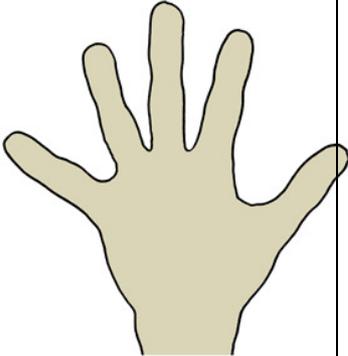


PROJECT DELIVERABLE

<p>Grant Agreement number: 224216</p> <p>Project acronym: HANDS</p> <p>Project title: Helping Autism-diagnosed teenagers Navigate and Develop Socially</p> <p>Funding Scheme: Collaborative Project</p>	
---	---

Deliverable description

Deliverable no:	D6.4.1
Deliverable name:	Report on Prototype 2 test results
Work Package No:	6
Lead beneficiary:	London South Bank University
Authors:	<p>Editing and Collation: Joseph Mintz, Corinne Branch, Peter Øhrstrøm</p> <p>Contributing Authors from ELTE/AF: Miklos Gyori, Krisztina Gy. Stefanik, Ildikó Kanizsai-Nagy</p> <p>Contributing Authors from AAU: Morten Aagaard, Henrik Scharfe</p> <p>Contributing Authors form LSBU: Joseph Mintz, Corinne Branch, Stephen Lerman, Caty March</p>
Nature:	Report
Revision history:	
Dissemination level:	Confidential
Document number:	HANDS_D.6.4.1_LSBU_R_CO_2011

Summary:

This document catalogues the available results from the four test schools based upon the implementation of Prototype 2 of HANDS mobile tool and software (October 2010 – July 2011) that has been collected up to and inclusive of the time of writing (June 2011). It includes an update on the current status with data collection by the three project academic partners – ELTE University (Cognitive Psychology), Aalborg University (Persuasive Technology) and London South Bank University (Applicability in the Learning Environment) as specified in Project Deliverable D6.2.1. This includes the following presentation of initial data:

- LSBU: Interviews, observations, questionnaires
- AAU: Interviews and observations
- ELTE: SRS, HFQ, ETA quantitative tests; eye tracking tests

As specified in the DoW, this deliverable sets out the raw test data. It is not within the remit of this deliverable to include analysis of the data. Such analysis will be reported in deliverables D2.5.1, D3.5.1 and D4.5.1. Further, an integrated conclusion based on the results arising from all three academic streams (Cognitive Psychology, Persuasive Psychology and Applicability in the Learning Environment) will be included in Deliverable D8.5.

However, this document does include the plans/timeline for the further analysis of the data and an integrated analysis of the results.

Project co-ordinator name, title and organisation:

Project Co-ordinator: Professor Peter Øhrstrøm

Organisation: Aalborg University

Tel: +45 9940 9015

Fax: +45 9815 9434

E-mail: poe@hum.aau.dk

Project website address: <http://www.hands.hum.aau.dk>

Table of Content

1. Introduction	4
2. Testing Prototype 2 of the Hands Toolset	6
3. Conclusion	
Appendix 1: ALE Data Catalogue	
Appendix 2: Cognitive Psychology Data Catalogue	
Appendix 3: PT Data Catalogue	

1. Introduction

The HANDS project is a multi-disciplinary project aimed to develop a mobile ICT solution to help young people with an autism spectrum diagnosis (ASD) to become better integrated in society. The three academic partners, based in London South Bank University, Aalborg University and ELTE University, have all contributed to the specification and development process for Prototype 2 in order to help build a mobile ICT solution with a set of software programmes which will help in supporting children (aged 11-18) in handling situations where they have to act autonomously, as well as to develop their social skills and self management skills. . In total 27 children are currently participating in the test group for prototype 2 (and 20 in the control group), all of whom have now been issued with the Smartphone, complete with the HANDS Autism specific software intervention uploaded and ready for use.

The project test methodology for prototype 2 evaluation uses, as specified in deliverable D6.2.1, a mixed-method approach, whereby qualitative and quantitative methods will both be used, stemming from the differing foci of the three academic partners. These foci are Cognitive Psychology (ELTE University), Persuasive Technology (Aalborg University) and Applicability in the Learning Environment (London South Bank University).

Additional testing is being undertaken in relation to the Android pilot and the Sharing Point functionality. Due to the later timescale for these aspects, raw data is not available at this time, and an analysis of the results of the evaluation of these will be presented in deliverable D1.3.4.

This multidisciplinary approach, whilst offering logistical and practical challenges, has also offered a richer analytical framework for evaluation of the HANDS tool. Integration of these three academic streams is regarded as extremely important, and a set of recommendations arising from a cross-analysis of the three datasets will be presented in Deliverable D8.5. This will include integration of the CoMe log file data.

1.1 Minor Modifications to the Testing Programme

- The Persuasive Technology testing for prototype 2 has been expanded to cover data collection in all four test school sites.
- The Applicability in the Learning Environment testing for prototype 2 has been expanded to cover interview and observation data collection at three test site schools, with questionnaire data from the fourth test site school. Further, a greater focus on the teacher as the principal case subject has been introduced.

- The Cognitive Psychology testing programme has been modified, based on evaluation of the prototype 2 testing data set. A modified version of the VABS test has been introduced which is more closely aligned to the specific experiences of children using HANDS. Developed at ELTE University, this has been named The HANDS Follow Up Questionnaire (HFQ). Further, based on analysis of the prototype 1 results, it has been decided not to undertake the post use prototype 2 ADOS tests, as it was felt that these would not greatly add to the evaluation of the efficacy of HANDS.
- Additional testing of the HANDS Android pilot has been undertaken, with additional test subjects, although this it should be noted that this has a specific evaluation programme, separate from the main Prototype 2 testing programme specified in deliverable D6.2.1. The results of the testing of the HANDS Android pilot will be reported on in Deliverable D1.3.4. The results of the Sharing Point test will also be reported in this deliverable.

