



Content scripts and good practice guideline publications (scripting, branching, simulations)

Project Acronym:	Ispectrum
Project Start Date:	1 st October 2010
Project Duration:	24-Months
Due date of Deliverable:	01.04.2011
Actual Submission Date:	06.07.2011
Name of Lead Beneficiary for this Deliverable:	Innovation in Learning Institute, Friedrich-Alexander-University (FAU) Erlangen-Nuremberg, Germany
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Executive Summary

In this report, content and design recommendations for the serious game of the ISpectrum were put together and the approach of searching for a suitable content and design is explained. The development of the game is based on a literature research about the use of serious games for people with ASD (Autistic Spectrum Disorders) and Asperger's disorder, interviews with advisory groups (persons who work with people with ASD), an online survey for potential users who rated the first drafts and experiences of the project team with serious games. Based on this, at the end of the report guidelines for the content and the design of the game are put together which help the developers with making the game.

1 Introduction

The ISpectrum project aims to improve the work based social skills and relevant work skills of people with high functioning ASD (Autistic Spectrum Disorders) and Asperger's disorder. This is done by creating a serious game for people with ASD that improves their social skills and skills needed in a work environment. ISpectrum also provides an e-learning course and live training for practitioners, trainers and support organisations about using virtual worlds for people with special needs. Furthermore a project website is developed, the serious game and the e-learning and live training material is tested and evaluated and the project is disseminated in all partner countries.

This report concentrates only on the development of game and tries to define a concept for the creation of the content and the design of the serious game. The development of the content is based on literature research about serious games and good practise examples and the use of online material for people with ASD. Out of this literature review, a needs analysis was conducted. For this analysis advisory groups in England and Germany were interviewed and an online survey where potential users and practitioners are asked to rate a first design of the game was done. Based on these results final content and design recommendations were put together and will form the basis for the development of the final ISpectrum serious game.

2 Aims of the game and target group

The project aims to improve the work based social interaction skills of people with ASD and Asperger's to increase their chances of gaining employment and increasing the numbers of employed people with ASD in the UK, Germany, Italy and Bulgaria.

ASD (Autistic Spectrum Disorders) and Asperger's are defined as "neurologic disorders involving serious impairment of abilities to interact and communicate socially, and repetitive and restricted interests and activities. Classic autism is at one end of the autism spectrum. This is associated with delayed or absent spoken language, and sometimes with cognitive delay. Asperger's Syndrome is at the other end of the autism spectrum. It is not associated with delayed language, cognitive development or self-help skills." (Ernsperger, in Simmons, 2006, p. 3). People with ASD usually also have difficulties in finding friends, understanding social rules and the use of language in a social appropriate way. Typically they have one or a few interests, activities or movements which they do repeatedly.

Asperger's Disorder was seen a long time as a mild form of Autism but is seen nowadays as a separate disorder. Whereas people with autism seen often not to be interested in other people, people with Asperger's Disorder often are and are willing to interact with other but do simply not know how because of a lack of understanding social rules and abstract concepts. People with Asperger's also often like to collect things or do know everything about a specific topic. One of the main differences is, that there is no speech delay in persons with Asperger's and no cognitive retardation. (Ernsperger, in Simmons, 2006)

At the moment it is estimated that there are over half a million people in the UK who are diagnosed with a form of ASD, that is according to the National Autistic Society (2010) 1 in 100 people. In the other countries, similar numbers exist. According to <http://www.wrongdiagnosis.com/> in Bulgaria there are at least 15,035 people with Autism and Asperger's syndrome. The unemployment rate among this people is higher than 90 %. In Germany epidemiological surveys assume that there are 15-20/10.000 persons with Autism in Germany (Bormann-Kischkel, 1999). Regarding to Asperger's Ehlers & Gilberg (1993) assume a prevalence of 7.1 per 1000 children aged between 7 and 16 years. Wolff (1995) includes in his calculation also milder and non-clinical forms of Asperger syndrome and assumes a prevalence of 2% for the German population. The proportion of girls to boys is stated as 1:3-4 for both Autism and Asperger syndrome (Frith, 1992).

