### DELIVERABLE D1.4

**Annual reports on user requirements and specification**

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Declaration by the scientific representative of the project coordinator

I, as scientific representative of the coordinator of this project and in line with the obligations as stated in Article II.2.3 of the Grant Agreement declare that:

- The attached report represents an accurate description of the work carried out in this project for this reporting period;
- The project (tick as appropriate):
  - ■ has fully achieved its objectives and technical goals for the period;
  - □ has achieved most of its objectives and technical goals for the period with relatively minor deviations;
  - □ has failed to achieve critical objectives and/or is not at all on schedule

### ACHIEVED OBJECTIVES

Annual reports on user requirements and specification, presenting an updated functional, technical and content guidelines - ACHIEVED

### NOT ACHIEVED OBJECTIVES

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Name of scientific representative of the Coordinator:

*Björn Schuller*

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1. Introduction

The aim of the ASC-Inclusion project is to develop an online virtual environment (VE) for children with ASC, to teach them about the recognition and expression of emotions. The virtual environment will provide a platform for social skills training and social interaction for children with ASC. This platform will provide emotion recognition training through games and interactive tutorials using video and audio clips, and also emotional expression training and feedback through analysis of users’ gestures, facial and vocal expressions using standard microphone and webcam.

The objectives of work package 1 -‘user requirements & specification’ have been to a) identify the needs of our target audience and b) to define the user experience by creating user scenarios of how the end user will interact with the system. An on-going iterative process has been adopted in achieving these objectives. This user-centric design means that at each stage of the platform development the end users will be consulted and the necessary refinements implemented to continuously meet the needs of the target audience. This process has not only helped define the user requirements of the proposed virtual environment ensuring that we are always meeting the needs of our end users, but also formed an integral part of the process of identifying and defining content for the platform (WP6), designing the evaluation of the platform (WP7), as well as informing the design of the overall system and prototypes (WP 2, 3, 4 & 5).

This annual report on user requirements will summarise the work carried out as part of work package 1 – user requirements and specification. The next phase of tasks to be completed as part of user requirements and specification will also be outlined.

2. Identify the target audience needs

The first objective of work package 1 – user requirements & specification – has been to identify the needs and capabilities of the end users of the online platform. Data about our end users has been collected from four sources:

1) Review of academic literature and current market products.
2) Focus groups & meetings with ASC children and their families.
3) Specialists’ focus groups.
4) An online international survey (on-going).

2.1 Review of academic literature and current market products.

The first task of the clinical teams was to examine past literature on children with ASC to gain a greater insight into the social, cognitive and behavioural abilities of these potential end users. This allowed us to identify those areas in which children with ASC demonstrate impairments but also areas of strength which can be capitalised upon in the development of this online training tool.

Previous literature reports social communication difficulties in individuals with ASC. Problems in identifying and understanding feelings, emotional expressions and mental states of others underlie these social communication impairments (American Psychiatric Association, 1994). These social communication impairments often
appear along with enhanced abilities in other non-social areas. Individuals with ASC often have superior abilities in systemizing (Baron-Cohen et al, 2002). Systematizing is the ability to comprehend and manipulate closed, rule-based, predictable systems. Computer environments are one such system which are rule-based and predictable, and are appealing to those with ASC.

To capitalise on these enhanced systemizing skills in individuals with ASC, the content and functionality of the platform will be designed in a systematic manner. This will make the platform more intuitive to use and appealing to our users. Also adapting this systematic design concept will aid in the pedagogical design of the social emotion information which can then be presented in a format that is more easily assimilated by children with ASC, and which ultimately will make the platform more effective in its ultimate goal - an effective training tool which improves social-emotional skills in children with ASC.

Not only was scientific literature on the cognitive and social abilities of children with ASC been reviewed but also scientific literature on previous technologies that have proven effective in enhancing social emotional skills in children with ASC, as well as current market products aimed at this population. The aim of these reviews has been to determine what has made these products effective in terms of the presentation of learning material both visually and structurally. Reviewing current market products has also helped to identify tools, functions, concepts and games commonly seen in virtual environments that are appealing to children that could be incorporated into the ASC-Inclusion platform. For example it was found that interactive avatars and user communication tools are common functions in virtual environments.