1.2 Data Collection Objectives and Usage

The key evaluation/research objectives for the data collected in the evaluation of Prototype 2 mirror those set out for Prototype 2, as specified in Deliverable D6.2.1:

1. the effect of the use of an ICT tool based on persuasive technology in developing the children's social skills, self management skills and social integration
2. the applicability of the ICT tool to the learning environment – i.e. how it fits in with existing practices of teaching and learning AND what impact it has on such practices
3. gaining feedback on the development, improvement and overall technical assessment of the ICT tool and elucidating recommendations for functional changes

The Cognitive Psychology data focuses primarily on Objective 1. The Applicability in the Learning Environment data focuses on Objectives 2 and 3. The Persuasive Technology data focuses mainly on Objectives 1 and 3

Although the data primarily answers these research/evaluation questions in respect of the HANDS tool, it also provides the potential to illuminate the use of similar technology for young people with ASD. This is particularly relevant given the significant growth of the mobile app market since 2008, with a growing number of apps being developed for use with people with ASD to develop life and social skills. However, very few if any of these have been evaluated or subject to efficacy testing, so the HANDS data and its analysis are of potential significance in wider app

development. Further, Cognitive Psychology eye tracking results also have potential application to the development of both mobile and fixed station applications for young people with ASD in a variety of contexts, including general academic learning as well as social and life skill development.

The data will, therefore, serve the following purposes:

- validation of the efficacy of the HANDS mobile device to develop social and life skills in young people with ASD; such validation will be crucial in any further development or commercialization of HANDS
- identification of key factors affecting engagement with such technology (and thus overall efficacy) by teachers, children and parents
- feedback on usability and design issues for further iterations of the HANDS software after the completion of the project
- general feedback on design and efficacy issues of relevance to a wider market of professionals working to develop apps for young people with autism

2. Testing Prototype 2 of the Hands Toolset

The development of the first prototype of the mobile ICT tool was completed at the end of September 2010 and went live online in October 2010. Implementation and use by teachers and children in the test group has continued from then. This deliverable reports on data available as at June 2011. This represents most of the data collected, although some data collection activities will continue in July 2011. Formal testing of Prototype 2 ceases at the end of July 2011, except for the Android and Sharing Point evaluations which continue in to September 2011.

2.1 The Implementation Experience

The go live of Prototype 2 of HANDS generally went smoothly. There were some minor delays due to technical server set up issues, but these were quickly resolved. Further, due to the fact that most teachers working with HANDS in Prototype 2 had had some experience of HANDS in Prototype 1, training and induction issues were much less significant than in Prototype 1. Further, as the technology solution was in essence unchanged from Prototype 1 – i.e. it consists of a client mobile application and a web server CoMe application, most technical and training issues, had already been addressed in Prototype 1. For example, synchronization issues that had been significantly problematic for some test sites in Prototype 1 had been resolved during Prototype 1 implementation, and did not, therefore, present a problem during Prototype 2 implementation. There were significant advances in design features in Prototype 2, relating to graphical user interface, general usability issues, and additional functionality, but these tended to enhance the user experience of Prototype 2, thus facilitating the process of implementation.

2.2 Applicability to the Learning Environment Data

The ALE test data of Prototype 2 of the Hands Toolset include recorded interviews, observations mainly collected by researchers at London South Bank University (LSBU) in co-operation with the teachers at the Helen Allison School. Additional site visits to carry out observations and interviews at Autism Foundation and Svedenskolan test site schools were also undertaken. Budget and resourcing restrictions did not allow a site visit to Egebakken school, however questionnaire data was collected from this school, as well as from teachers who did not participate in site visit data collection at Autism Foundation and Svedenskolan schools. The raw

dataset is kept at LSBU and it will be analysed in deliverable D3.5.1 due September 2011.

The majority of planned data collection activities were completed. Good relationships between the LSBU team, and staff at the four test sites, developed during Prototype 1, were beneficial in facilitating smooth planning and communication around data collection activities. All planned teacher interviews, teacher observations, and teacher questionnaires were completed. Effective planning and resourcing by the LSBU team meant that all intended data was captured. Further, all child interviews at HA school were completed successfully, again due to close collaborative working between staff at LSBU and HA. However, in regard of four parents at HA school, interview data was not collected. Despite all reasonable efforts, within the bounds of ethical acceptability, being made to arrange these interviews, four parents, due to a number of reasons such as pressures of work, did not make themselves available.

A catalogue of the LSBU prototype 2 dataset is presented in Appendix 1.

2.3 Cognitive Psychology Data

The Cognitive Psychology test data of Prototype 2 of the Hands Toolset include recorded interviews, observations mainly collected by researchers ELTE University, Budapest, in co-operation with teachers at the partner schools. The raw dataset for tests SRS, ETA, HFQ, ADOS and Eye tracking data are stored at ELTE University, and it will be analysed in deliverable D2.5.1.

Again, the majority of the data was successfully collected. This was facilitated by meticulous forward planning by the ELTE and AF teams, who provided detailed testing schedules, regular updates, and easily understandable reporting schemas, to allow staff at test site schools to effectively undertake data collection activities. Most data sets had a high completion rate. The ETA data set, however, had a number of Missing data items. This was because the requirements of a controlled experiment needed significantly more energy and work than a usual, informal task analysis which is typically undertaken in school settings (Deliverable D2.5.1 will contain more details). Thus, in some cases, although teachers, who were the ones due to the nature of the test who had to carry it out on behalf of the ELTE researchers, made best efforts to collect the data, some of the test criteria were not fulfilled in some cases. This led to 'missing' & 'excluded' items. Reasons for missing/excluded items included problems with ensuring relatively calm circumstances for the

assessments, organising appropriate premises for out-of-school measurements, and in some cases selecting individually relevant goal-behaviours, which are appropriate for being supported with a simple, linear algorithm, caused difficulties too. However, the usable data set was still quite acceptable and provided very interesting and exciting results from initial readings. The experience was also useful methodologically, as it provides useful pointers for adaptation of the ETA data collection scheme in future use, although it should be noted that the complexities of undertaking controlled experiments in school settings are likely to always present some limitations on data collection success.

See appendix 2 for more details.

2.4 Persuasive Technology Data

The Persuasive Technology test data of Prototype 2 of the Hands Toolset include recorded interviews and observations mainly collected by researchers at Aalborg University (AAU) in co-operation with teachers at Egebakken, Svedenskolan, Helen Allison and Autism Foundation schools. The raw dataset is kept at AAU and it will be analysed in deliverable D4.1.5 due September 2011.

