes or subject which could be interesting for the game. This, in combination with the fact that the game is tested afterwards with the target group, makes that certain insights from this research can be derived for future research. These insights are:

- Make sure that the target group is involved in the early stages of development process and afterwards. This ensures that something is developed which is actually wanted by the target group;
- Children love to work together and be challenged as a group, but don’t make these challenges to elaborated or similar as other challenges. This will lead to dropping out of focus of certain individuals. Make sure that the in-game challenges are surprising and fitting in the context.
- Make sure that players are always stimulated. One moment of decrease of focus during gameplay can affect the results of the whole gameplay afterwards. This is also supported by the fact that some participants had trouble staying focused after one of the iPads crashed.

Another thing to mention is that only 5 participants completed the pilot. This sample of the target group is too small to be used as a truth for all children within the target group. It is advised that future research within the context of this project should try to test with more participants and also try to research whether there are differences between chronically ill and non-chronically ill children. This would really prove whether chronically ill children are actually helped by a location-based game like the GameOlympics game.

12 Conclusion

Based on the results derived from the pilot the conclusion is that co-creating and play testing a location-based game can help chronically ill children enhancing the feelings of social inclusion and connectedness. It is not completely clear to what extend a LBG can help chronically ill children to feel more included, but that there is a positive influence of LBG’s on enhancing of social inclusion is clear. This is especially indicated by the fact that more than half of the participants feel more connected with their group members after playing the game. This indicates that the participants indeed connected more during playing the game. More connectedness is a great indicator of social inclusion. Because social inclusion is all about feeling connected to other humans and having social contact with them.

The fact that most participants did enjoy playing the game and were quite positive about the challenges, the storyline and the overall experience of playing the game, as mentioned in the results, also supports that the pilot was a success.

Despite of this, there were some issues during the pilot which may have affected the results a bit, for example the crashing of one of the iPads. The fact that the pilot was conducted with only six participants, with one dropout in an early stage whose feedback couldn’t be used due to the dropout and lacking of feedback, suggests that more testing must be done to really prove that location-based games could be a tool for enhancing social inclusion.
However, the participants were positive in general. If some technical issues are solved and more participants would test the game, it is expected that the same or even stronger proof is provided that location-based games, similar to the GameOlympics game, indeed can enhance social inclusion for chronically ill children from 10 to 12 years old.
References


Appendix A: Original Game Olympics Template

**Theme:** An "Olympics" theme is chosen, where people compete in different imaginary Olympic sports like "pavement walking", jogging, cycling, nature-gymnastics etc. and win trophies. Players can also submit their own sport ideas.

**Narrative:** You are challenged to enter your very own city Olympics where new missions are unlocked everyday along the Health and Fitness Route. With famous Olympians from your country as your coaches you will be training in various city-friendly Olympic sports like the pavement-gymnastics, the cycling-with-friends-tour and the grocery shop tennis.

**Game:** Each time you unlock a mission your coach will give you your goal, i.e. cycle with friends on the weekend and take a group picture. Upload the group picture to complete the Mission. Once you complete a mission you unlock a badge and with it comes the photo proof that you did it.

**Community:** Players can organize a neighborhood-Olympics day where they close the streets and play their own invented Olympic games.

### PREP WORK

Before developing content for your game follow the steps below to create a backstory and do some location research for your game.

<table>
<thead>
<tr>
<th>STEP</th>
<th>DESCRIPTION</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>WRITE A BACKSTORY</td>
<td>Having an overall backstory will help you create your narrative and characters later on. You can use the Olympic games theme as a starting point and then let your imagination go wild!</td>
</tr>
<tr>
<td>2.</td>
<td>FIND A LOCATION</td>
<td>Identify a minimum of ten spots along the Health and Fitness Route where people can sign up for challenges.</td>
</tr>
<tr>
<td>3.</td>
<td>BRAINSTORM</td>
<td>Gather everyone on your team to brainstorm Olympic game ideas that match your location and backstory!</td>
</tr>
<tr>
<td>4.</td>
<td>CHOOSE TRAINERS</td>
<td></td>
</tr>
<tr>
<td>You will want to choose some characters to be the trainers in the app. These characters will give players directions for the Olympic games you invented and some words of encouragement.</td>
<td>You can choose as trainers anyone from a famous athlete like Serena Williams, to an ancient figure like Hercules, to a local hero in your neighbourhood.</td>
<td></td>
</tr>
<tr>
<td>---</td>
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</tbody>
</table>
| **STEP 5: CHOOSE A PLATFORM**  
We recommend the enigmapp platform, open up the app and play some games to familiarize yourself with it. | **EXAMPLES:**  
http://www.enigmapp.fr/game/view/189/SKEDU8Y4 |
| **GAME DESIGN**  
Now it’s time to make your game! Just use your prep work and your imagination to fill in each of the boxes below. |  |
| **GAME DESCRIPTION**  
This is what players will see when choosing the game on the Enigmapp Platform | **EXAMPLE:**  
We’re calling all local athletes to join the 2018 Olympics Games of our neighbourhood. All you need is your phone and some comfortable clothes. Ready to join? |
| **GOAL**  
Identify a clear goal for your game and how you win. | **EXAMPLE:**  
Your goal is to complete in 10 Olympic sports within the app. For every Olympic sport you complete you unlock a trophy. Collect 10 and you become a local Olympian. Are you ready to take the Gold Medal home?! |
| **RULES**  
What players can and cannot do. How the game works. | **EXAMPLE:**  
- To complete a sport you have to take a photo or video of you doing it.  
- For each sport you complete you win a trophy.  
- If you submit your own sport ideas to the community you win extra trophies.  
- Complete a set number of sports i.e. 10 and unlock the Olympian status and the golden medal. |
- Every month there is a new challenge with new sports, so you will have to keep on training to keep your Olympian status.