The effectiveness of the Mind Reading DVD as an intervention [Golan & Baron-Cohen, 2006] and The Transporters DVD [Golan et al, 2010] were reviewed for this purpose. The results from these studies, in particular the effectiveness of the Transporters DVD, in improving the ability of children with ASC to recognize a range of emotions permitted identification of a method through which learning material can be presented in an engaging manner. The concept behind The Transporters DVD was to capitalize on the enhanced systemizing skills seen in individuals with ASC to aid their learning and engagement with emotional information so as to improve social-communication skills and interaction. See Deliverable D1.1 – ‘Initial report and analysis on user requirements and specification’ for further information.

2.2 Focus groups & meetings with ASC children and their families

Over the past 12 months a number of user focus groups have been carried out with ASC children and their families by the clinical teams from Karolinska Institute and Bar Ilan University. These focus groups have focused on high-functioning children with ASC (average range of intelligence). The purpose of these focus groups’ is to provide qualitative feedback which will help specify the user requirements and to design accordingly the computerized therapeutic intervention. The majority of these focus groups have used pre-existing virtual environments during these sessions to gather information from the children about aspects they like and dislike as well as to examine how they interact and how well they can operate the virtual environment. The main purpose and findings of each of these focus groups will be outlined below.

2.2.1 Focus Group 1 – Bar Ilan University

The first focus group carried out by Bar Ilan clinical team involved presenting a pre-existing virtual environment, ‘Zigazu’ (Zigazu.com) to a group of children with ASC. The aim the focus group was to gain an understanding of the children’s impressions
of this virtual environment (VE). Specifically the team wanted to investigate the children’s emotional reactions to the VE, their cognitive comprehension of a virtual environment and to examine behaviourally how the children would operate and interact within the VE. Nine children took part in this evaluation (8 boys, Mean age=8.33, SD=2.19). All the children were previously diagnosed with high functioning autism or Asperger’s syndrome by a trained clinician, and they were all verbally fluent.

A 2-hour meeting with each child and his/her parents was held. This meeting involved observation of the child using the VE in free-play & directed play, followed by an interview with the child. The feedback from this focus group session found that overall children had a positive attitude to the VE and quickly began to independently explore the environment but a couple of younger children needed encouragement to begin playing with an unfamiliar game.

The child’s understanding of the VE was noted through their ability to navigate in the VE, use the VE toolbar (availability of different functions), alter the difficulty level, and explore hot-spots which produce animations, track their score and use the helper. The majority of children independently were able to change settings/alter functions as detailed above, while just a small number needed additional instruction. In terms of the cognitive understanding and behavioural abilities of the children, overall the children could operate and navigate around the environment independently and learned easily how to change settings and use the different functions available.

Throughout this session the clinical team noted that the use of a specific plot/mission in guiding the child’s interaction was desired and liked by a lot of the children. However the description of the plot needed to be shortened. Based on these results a plot/mission has been designed for the ASC-Inclusion VE. The narrative of the virtual world will be a research camp, where the child is part of a research team studying human behavior. Each learning unit will be broken into a short lesson, and each will take the form of a “research mission” session. For each mission the child will be assigned with, he/she will be presented with a short “ briefing” that will convey the lesson material. The “mission briefing” will take the form of an interactive presentation, in order to maintain the child’s attention and interest. Games especially designed to train the child on the learned material will be presented to him/her as a mission throughout the learning unit.

Different games were also presented to the children during this session to gather feedback on those games the children liked the most. The drawing game, the Pet game which involves a pet fish that the child must nurture and create your own avatar was reported as the most popular games. An avatar character is a common feature of VE’s and will also be include in the ASC-Inclusion VE. The child will be able to design their own avatar, and this avatar will have an active role in the VE.