See appendix 3 for more details.

2.5 The Data Analysis

The analysis is grounded in the initial focused attention to the individual Cognitive Psychology, Persuasive Technology, and Applicability in the Learning Environment data sets. This will be directly reported in Deliverables D2.5.1; D3.5.1 and D4.5.1 respectively.

In order to facilitate an integrated overview of the outcomes of the development and implementation of the HANDS Mobile Tool, as well as the formulation of common recommendations for the future development of similar technology, collection of data as well as the analysis will be discussed among the partner – in particular involving the the User Participatory Design Group (UPDG). The purpose of this will be to integrate contributions from the individual academic streams, indicating for the particular case how the use of the tool has had an impact from the perspectives of

- a) cognitive psychology – i.e. outcomes in terms of measurable impact on social and life skills development,
- b) persuasive technology – i.e. outcomes in terms of persuasion such as credibility, kairos, use of rewards and,
- c) applicability in the learning environment – i.e. outcomes in terms of ease of use and integration in to existing pedagogical structures and practices, and qualitative evaluation of impact on practice.

The practical integration of the these three rather different kinds of analysis is carried out as a constructive dialogue among the Hands mainly organised within the framework of the User Participatory Design Group. A set of common conclusions about the efficacy of the HANDS MoBile Tool and associated recommendations for the design and implementation of similar mobile technologies in the future will be developed.

The analyses of the three datasets described above will be integrated in order to lead to common conclusions and recommendations will be presented in Deliverable D8.5.

2.6 End-user feedback and end-user requirements

For the Prototype 1 implementation and evaluation, collated and integrated feedback was fed in to the specification and development cycle for Prototype 2. During Prototype 2 implementation and evaluation, as Prototype 2 is the "end product" for HANDS, the pattern was not identical. There continued to be attention to correction of technical errors in the software (bug fixes), and in some cases some minor alterations to allow for matching of functionality to the experience of its use by teachers. This was facilitated, as reported by the online fault reporting system for HANDS.

There continued to be User Participatory Design Group (UPDG) meetings as in Prototype 1. All four schools have participated and the 3 universities have also been represented on the group as well, but with the core idea in mind this time being that the users (the teachers) should have the opportunity to exchange ideas, experiences and best practice example . The UPDG have met approximately once every second week in a videoconference (Adobe Connect) to consider specific topics in which the starting point of the design was the teacher's experience of HANDS in the context of their professional practice and work with children with ASD in the school context. The meetings proved very useful in allowing teachers to exchange experiences and ideas between different schools, to deal with queries and questions about how best to use HANDS, and to think further about how HANDS could be tailored to the needs of their individual children.

3. Conclusion

The data analysis for Prototype 2 of the HANDS phone is in an ongoing status across all three academic strands of the project, although at time of writing most data collection has been completed. Academic partners are now analysing the data, ready for presentation of results and recommendations in deliverables D2.5.1, D3.5.1 and D4.1.5 in September 2011. In parallel with the individual analysis, the three academic institutions are engaging in a process of data sharing, and cross data analysis, leading to a cross analysis report and cross project recommendations in deliverable D8.5, as indicated in the timeline in Table 1. This includes cross analysis of the CoMe log data files and cognitive psychology results by Aalborg University and ELTE University.

Appendix 1: ALE Data Catalogue

Inclusions:

Data Collection Summary
 Teacher Interview Schedule
 Teacher Interview Sample Interview Data
 Child Interview Schedule
 Child Interview Sample Interview Data

Data Collection Overall Summary for Prototype 2 ALE Evaluation

Data Type	Location	Number
Teacher Interviews	UK	10
Teacher Interviews	Hungary	4
Teacher Interviews	Sweden	4
Teacher Questionnaires	Hungary, Sweden, Denmark	15
Classroom Observations	UK	10
Classroom Observations	Hungary	4
Classroom Observations	Sweden	4
Parent Interviews	UK	9
Child Interviews	UK	10

Data Collection Detailed Summary for Prototype 2 ALE Evaluation

Teacher Code	School	Child/ren they are working with	Job title	Data
36.140	HA	36.231, 36.232, 35.241, 36.234	Teacher	1 x interview, 2 x observations
36.142	HA	36.220	Head of department	1 x interview, 2 x observations
36.145	HA (Based at FE College)	36.240, 36.238, 36.237	Teacher	1 x interview, 2 x observations
36.147	HA	36.225, 36.223	PSHE teacher and senior practitioner	1 x interview, 1 x observations
36.157	HA	36.234, 36.241	Teacher	1 x interview, 2 x observations
42313	SVE	42.216, 42.224	Teacher / day care assistant	1 x questionnaire
42511	SVE	42.216, 42.224	Teacher	1 x interview, 1 x questionnaire, 1 x observation

42520	SVE	42.222	Teacher	1 x questionnaire
42512	SVE	42224, 42216	Teacher	1 x questionnaire
42522	SVE	42.219, 42.228	Teacher	1 x interview, 1 x questionnaire, 1 x observation
22.501	EGE	22.209	Teacher	1 x questionnaire
22.504	EGE	All students	Lead Teacher	1 x questionnaire
22.123	EGE	22.211	Teacher	1 x questionnaire
22.103	EGE	22.212	Teacher	1 x questionnaire
22.106	EGE	22.201, 22.205		1 x questionnaire
15126	AF	15211	Teacher	1 x interview, 1 x questionnaire, 1 x observation
15136	AF	15233	Teacher	1 x observation, 1 x questionnaire
15146	AF	15291	Teacher	1 x questionnaire
15156	AF	15294, 15293	Deputy Head and Teacher	1 x questionnaire
15176	AF	15294	Teacher	1 x questionnaire
15166	AF	15233	Lead Teacher	1 x questionnaire, 1 x interview

Teacher Interview Schedule

1. You have now been working on HANDS prototype 2 with your Child for 6 months.
 - a. Were you involved in Prototype 1?
 - b. Please can you just give me a brief description of your involvement in Prototype 2.
 - c. What were the major differences for you in the P2 software compared to P1? Probe for positives and negatives.
 - d. Were there any differences in your approach when using Prototype 2 in comparison to Prototype 1?
 - e. Were there any differences in the schools approach when using P2 in comparison to P1?