**SPORT CHALLENGES**

**EXAMPLE:**
- Bench tennis: compete with someone else on a tennis match played over a bench. Record a video to complete the challenge.
- Pedestrian Obstacle course: Run a suggested route while avoiding pedestrians, street lamps, trees or other obstacles. Take a photo of the starting point and the end point to complete the challenge.
- Tree Gymnastics: Find a tree and do 100 jumps, 50 Hula hoop spins and 50 jumping rope jumps. Take a short video of you to complete the challenge.

**TRAINER DIALOGUES**

What your non player characters will say.

**EXAMPLE:**
Once you have chosen characters from your prep work steps, then use their voice and style to write fun and encouraging dialogues i.e. "Hello future Olympian, this is Hercules speaking, I just got out of this crazy fight with a monster whose heads I just couldn’t cut off. What a day! I bet you had a long day too- but nothing than can keep us from training together, ready for your new sport?"

**GAME ASSETS**

The images and art for your game.

**EXAMPLE:**
If you have an illustrator on your team it would be fun to draw images for the trainers and for each sport. Otherwise just use photos you find online to make the assets.

**PLAYTEST**

Once you have a first version of your game make sure to playtest it with your friends to see what works and what doesn’t, and how to improve it.

*Table 2: The initial version of the GameOlympics Template.*
Appendix B: Expert interviews

In this section the questions asked to the experts are given. The questions have been translated into English for this report. Not all questions have been asked to all experts, because the questions which matched the most with the expert’s domain of interest were picked out.

Interview questions

1. What is your specialisation?
2. For which target group would a LBG be suitable?
3. For what age group would a LBG be suitable?
4. What are the functional/mental limitations of these kids in the areas of:
   a. Their specific disease
   b. Knowledge
   c. Motivation or rule of parents
   d. Technical
      i. Does these children have a smart phone
5. If the earlier described target group is chosen, what would be wished goals that should be achieved with the game?
   a. Physical activity?
   b. Discovering?
   c. Contact with non-ill children?
   d. Contact with other ill children?
   e. Achieving knowledge of their disease?
   f. Handling stress (coping)?
6. Based on this goal, what outcome measure would be good to measure?
   a. How would this connect to the Game Olympics template?
7. The subject of the game isn’t settled yet. Do you have specific ideas for a theme or subject for the game?
8. Do you think that a game with interactivity from the game itself is enough or should the player be able to upload images or videos themselves?
9. Should there be accompaniment during game play, or should the game be designed in such way that children could play it without supervising of others?
10. Are there safety issues, like traffic of limitations due to the disease, which needed to take into account during game design?
11. When the game is designed and tested, what are the borders for measurement of the experiment?
12. When the game is designed, is it possible to test the game with children or is it advised to test the game with independent adults?
13. What would be a good way to measure information during testing of the game?
14. To what extend can testing the game with children be a problem with regards to privacy issues?
15. Are there any things which you want to address?
16. Can I contact you in the future if I have other questions?
17. Which clinical area do you think it is good to focus on, or is a general approach better?
18. What do you think would be a good location for the game? What role can the Child Health Campus play in this project?
Appendix C: Questionnaire

Below, the questionnaire questions are stated. Questions have been asked in Dutch, but English translations are stated below each question. Answers of the most important questions have been implemented in the results section.