It is also assumed that a lot of people are not aware that they are having a very mild form of ASD or Asperger's Disorder. So the estimated number of unreported cases might be even higher.

Few studies have focused on the integration of Autists / Aspergers in professional life (e.g. Dalferth, 1995). These showed that the peculiarities of autistic people in sheltered workshops especially occurred in situations of social contact. This comprehends simple social rules (e.g. eye-contact) as well as skills in the whole emotional spectrum. Furthermore autistic / Asperger persons usually had difficulties to adapt to frequent changes of their working

environment and to maintain their own way of organisation. Some showed difficulties with motorical coordination, whereby they could not be deployed at machines (Dalferth, 1995). The German Association for Autism in Germany (2008) states that trials in the past for education and deployment of persons with Autism usually have failed not because of a lack of motivation or professional qualification of the autists, but mainly because of a lack of social competence (which includes also a lack social skills of trainers and colleagues, who are inexperienced in the interaction with autists).

The aim of the ISpectrum game is to include not all people with ASD into the work field, but the game is only suitable for people with a high functioning form of ASD or with Asperger's Disorder, because it aims to include the participants into the general work market, where the ability to speak and a sufficient level of cognitive ability is obligatory. The target group are mainly young adults, who are searching a job and who are willing to work in a job on the general work market.

It seems that even of people with mild forms of ASD or Asperger's only a very limited number finds work on the general work market. It is the aim of the ISpectrum project to increase this number.

3 Literature Review: Why using a Serious Game for the ISpectrum project?

Serious Games can be defined as

“Any meaningful use of computerized game/game industry resources whose chief mission is not entertainment” (Ben Sawyer)

In general these are all games which do not focus on entertainment but intent to learn something meaningful to the user. Serious games can be split up in military games, government games, educational games, corporate games, and healthcare games. (Susi, Johanneson & Backlund, 2007).

Developing serious games seems to be very popular at the moment. But does it really have advantages for this project? Research indeed shows that people do not learn better with serious games, but that they can explain and use their new knowledge better after learning and practising it in a serious game (Aldrich, 2009). Also the transfer of learning is improved by not only reading or hearing about something but by practising it actively as it is usually done in a game (Kerres, 2009). Aside of these advantages, playing games is seen as the most natural form of learning, it does not need to be explained a lot, just by playing implicit

learning takes place. When a virtual environment is used which is as realistic as possible as in the ISpectrum game, the new knowledge is displayed in a useful context which helps to transfer the knowledge to the real world. Usually also emotions are created when a serious game is played, this is also helpful for transferring and remembering new knowledge. (Aldrich, 2004, 2009). Also serious gaming gives the opportunity to the user to act out new forms of behaviour in a safe environment without real consequences. Taken all this in account it seems very useful to offer a serious game for the ISpectrum purpose, as working tasks are something which is best learned with 'learning by doing'. That serious games are also suitable for persons with ASD and Asperger's syndrome is explained in the next chapter.

4 Serious Games for persons with ASD: Good practise experiences

Although a serious game who trains adults with ASD for social qualification in different job areas does not exist yet, there are some very positive experiences with computer games and learning in children with ASD and Asperger's syndrome. In a study of Tanaka et al. (2010) a game that trains facial recognition skills in children with ASD was tested. The children who played the game improved significantly more than the control group in facial recognition skills. Also in a research of Beaumont and Sofronoff (2008) children with Asperger's syndrome, who played a game called 'Junior Detective' that aims on decoding emotions and postures, improved in this area compared to a pre-test. When the game is realistic and people with ASD play with an Avatar, they use the avatar to express their own feelings and recognize the feelings of others and engage in role-playing (Moore, Cheng, McGrath & Powell, 2005). This is behaviour which is hard to train for people with ASD, but which can be practised more easily in a virtual environment.