2. We will come back to talking about HANDS later, but I wanted to get more of an idea of what the children using the phone are like as learners... Tell me what it is like working with X?
 - Probe for academic level, social skills, interaction with other children, parental positioning, level of independence
 - Probe for any work on – social skills and life skills with the child including any programmes

- Probe for teacher's aspirations for X and her views of X's aspirations and abilities
 - Probe for difficulties in working with X, but approach obliquely and avoid overemphasis
 - Ask directly on X's experience with technology and confidence with it?
3. What has it been like having Child X use HANDS? *If in the observation, a relevant use of the phone in relation to life/social skills was observed, pick this out as an aspect to praise/comment on, adding it in to the initial question....*
 4. What has it been like having Child X use the general phone functions?
 5. Can you tell me about some other examples when X has used HANDS?
 - In relation to an example of the use of HANDS, question:
 - How was that HANDS activity set up? (probe for balance between teacher and child input, and input from other professionals/colleagues?)
 - Probe for multidisciplinary working and ask explicitly who was involved in the process of planning and implementing the use of the phone with Child X? Clarify input from the researcher team.
 - What were your goals/reasoning in setting up/supporting the use of that phone activity?
 - Probe for perceived effectiveness of HANDS in relation to the goal *Probe for whether the child was allocated rewards in relation to the goal*
 - Probe for the extent to which the child's perceives that a problem exists influences the effectiveness of the use of a particular intervention (function)?
 6. In relation to Child X and use of Prototype 2, has there been any use of HANDS between school and home?
 - Probe for involvement of parents in decisions on use of HANDS, use of HANDS at home, and any feedback from parents so far
 - Have there been any changes in working relationship with parents?

7. Looking back at the use of Prototype 2 over the last 3 months, with Children using HANDS, in what way do you think the phone has helped these children?
- a. what worked best?
 - b. what could be improved?
 - c. How did PT2 compare to PT1
 - d. Probe for development in life/social/self-management skills
 - i. What is your general approach to teaching social and life skills? Probe for description.
 - ii. What skills did you focus on?
 - iii. Do you think there are other skills areas where the phone could make a difference to Child X or to other children?
 - iv. What do you think has the phone enabled the children to achieve?
 - v. Do you think the phone was successful as a learning tool. How did HANDS compare to other programmes in place to help the child learn social and life skills?
 - vi. What effect has HANDS had on the children's social skills in specific situations?
 - vii. Has there been any effect/change on the children's social and life skills in general? [i.e. do they think the social skills developed in particular situations are generalized more widely?]
 - e. What did Child X think of the HANDS?
 - f. (if the child used PT1, what did child X think of PT2 in comparison to PT1?
 - g. Do you think that HANDS works best as a tool for use inside school or outside school (including at home)?

8. Child X and the ETA task:

What was your impression of the ETA task?

Do you think it made a difference to the child?

Do you think the skills they learnt / didn't learn are transferable?

9. In relation to Child X and use of HANDS, can you tell me about their wider use of the phone, e.g. use of other functions apart from HANDS software – phone, texting, video/camera, music player, internet etc.. *(this may have come up in earlier questions, but if not important to focus on it/probe here)*

- a. Probe for any problems/issues arising from this
- b. Probe for effect of use of the smartphone generally on Child X's social integration e.g. developing friends etc...
- c. Ask directly on the effect of the introduction of the smartphone on Child X's confidence, eg. with technology

10. In relation to specific features of the phone:

- How do you think the Diary function was successful?
- What would you change or improve?
- How do you think the PT function was successful?
- What would you change or improve?
- How do you think the CoMe was successful?
- What would you change or improve?
- How do you think the rewards function was successful?
- What would you change or improve?

- Overall, has the phone met or not met your expectations?

- Did you make use of the tunnel function on CoMe?
- How useful were the tunnels?

11. The HANDS and Persuasive Technology

- How did you use the rewards system on HANDS?
- How did PT2 rewards compare to PT1 rewards?
- Did you link the HANDS rewards to wider class/school rewards systems?

- What effect did the rewards have on the child?
 - Probe for motivation, engagement with HANDS or more widely
- Do you think that the children felt that HANDS was credible i.e. did they feel motivated to do what HANDS “told them” to do?
 - Probe for perceived reasons as to why it was or was not credible?

12. When you think about your work with Child X, what effect has the introduction of HANDS had on the way that you work with them?

- a. In general, what would you say has been the influence of being involved in a research project on your teaching practice, in terms of life/social/self management skills?
 - i. Probe for changes in roles and responsibilities, relationships/working patterns with parents.
- b. Have there been any time when you have changed the way the whole class works to support child’s use of HANDS?
 - i. Probe on inclusion strategies
- c. In general, would you say that HANDS has been an extension of your existing practice in the classroom, or has it involved changes or alterations in your practice? Probe for differences in this between PT2 and PT1.
- d. Has the introduction of HANDS made any difference to your confidence in the use of technology in the classroom?

Have there been any changes in the way you collaborate with other professionals?

LSBU Sample Interview Data

36.140 Teacher Interview HA

INTERVIEWER

So, as I was saying, this is the final interview for the 2nd prototype.

36.140

Mhm.

INTERVIEWER

There won't be any more interviews after this. Um, it, it will take probably an hour, um, just to warn you because there's quite a lot ...

36.140

What, the interview will take an hour?

INTERVIEWER

Yes, yeah.

36.140

(Laughs) I'm teaching again in an hour. Yeah, go on.

INTERVIEWER

Okay, okay. Thanks for letting me know so I can try and get through all the questions. Um, so I'll just start by, um, asking you, so you were involved in prototype 1 as well as prototype 2?

36.140

Yes.

INTERVIEWER

And can you tell me which children you've been working with for prototype 2?

36.140

Prototype 2 has been 36.231, 36.241, 36.234 and 36.232.

INTERVIEWER

Okay. So you've had quite a lot this time?

36.140

Yes.

INTERVIEWER

Aha. But I understand that I think JC has been helping you a bit, was meant to be helping you a bit?