The ability to change the difficulty level of games was also an important feature. To accommodate the range of abilities in our proposed end users, the VE will have different levels of difficulty which the child can switch between. See Deliverable D1.2 – ‘Second phase report and analysis on user requirements and specification’ for further information on the results of this focus group.
2.2.2 Focus Group 2 – Bar Ilan University
The children were asked to continue playing in the virtual environment ‘Zigazu’ for 1 month following focus group 1. This allowed the clinical team to examine the children’s impressions of the VE after this extend time playing in focus group 2. Another aim of this focus group was to investigate the children’s emotional reactions to the VE, their cognitive comprehension of the virtual environment and to examine behaviourally how they interacted within the VE. A further purpose was to observe the child’s play in pre-selected games representing different game genres to further specify the user-requirements. It also allowed the clinical team to collect further information on the challenges and preferences of the children towards the different games. The children were also introduced to another VE in this session – ‘Mikmak’ (http://www.mikmak.co.il/).

Eleven children took part in this second focus group (10 boys, Mean age=7.92, SD=1.77). Again all children were diagnosed with an autism spectrum condition by trained clinicians and were verbally fluent. The session lasted two hours and involved observation of the child during free play with each of the VEs, Zigazu and Mikmak. Each VE free play session was proceeded by a short interview. Each child also had 30 minutes of directed play in pre-selected games representing different game genres.

The result from the 2nd focus group showed that the children maintained their positive attitudes towards the VE, continued to use it and did not have difficulty operating the VE independently. Games such as drawing, strategy based games and the ‘Pet’ game, were found to be most popular. The children also liked the ‘messenger’ type tool where by they can communicate with other children playing in the VE. The children also enjoyed the virtual home and avatar. As a whole the children enjoyed the VE Zigazu. Feedback from children suggested they would like more choice and freedom to design and interact in the VE environment for applications and games.
such as the virtual home, Avatar and the pet. It was also suggested to have more variety in the rewards that the children could win.

The children were then introduced to the new VE - Mikmak. The children showed a positive reaction to this new VE and appeared to enjoy playing in this environment. In particular the active avatars were liked by a number of children as well as the rewards they earned for achievements. Startegy, riddle and arcade type games were preferred by the children in this VE. Also the helper in Mikmak was text help rather than audio help as in Zigazu and the children noted that they preferred the audio help. Further details of this focus group are available in deliverable [D1.3].

The results of the 2 focus groups showed that overall the children found the two VE’s easy to understand and to operate. Elements of the VE which the child could design or interact with seemed particularly popular. These focus groups also provided valuable information on the types of games children with ASC enjoy, with a particular preference for logic, strategy and thought games. The results from the focus groups have also helped to identify and define the preferences of this user group in terms of content, functionality and visual design of the VE.

2.2.3 Focus Group 3 – Bar ilan

The main objective of this session was to present a newly designed virtual environment (VE) to a group of ASC children in order to gain feedback about the theme and the games.

Firstly the team wanted to know the children’s opinion and understanding of the theme of the virtual environment – a research camp. Overall the children liked the theme but a few children had difficulty understanding this theme and needed additional explanation from the examiner.

The children were then asked about their understanding of a researcher, as this was the concept for the avatar, and what gadgets a researcher may have. Children were allowed to make up their own gadgets as well as suggest already existing ones. Only one child was unfamiliar of the concept of a researcher. The most common definition given by the children was "a researcher is someone who researches different things". Some children gave more detailed descriptions, for example “a researcher is someone who gets information about something and reveals stuff about it” and “a researcher is someone who tries to discover something new or one who tries to decipher a mystery”.

The children also listed the types of tools researchers use. The following real gadgets were mentioned by children with the number who said the gadget in brackets: magnifying glass (12); microscope (4); telescope (2); binoculars (1); camera (1); eye/finger scanner (3); laser pen to cut things (1). The following invented gadgets were suggested by children: Machine/helmet of thoughts (3) – a machine that scans the thoughts of people and helps the researcher to better understand how to behave in different situations; translation machine (3) - a machine which help the researcher better understand the situation; time machine (2); helper (3); guide (2); freeze machine (1) - freezing the screen and the characters so the researcher has more time to decide what he should do in different situations. This feedback was helpful for thinking about functions and tools to include in the virtual environment and that can be incorporated into games.