Also in general the use of computers has a positive effect on social behaviour in children with ASD (Bernard-Optiz, Sriram & Nakhoda-Sapuan, 2001). Computers allow especially children with ASD to try out social interactions in a protected environment and give a clear structure with detailed instructions when needed. People even with severer forms of ASD seem to enjoy gaming and seem to learn quite easily from them, as an article on the website of the Autism support Network (2011) explains. For persons with very severe forms of ASD, the computer can also be used as a communication tool since a lot of persons with severe forms of ASD do not talk but do use computers to express themselves (Murray & Aspinall, 2006).

Children with ASD suggest that they would prefer a computer game with text, audio and rich visual effects like animations (Lehman, 1998). Shane and Albert (2008) discovered that adolescents with ASD would prefer animated programs compared to human characters to play with. The reason animated characters are favoured is, that these characters can often be changed and adapted (colour of the hair, sex, cloth) and this is important to people with ASD because they want that their Avatar looks like themselves to identify themselves with the Avatar.

Other important things that should be taken into account for the game are based on website design for people with ASD. These design recommendations follow the SPELL approach (The National Autistic Society, 2010). This approach stands for a clear, logical structure, a positive reflection of ASD, an empathic approach, low arousal with not too much images and animations and external links to other areas. For the serious game this means, that important information should be given in extra textboxes which are not interrupted by animations, a very clear structure that help the learner to orientate in the game, not too much arousal (e.g. possibility to switch of the tone etc.) and a clear design of the virtual environment. The characters should be realistic, but not with pictures but more like Avatars when some characteristics can be customized. The environment should be very realistic to enhance identification with reality.

It seems that computer games and general are liked and often played by persons with ASD and that serious games offer a great opportunity to actually change and improve social skills and that computer based games do offer some advantages compared to regular training material. When some considerations are taken into account, it seems the right decision to create a serious game for our aims in the ISpectrum project.

Based on this considerations mock-up scenarios for one game environment (the office setting) were developed and included in a survey. These mock-ups and ideas were rated by potential users and experts from advisory groups and give a better understanding into the needs of persons with ASD. The results of these findings are summed up in the next chapter.

5 Conclusions from the need analysis

5.1 Conclusions from the advisory group meetings

During the first month of the project, three advisory group meetings were organised; one in the UK and two in Germany. During the first meeting in the UK, women who work with adults with ASD and Asperger's syndrome and who are trying to find work for them were interviewed about the general differences between persons with ASD and people without

these syndromes. This was very helpful to the project group because it gave a better insight in the problems people with ASD face. After this meeting and the literature research, some mock-ups for one of the game scenarios (the office scenario) were designed. Picture 1 is one of the pictures of the mock-ups which was used for the needs analysis and gives an impression of the game scenario.



Picture 1: The office in the office scenario game

In the first meeting in Germany, practitioners rated the mock-ups and commented on the ideas for the games. They really liked the design and ideas of the game and gave feedback on additional options for the game like the possibility to arrange things on your desk, to have a place to relax, to add telephone training and learn social rules like knocking on doors when you want to go in. They also explained what kind of social misunderstandings can happen when somebody with ASD starts to work in an office like the misinterpretation of tasks or facial expressions. They also commented that the three job areas should include an outside job area like gardening, because this is really liked by people with ASD. They agreed that in total three areas will be best: an office work place, a job environment in the retail area and an outdoor job (maybe gardening). Also the idea of a virtual job centre where you can practise your interview skills was favoured by the advisory group.

This was again very helpful and gave the project team the feeling that they were on the right way in the game development. A second meeting in Germany took place together with the whole consortium. Also a potential user with Asperger's syndrome was attending and gave useful tips like what she wished to earn after finishing a level of the game, what kind of Avatar she would like and what kind of mini games would be useful in the game. These recommendations will be taken into account when designing the game.

5.2 Conclusions from the online survey

Also an online survey took place in April in all four partner countries. Partners distributed the link to a survey around their networks and potential users with ASD, parents of children with ASD, employers, teachers and practitioners could rate the pictures of the mock-up scenarios of the first game (the office scenario) and comment on the ideas for the game. Table 1 gives an overview over all participants in the survey.