1. Wat vond je van de game, en waarom?
Wat did you think of the game, and why? (Bad, average, neutral, fun, really enjoyable)

Slecht     Matig     Neutraal     Leuk     Heel Leuk

Omdat: ·

2. Hoe heb je het spelen van de game ervaren, en waarom?
How did you experienced playing the game, and why? (Bad, average, neutral, fun, really enjoyable)

Slecht     Matig     Neutraal     Leuk     Heel Leuk

Omdat:

3. Hoe leuk is deze game om met vrienden/vriendinnetjes te spelen, en waarom?
How fun is it to play this game with friends, and why? (NOT fun at ALL, average, neutral, fun, really enjoyable)

Niet leuk     Matig     Neutraal     Leuk     Heel Leuk

Omdat:

4. Hoe vond je het dat jullie moesten samenwerken in je groepje?
How did you like the fact that you should cooperate with your group? (NOT fun at ALL, average, neutral, fun, really enjoyable)

Niet leuk     Matig     Neutraal     Leuk     Heel Leuk

Omdat:

5. Hoe verliep de samenwerking tijdens de opdrachtjes?
How did the collaboration go during the challenges? (Bad, average, neutral, fine, really good)

Slecht     Matig     Neutraal     Prima     Heel goed

6. Wat vond je van de opdrachtjes in de game, zoals het raden van de woorden en de cijfer-letter puzzels?
What did you like about the challenges in the game, like guessing the words and the number-letter puzzle? (Not fun at all, average, neutral, fun, really enjoyable)

Niet leuk     Matig     Neutraal     Leuk     Heel Leuk

7. Wat vond je de leukste opdracht?
What was the best challenge according to you?
8. Wat vond je de stomste opdracht?
What was the worst challenge according to you?

9. Heb je nog andere ideeën voor zulke opdrachtjes?
Do you have other ideas for such challenges?

10. Kun je kort opschrijven wat volgens jou het verhaal van de game was?
Can you shortly describe what, according to you, the narrative in the game was about?

11. Wat vond je van het verhaal in van de game?
What did you think about the story in the game? (Not fun at all, average, neutral, fun, really enjoyable)

   Niet leuk    Matig    Neutraal    Leuk    Heel Leuk
   1           2          3             4            5

12. Welke dingen vond je goed aan de game en wat kan er beter?
What things did you like about the game and what could be improved of the game?

13. Als je een cijfer moet geven over de samenwerking met je groep wat zou dit dan zijn, en waarom?
If you have to give a grade about the cooperation with your group, what would it be, and why?

   1   2   3   4   5
   6   7   8   9  10

14. Als je een cijfer moet geven over het verhaal van de game wat zou dit dan zijn, en waarom?
If you have to give a grade about the story of the game, what would it be, and why?

   1   2   3   4   5
   6   7   8   9  10

15. Kruis het cijfer aan. Geef een cijfer over hoe graag je dit spel nog eens zou willen spelen. (1= nooit meer, 5= heel graag)
Tick the number. Give a grade about how much you would like to play this game again. (1 = never again, 5 = very much like)

   1   2   3   4   5

16. Kruis het cijfer aan. Geef een cijfer over hoe erg je dit spel zou aanraden aan anderen. (1= nooit, 5= absoluut)
Tick the number. Give a grade about how bad you would recommend this game to others. (1 = never, 5 = absolute)

   1   2   3   4   5
17. Voel je je meer verbonden met je groepsgenoten?
Do you feel more connected to your group members? (I feel Much less connected, I feel a bit less connected, I feel equally connected, I feel a bit more connected, and I feel much more connected)

<table>
<thead>
<tr>
<th>Veel minder</th>
<th>Beetje minder</th>
<th>Evenveel</th>
<th>Beetje meer</th>
<th>heel meer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absoluut niet</td>
<td>Denk het niet</td>
<td>Weet ik niet</td>
<td>Misschien wel</td>
<td>Absoluut wel</td>
</tr>
</tbody>
</table>

18. Denk je dat als je zulke spellen vaker speelt dat je dan nieuwe vriendjes kan maken? Do you think that if you play such games more often, you can make new friends? (Absolutely not, I don’t think so, I don’t know, Maybe, Absolutely yes)

19. Welke dingen zouden volgens jou het spel leuker kunnen maken? Denk aan opdrachten, routes, puzzels, alles mag!
Which things do you think could make the game more fun? Think of assignments, routes, puzzles, everything is allowed.
Appendix D: Game Installation

The GameOlympics game is a game in the social health context. Its main goal is to enhance feelings of social inclusion for chronical ill children. The game was developed with the TaleBlazer software platform. To play the game some steps need to be taken beforehand.

**Instructions:**

2. Open the TaleBlazer application.
3. Go to the ‘menu button’ at the top-right corner in the application.
4. Next go to the tab ‘Game Code’.
5. Fill in the following code: **gvtemut**.
6. After this, the game can be downloaded and played. See the Figure for a visual explanation for where to find the above.

**Make sure:**

- That the game is downloaded while connected to Wi-Fi. When the game is downloaded it can be played offline on location;
- Your GPS on your mobile device is turned on;
- Your battery is full, the game can take some battery of your phone.