36.140

Yes he was but I don't want to [unclear-00:01:05]

INTERVIEWER

Ah, okay. Okay.

36.140

I think he did something just immediately before you came to check what he'd been doing.

INTERVIEWER

Aha.

36.140

Bless him.

INTERVIEWER

But you've, you've basically taken on those four children?

36.140

Yeah.

INTERVIEWER

Okay. Okay. Um, can you, um, er, just give me a brief, brief description of your involvement in prototype 2?

36.140

Right. Prototype 2 I put several scenarios on each child's, um, phone and they have at least three a day each, um, and some of those have actually been changed as well, that the child either didn't like what I had put on there and was resisting using it so I changed the wording. It's still the same sort of intervention that's on there.

INTERVIEWER

Mhm.

36.140

Um, some of the interventions they just had to press their thumbs up to say they'd read it, others they actually had to respond to by typing in an answer.

INTERVIEWER

Mhm.

36.140

Um, 36.232, who kept losing his phone, I deleted a lot of his stuff because he was only having his phone within school.

36.140

Mhm.

36.140

But as I spoke to you the other day, that's still appearing. I don't know, have you had an answer on that one?

INTERVIEWER

No, not ...

36.140

Be a bit early, wouldn't it ...

INTERVIEWER

Mhm.

36.140

... to have had an answer on that. Um, so, each has had at least three things put on their phone and some of them have had to change as we've gone through the term.

INTERVIEWER

Mhm, okay. So you've been working on mainly interventions, so ...

36.140

Yes.

INTERVIEWER

... but with those ... all of those four children?

36.140

Yeah.

INTERVIEWER

Okay. Um, and, um, what do you think have been ... have there been any differences between prototype 1 for you and prototype 2, if you could just say me ... tell me a little bit about what you think the major differences, if it was better, worse?

36.140

Once they'd got the synchronisation sorted ...

INTERVIEWER

Mhm.

36.140

... even with prototype 2, right at the beginning the synchronisation wasn't very good but once all that was sorted it was a lot faster to synchronise them, a lot better to synchronise. Um, the site was slightly easier to ... the Come[ph] site slightly easier to navigate ...

INTERVIEWER

Mhm.

36.140

... but it still took quite a long time, each time you'd put something in you had to wait while it was all being, I don't know, sent somewhere or other.

INTERVIEWER

[unclear-00:03:33] (speaking together) loading?

36.140

[unclear-00:03:34] (speaking together) loading up. Yes, that still took quite some time but it was easier to navigate.

INTERVIEWER

Mhm.

36.140

I think that's really the only two differences.

INTERVIEWER

Okay.

36.140

Yeah.

INTERVIEWER

So there has been a bit of a difference with the kind of technical ...

Student Interview Schedule

Introduction for the child:

Hi X,

My name is XXX and I'm from the HANDS project. I would like to ask you some questions about the HANDS programme on the phone that you have been using and what you think about it. Is that ok? [wait for child's response]. I have a voice recorder here [show to child]. Is it ok if I record us speaking? [wait for child's response]. Ok, I am going to start now, please tell me or your teacher if there is anything I say that you are not sure how to answer.

If the child has used the 1st prototype: You may have used the first version of the hands software before. I would like you to try and answer the questions thinking about prototype 2 of HANDS.

1st section

A series of questions which will assess the technical aspects of the phone:

1. Which version of HANDS have you used?
2. (For children who have been involved in PT1 and PT2) Which version of hands do you like more? Why?
3. Where did you use HANDS software to help you? Prompt for home, school, etc.
4. Do you think HANDS worked best inside school or outside school?
5. What have you used the HANDS software for? Probe for a more detailed discussion of the scenarios in which HANDS was used *If they answer this question in relation to the phone functions, gently remind them you want to talk about the HANDS software and that you will ask them about the phone functions later.*
6. Did it help you?
7. What other functions on the phone did you use? Prompt for camera, etc. Probe for details of the type of scenarios they used these in.
8. Did they help you?
9. What would you change on the HANDS software? *adapt the question in relation to the child's previous response*
10. What was the best thing that you did when using HANDS?
11. What was the best thing about the HANDS software?
12. Was there anything you didn't like about the HANDS software?
13. Was using HANDS easy? *supplementary about why, what etc*
14. Was using HANDS difficult? *supplementary about why, what etc*

2nd section

A series of questions which will assess the persuasive aspects of the phone:

Using cue cards (photos)

1. Who helped you to use HANDS?
2. Was it.....? (*show cue cards of mum, dad, siblings, teachers, TAs, Friend, and himself*)

3. What did they do/ how did they help you? *probe for who initiated the activity or led the activity*
4. Did you get rewards on the HANDS software?
5. Did you like the rewards?
6. When HANDS asked you to do something, did you want to do it?
7. How does being told to do something by HANDS compare to being told by your teachers and by your parents?

3rd Section

A series of questions which will assess the social and life skills:

1. When we saw you before, you told us you were good at..... (*we can draw this info from previous child interview*) - has HANDS helped you with this?
2. You told us you had difficulties with..... Has HANDS helped you with this? (*at school, home, residence*)
3. What other things would you like HANDS to help you with?

36.241 Student Interview HA Data Extract

INTERVIEWER

See if that's working! So, I've got a list of things. We're going to speak to all the children who have been using it, so we've got a list of questions, so we kinda make sure we ask everyone the same thing.

36.241

Yep!

INTERVIEWER

Okay, so you've just been using HANDS since the beginning of this year.

36.241

No, the beginning of last ... sort of ... after the summer holidays.

INTERVIEWER

Yes, after the summer holidays ...

36.241

... yeah, since then, yeah.

INTERVIEWER

So tell me a bit about what you've been using it for, what kinda things ...

36.241

To be fair there's been quite ... the teachers I have in my class ...36.140... unfortunately it hasn't gone to the sort of plan really cos they keep gathering me stuff but I've been ... when I've heard back ... from them ... they haven't actually downloaded the ... software probably that well, so ...

INTERVIEWER

Right.

36.241

It's good. I can see what this plan ... of this HANDS phone is doing ... unfortunately, for me, maybe I don't think it's ... I think it needs to be given to someone else.