Table 1: Participants in the needs analysis online survey:

Country	Overall		England		Germany		Bulgaria		Italy	
Number of Participatiants	98		28		53		7		10	
Persons with ASD	21		1		20		0		0	
Persons without ASD	49		21		17		4		7	
Parent with a child with ASD diagnosis*	13		5		8		0		0	
Person specialised in working with persons with ASD*	24		6		11		3		4	
Employer	4		3		1		0		0	
Decision Maker (politician, head of instiution, other)*	3		0		2		1		0	
NGO*	5		0		3		2		0	
Teacher*	10		7		0		2		1	
Other*	8		3		2		0		3	
Not specified	28		6		16		3		3	
Gender	M:	W:	M:	W:	M:	W:	M:	W:	M:	W:
	23	47	6	16	15	22	n.s.	4	2	5

In total 17 mock-up pictures were rated in the survey in a quantitative and qualitative method. Also some open questions about possible game scenarios and mini games were asked. In general people were more content than average with the scenarios (above 3 on a 5 point Likert scale), but some were quite sceptical about the game, especially the people with ASD themselves. They rated the pictures a little worse than the other survey participants.

The ratings in Germany were a little lower than in other countries, this seems to be due to the fact that in Germany a lot of people with ASD answered the questionnaire and they rated everything a little more negative than people without ASD. The possibility of choosing your own character seems to be very important to the users (at least gender should be an option, or a picture of oneself could be uploaded).

Also diversity of gender/age/ethnicity is important: colleagues should be divers and realistic (the people at the job interview training and work colleagues should not look the same). Furthermore it seems to be very important that the work environment looks very realistic.

The memory game (a game of sorting facial expressions to certain emotions, that at first was included in the break area) is not seem as a recreational game, but as work. Therefore it

could be a social interaction task and as a break game something relaxing should be offered. The money box is seen negative by some users, maybe another reward is better.

Another often mentioned comment is that it should be very clear who you are in the game and who the other persons are. Also self confidence should be encouraged by the game, so positive and immediate feedback is very important. And also it should be clear where each door leads to in the game and the pictures on the wall seem to be scary or distracting to some people with ASD and should be changed.

Based on this comments of the survey, some aspects of the game were again newly defined and changed. The final design and content recommendation are listed in the next chapter and will be used for the creation of the final version of the ISpectrum game.

6 Design Recommendations

6.1 Recommendations for the content of the game

Based on these conclusions the game will have three different working scenarios from which the participant can choose: office/ IT, retail and an outdoor working scenario. The outdoor scenario was added after the interviews with the advisory groups, because these kinds of jobs are more favoured by people with ASD. The manufacturing scenario which was in the bid of the project was replaced by the outdoor job, because people who work in manufacturing usually work in sheltered workshops and there are no jobs in this area on the general work market available.

Also a virtual job centre is developed where persons with ASD can practise their job interview skills and can decide which work field will suit them the best. After the use of the job centre, one of the three work scenarios can be tried out and people can practise various social skills in a virtual environment. In every work sector there are different mini games and tasks which focus on social relationships, communication with colleagues, clients and employers, facial recognition games, dealing with abstract concepts, organising tasks etc. The work sectors consist out of three different levels and complexity of tasks and communication skills increases with each level. If tasks are fulfilled, the player is rewarded with career points which he/she can use to buy virtual goods for the workplace or which can be used to do be added to the possibilities of relaxing tasks like a new game or some new music. This will be a better reward than the first planned money box, because now rewards for the job interview can be earned as well and a money box was sometimes seen as too childish. After finishing certain task and earning enough career point, the next level can be started. After completing all levels of the chosen work scenario, the user can print out or

download a certificate, that the training is successfully ended. The structure of the game is displayed in figure 1:

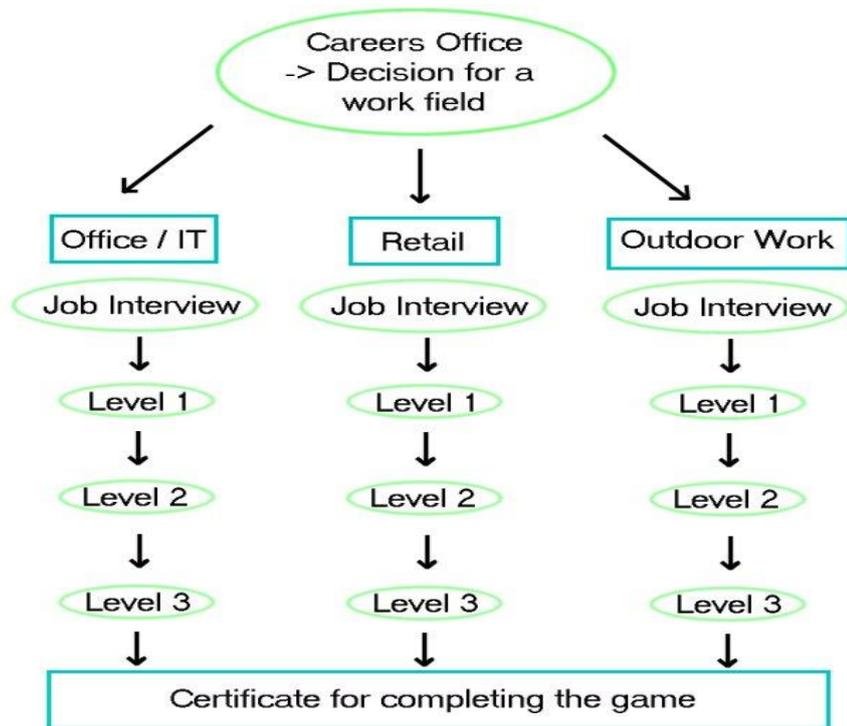


Figure1: structure of the game

To help the player with the task a virtual work buddy is always available by clicking on an icon and he gives information and tips about the task. Also if the user seems to struggle with a task in the game or is not doing anything for some minutes, the buddy can pop up and ask if he can help with anything and suggest doing a task. The buddy and also the complete game should not put pressure on the user, as people with ASD are very different and sometimes their achievement also depends from day to day, the user should be encouraged to play the game but not be pressured to go faster. This is also important for the levels of the game, a level can stand for a normal work day at the beginning of working in a new job, the next level is after a couple of weeks when you already know something about rules and norms in the company and the last level after some more weeks when something unusual happens (like the work buddy is sick, a new colleague is joining you in your office, there is unplanned team meeting etc.). This is better than to state that the first level should be accomplished after one day or one week etc. Because pressure is not good for people with ASD but sometimes does occur at work, one task with time pressure can be added to the game to practise this (in level 2 or 3). Also social comparisons with other players should be avoided.

It is also important that tasks are very clear and all steps of the task are mentioned, because people with ASD tend to take all tasks very literal. E.g. do not give the task: 'Answer the phone when it rings' but explain that the user also should ask if he can take a message when it is not for him and that he should write down the name of the caller and the message. It is also very important that clear feedback is given after every task and that it is encouraging but also gives clear information what could be improved in the future.

In the game, different tasks can be fulfilled in a lot of places of the virtual environment. E.g. by clicking on the desk a task pops up, or by walking by the door of the boss office. There are more work related tasks and social task which are also important in the work area.

Examples for work related tasks are:

- Taking phone calls (what should I do, say and note down when the phone rings?)
- Writing e-mails (what should I write, netiquette)
- Organising my desk (drag and drop)
- Organising my work day (different task are listed, what is the most important etc.)
- Have a talk with my boss about my work (how to behave, how to deal with feedback)
- Working together with a colleague
- Getting typical tasks (like making notes of a meeting and ask if something is not clear to you)
- Dealing with time pressure (e.g. Typing a document in a certain time)
- Dealing with noise while working (in a higher level noise can switched on)

Examples for social tasks:

- Making small talk in the hall (what to say, typical scenarios)
- Facial expression recognition (memory game)
- Social rules (knocking on doors etc.)
- Understanding irony/ sarcasm
- Explaining ASD to my colleagues
- Asking for a break/ time alone

A side of the tasks, a recreational area is included in the game, when clicking on a 'Break' button, the user can take some minutes of rest in the game and do something he/she enjoys (listening to music etc.)