Children were asked about their opinion of the jungle surroundings in the VE and of the new full-body avatar. The children had a positive attitude towards the jungle and
some were even excited. They had a strong connection to the concept of a jungle/animals etc. All the children loved the new full-body avatar and were excited about the opportunity to buy accessories.

Three games were presented to the children: a memory game, a matching voice to face game and “mahjong”. The overall view was that the games were too easy and led the children to become bored quickly. One child said he preferred animated characters to real ones. The matching face to voice game was the favourite but the feedback the game gave for incorrect answers did not help the children learn. The children didn’t like the voice of the narrator in the memory game, and it was suggested that the game could be created to teach the concept of changing emotions rather than one emotion at one time and a different emotion at a different time. Parents also noted that it would be better to pause on a specific expression that represents a specific emotion, rather than a natural expression as in the current version of the game. The Mahjong game was said to be very visually loaded. 2 children said this was their favourite game, but these were the only 2 children in the group to say they liked it. The feedback on the games was helpful to think about how to present the material differently and how to design the feedback and reinforcements.

2.2.4 Focus Group 4 – Bar Ilan
The aim of the last focus group carried out by Bar Ilan was to (1) confirm if the type of content (social scenes, short stories) we intended to create/film for the platform was understandable to children, (2) to get ideas for social scenes that are part of the children’s world, and to test if they matched those created by the ASC-Inclusion team’s scenes, (3) to make sure they could understand and could give judgments of people’s feelings and thoughts just from verbal descriptions, to see if this is a another possible mode of games design and (4) to examine the children’s ability to sustain attention to emotion tasks and their ability to complete tasks these tasks successfully.

In the first task, children were asked to invent their own situational scenes or sentences for each emotion. Games were used when necessary to make the task more fun. Some of the children (3) refused to cooperate or partially cooperated in the first task, while the remaining children (6) had no problem with this task. The sentences and scenes produced by the ASC-Inclusion’s team were found to be very similar to those produced by the children. Also the children could understand the social scenes and stories written by the ASC-Inclusion team.

In the second task, children were presented with pre-written scenes by Compedia and asked questions about the emotions involved in each scene, for example “how is mom feeling? a) happy, b) sad, c) angry”. The children could understand verbal descriptions of emotions in this task. The children (all but 1) were found to be able to sustain attention during this task and were successful in answering most riddles (the largest number of wrong answers was 3 out of 11). It is recommended to either add face or voice recognition to this task or make the situations more complex in order to make the task more challenging as using context alone to detect emotion was too easy for these children.

The results and feedback from this focus group are important as it is necessary to understand the cognitive capabilities and limits of our users, such as the ability to sustain attention. The results are also helpful in thinking about how to set up emotional tasks with the right level of difficulty.
2.2.5 Focus Group 1 – Karolinska Institute
Three focus groups have been carried out by Karolinska Institute. The purpose of the focus groups was to provide qualitative feedback regarding games, game concepts, design, and user behaviour. The results of which have helped identify game concepts appealing to children with ASC, to specify the user requirements and to help inform the design of the computerized therapeutic intervention tool. The focus groups took place in school and some in the child’s home. The focus groups consisted of a total of 13 children aged 5-11 years with a diagnosis of autism spectrum condition.

The purpose of the first focus group was for the examiners to introduce themselves to the children, to assess the children’s level of cognitive functioning and to gather information on the types of games they liked to play and how often they played computer games. The children were told that their help was needed in developing a new computer game. The children were also given a brief introduction via a PC and projector of two existing virtual environments Zigazu (www.zigazu.com) and Tinkatolli (www.tinkatolli.me).

All children reported that they had a long and extensive experience in playing computer games, with the majority reporting daily usage. The children were very interested in the different games in Zigazu and the avatar character in Tinkatolli.

2.2.6 Focus Group 2 – Karolinska Institute
The purpose of the 2nd focus group was to evaluate 6 different games with the children. The children first played on each game for 5 minutes and afterwards they could pick their favourite game to play. The children were asked to rank the games in order of preference and also feedback was gathered on aspects they liked and disliked about each game.