INTERVIEWER

Okay.

36.241

For more needs, for more use you know, instead of me ... so.

INTERVIEWER

Okay, what is it that makes you think it would be better for someone else?

36.241

You know, to remind them sort of. I know I can't remember everything but I think I can remember most things but someone like who really NEEDS it more and who has got ... more probably ... needs ... than me and who would need it more.

INTERVIEWER

Okay, oh that's useful to know, thank you. You had something set up on it, is that right?

36.241

Yes, yes.

INTERVIEWER

Things about reminders ... did it ask you some questions?

36.241

Yes, sort of like at the end of the day, the end of the maths lesson, 'How would I rate myself?' ... 'What was good about my day?' ... because I have a sentence, 'How is your day?' ... and I answer it to a teacher and then I press 'Okay' to it. So, yeah ... that's all I think I use if for to be fair ...

INTERVIEWER

So it asks you ... tell me again ...

36.241

It says, 'End of a Maths lesson'.

INTERVIEWER

Right.

36.241

It says, 'How well did you do?' ... and also it says, 'How do you rate yourself?' So it would say first, it would say 'zero-ten' and I would rate myself then and then the next question would be, 'Did you need help?' and it says, 'Yes or No?' so those are my two answers.

INTERVIEWER

Okay, so when it gives you those questions is that helpful, how does ... does it make you feel useful?

36.241

Makes me feel better ... maybe makes me want to improve ... but I already know that anyway, so ... if something I'm not so good at ... that type of Maths or uncertain on that other bit of Maths, so I think it's ... yeah.

Appendix 2: Cognitive Psychology Data

The following description of the raw data to be used for Prototype 2 testing, has been compiled by Miklos Gyori. The WP2 (Cognitive Psychology) raw data have come from three methodological sources:

1. Interactive-dynamic **eye-tracking measurements** on the mobile visual user interface of HANDS Prototype 1;
2. **Psychometric data** from
 - a. the Social Responsiveness Scale;
 - b. the HANDS Follow-up Questionnaire (HFQ);
3. Data from the pilot measurements by the '**Experimental Task Analysis**' method.

Please, note the followings:

- All methods and data collecting procedures will be described in a highly detailed way in project deliverable D2.5.1.
- Description of methods and procedures below are, therefore, highly redundant to D2.5.1.

1. Interactive-dynamic eye-tracking measurements and data-set

As described in deliverables D2.1.2 and D2.4.2., "the highly atypical perceptual and cognitive processes characterising individuals with autism spectrum disorders necessitate specific care in designing the (mobile visual) user interface of the HANDS software, to avoid non-effective or even counter-effective (maladaptive) solutions. Eye-tracking methodology allows one to test if the visual user interface of the software guides adaptively the user's attention." (D2.4.2., p. 43)

A total of 27 subjects were recruited for the eye-tracking measurements, 10 children with Autism Spectrum Disorder from the Autism Foundation, Budapest, all participants of the HANDS Project test samples; and 17 children with typical development (TD) via various means of recruitment. All children participated in the eye-tracking measurements on a voluntary basis. Subjects went through eye-tracking and IQ measurements, and, on the basis of age and IQ data, an age-and-IQ-matched control group was formed for the test group with ASD. Data from these two matched groups (N = 7 in both groups, separately) served as input into the contrastive analyses of visual scanning patterns.

subject nr.	HANDS code	diagnosis	sex	age	HANDS user/non-user
ASD1	15291	ASD	m	12,25	HANDS Pt2 user
ASD2	15255	ASD	m	12,08	HANDS Pt1 user
ASD3	15293	ASD	m	11,92	HANDS Pt2 user
ASD4	15266	ASD	m	12,83	HANDS Pt1 user
ASD5	15295	ASD	f	15,50	non-HANDS-user
ASD6	15222	ASD	m	13,67	non-HANDS-user
ASD7	15233	ASD	f	15,33	HANDS Pt2 user
TD1	-	TD	m	14,50	non-HANDS-user
TD2	-	TD	m	12,50	non-HANDS-user
TD3	-	TD	m	14,25	non-HANDS-user
TD4	-	TD	m	14,17	non-HANDS-user
TD5	-	TD	f	12,17	non-HANDS-user
TD6	-	TD	m	15,25	non-HANDS-user
TD7	-	TD	f	12,33	non-HANDS-user

Table 1. Participants in eye-tracking testing of HANDS Prototype 2 – only those are shown whose data were fed into the contrastive analyses.

Testing took place in one session, consisting of 6 sweeps for each subject (3 practicing and 3 test). The scheme for a session with the 6 sweeps is shown below:

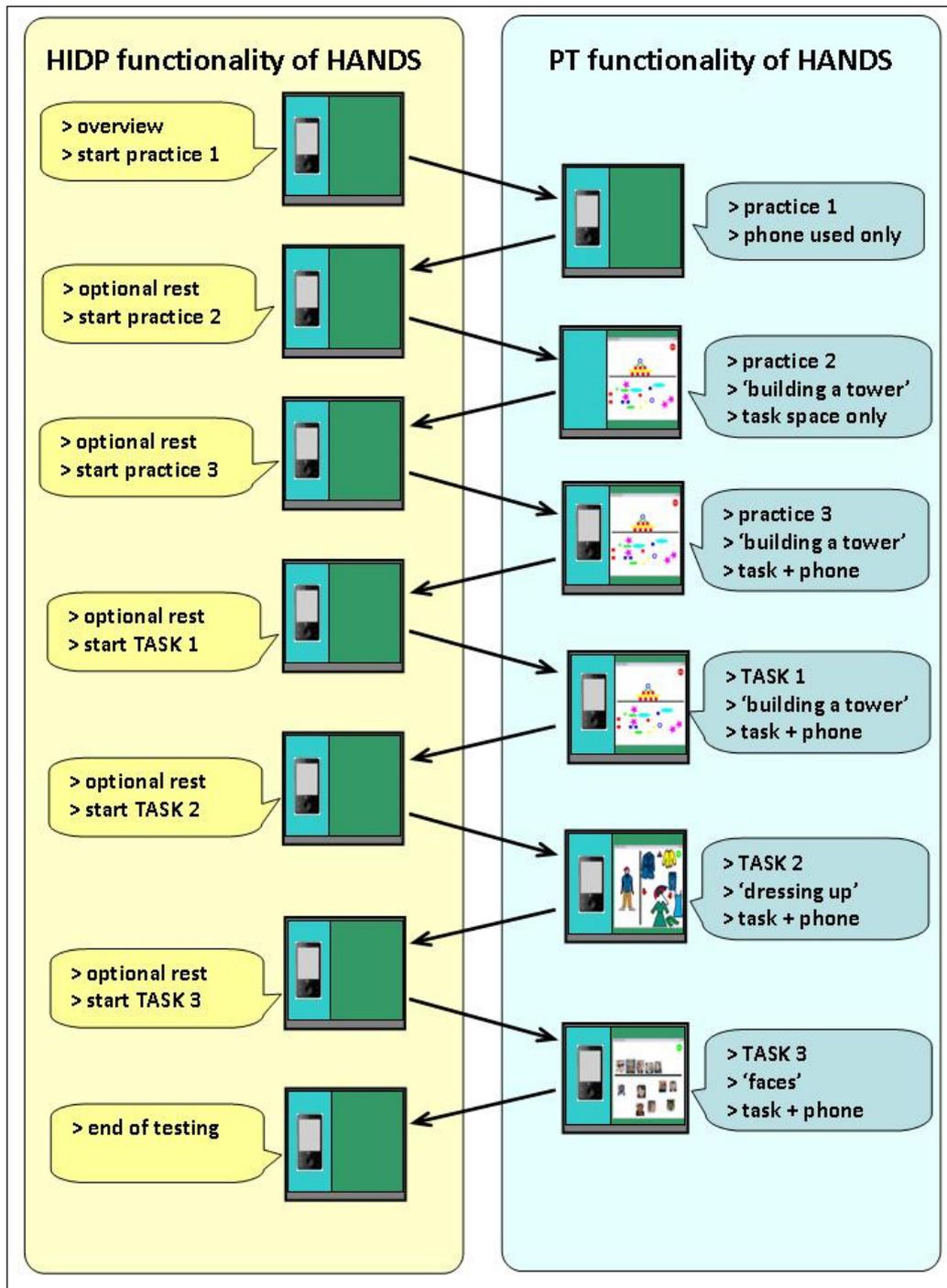


Figure 1. Overview of eye-tracking test procedure. (Introductory instructions, request for consent and closing interaction are not shown.)

Eye-tracking data were collected only at ELTE University, Budapest, Hungary, in a close collaboration with Autism Foundation, Budapest, Hungary.

Data folders (or compressed folders) are named according to the following convention: HANDS_2_code; where 'code' refers to codes in the *Table 1* shown above.

Therefore, there is one data folder for each subject, respectively.

Each data folder contains 2 kinds of data files:

- 'txt' file(s) contain raw eye-tracking data
- 'avi' files are for illustration: they are screen-videos and show the gaze-focus of the given subject and its scanning pathway.

Structure of the 'txt' files (only relevant columns explained):

- column #1: program-internal code for the subject
- column #2: our code for the subject
- column #3: gaze found by tracker / gaze not found by tracker ('1'/'0')
- column #4: time stamp for actual measurement (in 'seconds,milliseconds'; counted from the tracker program start)
- column #5: 'x' coordinate of the gaze fixation point, in screen pixels
- columns #6: 'y' coordinate of the gaze fixation point, in screen pixels.

As noted before, deliverable D2.5.1 will present a detailed description of our eye-tracking methods and data flow for Prototype 1 cognitive psychology testing.

2. Psychometric measurements and data-set

Psychometric measurements targeted social skills and adaptive, daily life skills. The key question has been is if the HANDS-aided intervention lead to an increase in them in PT2 test period. Here we used focused and more detailed (but not individualised) tools, primarily questionnaires and checklists, to measure effects of the usage of HANDS software in a more detailed manner; but still beyond the actual, specific and individualised focus of intervention. We combined a standardised instrument, the Social Responsiveness Scale, SRS , with a much-focused questionnaire developed by the research team, the HANDS Follow-up Questionnaire.

Social Responsiveness Scale (SRS; Constantino & Gruber, 2005) is a 65-item questionnaire, designed to screen children and adolescents (4-18 years) for symptoms of autism spectrum disorders and to aid the diagnosis of ASDs and some other disorders with overlapping symptoms; it has a version for rating by parents and another for rating by teachers/professionals.

HANDS Follow-up Questionnaire (HFQ; Gyori et al., 2011) is a 55-item questionnaire, following the scheme of SRS, to quantify some everyday social, communicative and daily living skills and difficulties related primarily to ASD; designed to complement

SRS in the HANDS Project; it has a version for rating by parents and another for rating by teachers/professionals.

SRS and HFQ data were collected from all the 4 test schools.

Both for SRS and HFQ data uniform data sheets were developed by our team, and these were used by test schools to upload data. For both HFQ & SRS and data these forms are self-explaining (see headers of data sheets), containing raw data, scores, scores for sub-scales (SRS only), as well as summary scores for both instruments.

As noted before, deliverable D2.5.1 will present a detailed description of our psychometric methods and data flow for Prototype 1 cognitive psychology testing.

3. Experimental Task Analysis and data-set

“The Experimental Task-Analysis, a methodology under development by the Autism Foundation – ELTE HANDS team, is a modified version of the TEACCH-based task-analysis technique. On the one hand it is aimed at being able to measure a specific skill/behaviour of a specific child before using the HANDS toolkit (baseline), and then the same skill with using the HANDS toolset in different settings (test). On the other hand, ETA technique could confirm or refute our assumption that HANDS toolkit is more useful than ‘traditional’, paper-based visual helps if we would like to help pupils to transfer their acquired skills/behaviours from one setting to another.” (D2.4.2, p. 27.)

Subjects of ETA measurements and status of their data are shown below in *Table 2*.