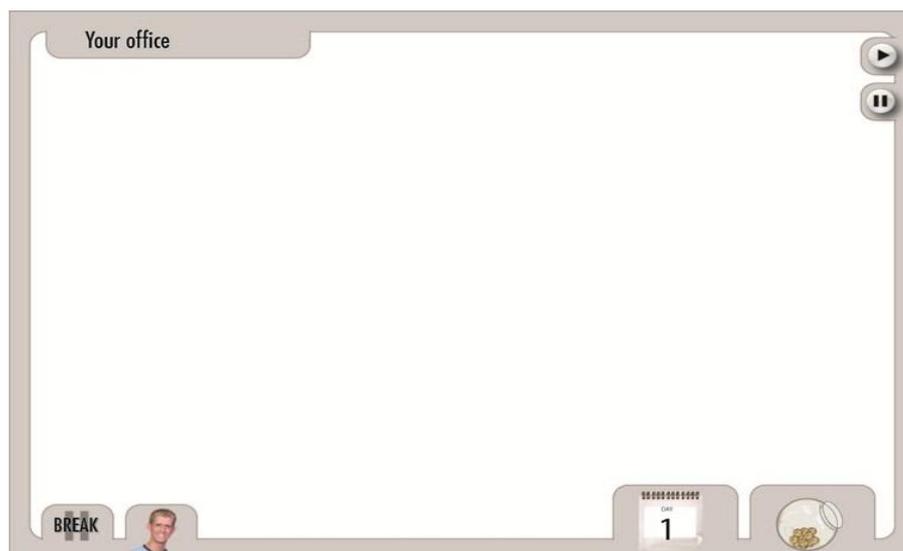
Besides of the game, it was suggested that a short video trailer is developed and shows the user before playing the game, how it can be played and what it looks like. The game could

also be enriched with short videos about a real working environment (but than it has to be clear, that it is just an example of an office) or about people with ASD who work in that working area (interviews etc.). These videos can be watched voluntarily in the game and are not rewarded with career points.

6.2 Recommendations for the design and frame of the game

As already said before, a clear and realistic environment should be developed for all scenarios of the game. The avatar should be changeable to some extent (sex, colour of the hair, cloth) that the user can identify him/her self with the avatar. So a collection of some avatars should be shown at the beginning of the game and the user can choose one. Other persons like the buddy should not be closable but should look the same for all users, because they also can not be chosen in real life. However, no avatars should be in the game twice for different persons, this can be very confusing to the users. That some elements can be scary to some users (like very bright pictures etc.) should be taken into account, but it should also be a challenge to deal with some elements you do not like as they are not changeable in real life.

The frame of the game, which was liked quite a lot by the users of the survey, gives clear structure to the game and helps the user to orientate in the game. Picture 2 shows how the frame of the game could look like.



Picture 2: the frame design for the game

In the frame there is a break button which can be clicked if the user needs time to relax while playing the game. If it is clicked, a relaxing task like music you can listen to, pops up. Next to it is the work buddy button, which gives additional information and tips to all tasks in the game. When the user clicks on it, a new window with written text opens. Also on the bottom of the frame is a calendar symbol which shows in what level you are. If you click on it, the status on your progress is show (e.g. you already completed 30% of level 1). Next to it there is a symbol for the career points which can be earned (in this picture it is still a money box, but this will be changed). When the user clicks on it, the points that are earned so far and the rewards that can be purchased with the points are shown.

In the frame there will be also a button for watching the videos which are made for that work scenario. On the top of the frame, it is clearly shown where in the game the user is (in this picture the user is in his office). On the right side there is a 'Play' and a 'Pause' button, if the user wants to stop playing the game for a while.

Branching

2D versus 3D Games

7 Conclusions

All steps we made during the research for the game content and design gave new, interesting insights into the world of people with ASD and their wishes for the game. With all these input, now new content and design suggestions are made and new mock-ups will be developed in the next weeks and again commented on by advisory groups. With this approach, it hopefully will be possible to create a game which is suited in the best possible way for persons with high functioning forms of ASD and Asperger's syndrome and the game will help them to improve their social and work related skills to get a better perspective in finding a job, which they like.

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