The results of this focus group showed that the ‘Maze’ game was rated highest by the children. The game was easy to understand and to play and has a clear structure. Although the game was considered too easy by a few children, the examiners felt the maze game had a good game concept and could be adapted well to work with facial expression recognition. They advised that the game include better reinforcement/motivation such as scores and time limits to increase the difficulty.

The 2nd most popular game was the ice-cream shooting game. Again it was perceived as easy to play with a simple concept and instantly liked by the children. The examiners again recommend adapting this game for the ASC-Inclusion platform as it would be simple to ‘emotionalise’ the game and already included a discrimination task. This discrimination task could again be adapted to faces, the aim would be to shoot faces with the same facial expression as a target face.
Similarly to the design of the previous focus groups again children were presented with a number of computer games. The children were requested to play with each

2.2.7 Focus Group 3 - Karolinska Institute

Similarly to the design of the previous focus groups again children were presented with a number of computer games. The children were requested to play with each
game for a specified time followed by a play period in each they could choose their favourite game to play. The children were asked to rank the games in order of preference and feedback was gathered on aspects they liked and disliked about each game.

In this focus group ‘Tinkatolli’ ([https://www.tinkatolli.me/](https://www.tinkatolli.me/)) was rated favourite by the children. In Tinkatolli each child is represented in the VE through an avatar character, the other avatars in the VE are their classroom friends, and the children can send messages to one another. However when the children were first began playing with this game they found it confusing and many of the children had questions about what was appearing on the screen. The examiners felt the game was too complicated for the children. When the children were allowed to choose their favourite game to play at the end of the session, all the children surprisingly choose Tinkatolli. The children realized on this second encounter that the avatar characters on the screen were other children in their class. The children were very excited about this and instantly began communicating with one another both virtually within the game and across the class room.

Overall it was found that the children very much liked and enjoyed Tinkatolli. The VE also promoted and prompted social interaction and has a therapeutic benefit as the children initiated play and social contact with the other children in the virtual world. However it took some time for the children to gain an understanding of the concept of the VE and insight into the fact that the other avatars in the environment were their classroom friends, and graphically it was judged over stimulating.

The examiners recommended that due to the fact that this game encouraged and motivated the children to interact socially it should be adapted in a simpler version for the ASC-Inclusion website. However given that the children did not easily assimilate the concept and purpose of the virtual environment and communication tool, it was recommended that an introduction be included in the ASC-Inclusion project to help explain the environment. A smart agent will be used for this purpose. The smart agent will act as a kind of help menu and audio clips will be used to guide the child.

The 2nd highest ranked game was ‘Snood’. This game caught the children’s interest but was too difficult for most of them. The examiners felt that as this game was visually appealing to the children that it could be adapted into a simpler version and ‘emotionalised’ easily.

The other 3 games presented during this focus group were all considered too easy and/or were difficult to ‘emotionalise’ and had a poor game concept that lacked reinforcement. The children commented that they did not like games where there seemed to be no purposeful end and with nothing to lose or win.
2.3 Specialists' focus groups

The first specialists' focus group which consisted of 5 psychologists who are experienced in working with children with ASD were recruited to provide feedback regarding the VE concept and implementation, as well as to highlight difficulties common to ASD children which may affect their ability to interact with the VE. A number of potential issues were highlighted by the group.

The first issue discussed was attention difficulties which are common in children with ASC and it was recommended that a target object produce constant motion on the screen to help the child remain focused. A high proportion of ASC children experience sensory-sensitivity and it was suggested that the visual display and richness of the visual environment be adjustable for children to choose the settings most suitable for them. It was also suggested that in order to increase the generalization of the emotion learning, not only structured emotion tasks but also emotionally eliciting events within the VE should be employed. Finally it was recommended to use reinforcements to enhance learning, so every time the child completes a difficult task they get rewarded. Further details of this specialists' focus group are available in deliverable [D1.2].

The second specialist panel meeting included a broader range of ASC specialists, in which in addition to the participation of 3 psychologists, two occupational therapists, two speech therapists, a behaviour therapist and a special education supervisor from the ministry of education also took part. The aim of this second session was to gain further feedback on the VE and the needs of children with ASC.
The session began with a short presentation of the Zigazu VE, and the panel was asked to comment on which elements and features they recommended and which might be challenging or disturbing for children with ASC. It was suggested to reduce the amount of choice and control as this might be confusing and challenging for younger users. It was also suggested that the rewards could be used to create a motivation to learn. However, the use of virtual coins as in Zigazu might not be suitable for young children with poor numerical abilities and may distract those with a fascination or preoccupation with numbers. Compedia mentioned that virtual money is a very common feature of VEs and that it is expected but that to take the recommendations into consideration the number of coins will be limited. It was also recommended that the VE included a lot of positive feedback and further ideas for generalization of learning were discussed. Further details of this focus group are available in deliverable [D1.3].

2.4 Online International Survey

A survey was created and sent to experts and opinion leaders in the field of Autism all over Europe. The objective of the survey is to have experts and opinion leaders input regarding the main issues in building an ICT tool for teaching children to recognize, understand, and express emotions. The aim is also to collect views from experts and opinion leaders about the basic concepts of the project, to better define user requirements. The data is still being collected and analysed.

3. Define the user experience by creating user scenarios

The findings and results from the review of the academic literature and current market products, the user focus groups and specialist focus groups have been translated into a user experience through the development of user scenarios or use cases. Essentially these user scenarios represent subsystem prototypes of the virtual environment. The previous activities outlined such as the user focus groups and review of literature has ensured that development of these user scenarios has been strongly user focused and permitted identification of the most popular elements which can be incorporated into the design.

The first set of user scenarios have been created and are currently being used to develop functioning subsystem prototypes. These user scenarios have been described in detail in deliverable D1.5: First Batch of Use Cases. These use cases or user scenarios will be briefly outlined here.

3.1 User Registration

For the child to use the virtual environment the child must first be registered by his/her parent. The stages involved in user registration will be kept minimal and no identifiable details about the child will be collected. Child registration will be done only by verified parents or therapists.

The parents will receive an email from the project team with a link to the registration page of the website. This will bring up a screen where the parent can set up their child’s account. The parent will be requested to enter their email address and select a password. The parent’s email address is the only identifying data that is entered during the registration process. The parent will then be requested to input basic information into the system, such as the gender of their child and their child’s date of birth. The parent will also be required to enter information about their child’s verbal
level, reading level and any sensory sensitivity; this will permit the system to modify
the presentation of the website to suit the child’s specific sensory requirements and
also to present an appropriate level of difficulty to match the child’s cognitive abilities.
This information will help to develop an initial user profile of the child. The parent will
be given a unique user code for their child when they first enter the system, and all
collected data will be associated with this code. The child will also be assigned with a
user name in order for the user interface to be child friendly.

The parent will be able to enter the project parent site. Here the parent can edit
details such as the email address used for contact. The parents can select to view
activity reports, these reports will summarise the child’s usage on the site, such as
type of games they play the most, how their learning is progressing and level
achieved.

3.2 Learning Unit
Children will have access to training material on 20 emotions and mental states. A
model teaching unit has been developed by the clinical teams which identifies the
essential information to be presented on each emotion. This model teaching unit
was developed by reviewing of a number of current market products teaching
emotion expression and recognition for ASC children, as well are reviewing scientific
evaluations of such products. This permitted identification of learning tools and the
associated lesson structure and presentation which produced improved emotion
recognition and general social behaviour in children with ASC. This information
formed a basis upon which we could begin to develop our own learning units. See
deliverable D1.5 for an example learning unit content.

3.3 Free Play
As part of the user focus groups the children were asked to engage in free-play using
pre-existing virtual environments such as Zigazu and Tinkatolli previously mentioned.
The primary purpose of the free-play was to observe how they navigate through the
VE and any issues associated with this. The results from the focus groups found that
the majority of children responded positively to the VE presented and began to
independently explore the environment. In the VE Zigazu, the children navigate using
a toolbar on the bottom of the screen; the majority of children understood the function of the toolbar and were able to explore the functions without assistance. The children knew how to activate hot spots of the VE which represent different subsystems such as ‘create your own avatar’. The children also knew how to activate the helper and track their score.

Based on these findings that navigational style of the ASC-Inclusion VE was designed. The toolbar will be visible on every screen of the VE. This will allow the child to navigate freely and quickly within the VE. The toolbar will consist of a number of small images (icons) which the child can select. Each icon will represent a different function. When the child scrolls over an image an audio sound will play which will tell the child the function of the icon.

Figure 3.2: Main Screen of ASC-Inclusion VE with toolbar

The main screen (see figure 3.2) displays a zoomed-out view of the rainforest. There will be images of different structures and animations placed throughout the rainforest. These images will function as hotspots. Every hotspot, when clicked will lead to an area on the camp. Some of these hot spots are outlined below.

1. The “Research Centre”
   A large tent with computers in it will navigate to the learning centre. Here the child will be assigned with “research missions” through which the learning material will be conveyed. They will have some games and interactive activities to train them in the learning material. This is how they will work their way through the different lessons in emotion recognition and expression.
2. Canoe station to the camp homes
An image of a canoe will bring the child to the camping area where they have their own personal homes. The child can design the interior of their homes. Other children’s homes and avatars will be visible within the camp area.
3. Recreation area
An image of a playground will navigate the child to the free games area of the VE. Different games can be accessed from here, some connected to the learning content, some for recreation and fun.

![Recreation area](image)

*Figure 3.5: Recreation area*

4. The “commercial area”
In this area the children will have the opportunity to use the virtual money they earn by playing and learning. The children will be able to enter some virtual stores and buy all sorts of virtual goods for their avatar, camp home, and interactive collections.
3.4 Designing of Avatar

Avatar and virtual home design is known to be one of the most powerful motivational factors in VE’s. Focus groups with ASC children were held to determine what aspects of the virtual environments they liked and disliked. The feedback from these focus groups indicated that the children liked having their own unique avatar character. In the VE Zigazu, the children liked that they could design their own Avatar, but suggested it should have a more active role within the virtual environment. Children also commented that they would like to be able to see the Avatars whole body and also select its clothes and have it present in the VE activities. In the VE Mikmak the children had active “walking avatars”.

Based on the focus group findings it was decided to include a whole body avatar the user can design in the planned VE, and to give it an active role throughout the VE activities. Since one of the focuses of the plan is emotional facial expressions, the avatars in the planned VE will be human, and bigger than standard avatars - so that their faces will be well visible. Children will be able to choose a facial expression to their avatar, and it will be visible to other children playing in the VE at the same time. They will be able to see the other children’s avatars’ facial expressions too.

4. Conclusions and self-analysis

The activities of the user requirements and specification carried out over the past 12 months such as reviewing current market products and user focus groups, have been vital in the development of the platform to date. It has helped to focus the design and development of the platform on the end user to ensure we continuously meet their needs and requirements. The spiral process between the activities and tasks of user
requirements and specification and other work packages such as content creation will continue in refining system prototypes and developing from a user centric perspective.

Reviewing the academic literature and current market products has permitted identification of methods in which teaching material can be presented in an effective and engaging manner to children, as well ideas of how to visually present the material. The Focus groups with ASC children and their families, as well as Specialists’ focus groups have been fundamental in understanding the interaction style and preferences of children with ASC when interacting in a virtual environment. The result and findings of the user requirements and specification activities has been used in the development of the first batch of use cases. These use cases outline the content of the VE and also how we envisage the child will interact with the system. These use cases form the bases from which to develop platform subsystems. Developing the platform from this user-centric perspective means that the user needs and requirements have been taken into consideration at an early stage, and when we go to functional prototype user testing, fewer system modifications will need to be made.

Future user focus groups will be carried out on subsystem prototypes of the ASC-Inclusion virtual environment; this is estimated to begin in January 2013. The second batch of ‘use cases’ are also currently being developed. This second batch of use cases will focus on the games of the VE. Again feedback from user focus groups will provide information that will input into their development.

6. References