			EX TA M E A S U R E M E N T S							
			'Daily living task'				'Social task'			
			School settings		Out-of-school settings		School settings		Out-of-school settings	
Subject nr.	Test/control	School	pre	post	pre	post	pre	post	pre	post
15222	control	AF*	✓	✓	✓	✓	✓	✓	✓	✓
15294	test	AF	✓	✓	✓	✓	✓	✓	✓	✓
15295	control	AF	✓	✓	✓	✓	✓	✓	✓	✓
15233	test	AF	✓	✓	✓	✓	✓	✓	✓	✓
15292	control	AF	✓	✓	missing	excluded	missing	excluded	✓	✓
15211	test	AF	✓	✓	✓	✓	✓	✓	✓	✓
22.203	control	EGE**	✓	✓	✓	✓	excluded	excluded	excluded	excluded
22.201	test	EGE	✓	✓	✓	✓	excluded	excluded	excluded	excluded
22.207	control	EGE	✓	✓	✓	✓	excluded	excluded	excluded	excluded
22.212	test	EGE	✓	✓	✓	✓	excluded	excluded	excluded	excluded
42.224	test	SVE***	✓	✓	✓	✓	missing	missing	missing	missing
42.216	test	SVE	excluded	missing	✓	✓	missing	missing	missing	missing
36.238	test	HAS****	✓	✓	missing	missing	✓	✓	missing	missing
36.243	control	HAS	✓	✓	missing	missing	✓	✓	missing	missing
36.237	test	HAS	✓	✓	missing	missing	✓	✓	missing	missing
36.236	control	HAS	✓	✓	missing	missing	✓	✓	missing	missing
36.240	test	HAS	✓	✓	missing	missing	✓	✓	missing	missing
36.242	control	HAS	✓	✓	missing	missing	✓	✓	missing	missing
36.225	test	HAS	✓	✓	missing	missing	✓	✓	missing	missing
36.235	control	HAS	✓	✓	missing	missing	excluded	excluded	missing	missing
36.220	test	HAS	excluded	excluded	missing	missing	excluded	excluded	missing	missing
36.230	control	HAS	excluded	excluded	missing	missing	excluded	excluded	missing	missing

*AF = School of Autism Foundation; **EGE = Egebakken Skole; ***SVE = Svedenskolan; ****HAS = Helen Allison School

Table 2. ExTA measurements and their availability for analysis in Prototype 2 testing.

As shown on **Table 2.** above, ETA assessments were made at four HANDS test-sites. From each test child, eight data sets were expected: from 2 kinds of tasks (a daily living task and a social task), two settings for each task type (a school setting and an out-of-school setting), and these four measurements administered both pre-intervention and post-intervention.

- The four folders contain data from one school, with all the protocols uploaded by schools.
- Each protocol contains data from one individual measurement.
 - Each protocol is named after the code of the subject kid, and file name indicates the task type, the setting, and the fact whether it is a pre- or post-intervention measurement.

As noted before, deliverable D2.5.1 will present a detailed description of the Experimental Task Analysis method and data flow for Prototype 1 cognitive psychology testing.

Appendix 3: Persuasive Technology Data

There are two kinds of data used for the evaluation of the HANDS prototype 2 from the perspective of persuasive technology:

- qualitative interviews with teachers and students at the four HANDS partner schools combined with observations at the schools regarding the actual use of the HANDS tools
- data reflection user activity - stored on the HANDS server.

Qualitative interviews

The interviews and the observations in question have been made by a team from Aalborg University with the following four members: Pernille Lepianka, Ulla Victoria Bulwan, Henrik Schärfe, Peter Øhrstrøm.

During the interviews with the students teachers from the local schools have been present whenever the school leaders have recommended this procedure.

Henrik Schärfe has instructed the interviewers. The following questions have been asked to the teachers:

- What are your experiences with HANDS?
- Please tell about positive experiences/outcomes.
- Have there been problems/failures?
- Can you show us how you use the system?

The following list of questions has been used as guide for the interviews with the students:

- How long have you used HANDS (PT1 – PT2)
- Can you show us HANDS on your phone
- Which functions do you use?
- How often do you use the functions?
- Where do you use HANDS?
 - School
 - Home
 - Elsewhere
- Do you talk with others about HANDS?
- Do you use your phone to other things than HANDS?
 - Calls/text messaging
 - Games
 - Video
 - GPS

- If you were to make your own HANDS phone, what would it look like?
- What is good and what is bad about the HANDS tools?

At the Helen Allison School the students were also asked reflect on the use of social media and the possibility of including special kinds of social media in the family of HANDS tools.

This topic was also raised at Autism Foundation, where a special section about social (use of) media was included, to shed light on the possibilities of establishing the SPo.

Question guide (used at Autism Foundation):

- For how long have you used HANDS?
- Can you say three good things about HANDS?
- Can you say three bad things about HANDS?
- What features do you use in HANDS?
 - HIPD
 - SSSI
 - PT
 - Others
- Can you show me how to use HANDS on your phone?
- Where do you use HANDS?
 - Home
 - At school
 - Elsewhere
- Do you talk with others about HANDS?
 - If yes - who? (Family or friends)
 - If no - why not?
- Do you have a Facebook profile?
 - If yes - what do you use it for?
 - If yes - how often do you use Facebook?
 - If no - why not?
 - If no - would you like to have a profile? Why / why not?
- Could you imagine talking about HANDS on a social networking site like Facebook?
 - Why / why not?
- Do you use your phone for anything other than HANDS?
 - Calls / texting
 - Games

- Video
- GPS
- Do you use more than one phone? (One for school and one at home)

It has not been possible to ask all questions to all students. The interviews have been organized as free and relaxed as possible. The students have been asked to bring their phones, and they have been asked to demonstrate the tools implemented on their phones.

Each interview lasted typically 30 minutes. In most cases there are audio recording from the interviews. However, in cases the interviews have only been documented by the interviewer's written notes.

The following interviews have been made:

Interview with 1 teacher at Egebakken, Aalborg, Denmark

Interviews with 3 students at Egebakken, Aalborg, Denmark

Interviews with 4 teachers at Svedenskolan, Stockholm, Sweden

Interviews with 4 students at Svedenskolan, Stockholm, Sweden

Interviews with 2 teachers at Autism Foundation, Budapest, Hungary

Interviews with 2 students at Autism Foundation, Budapest, Hungary

Interviews with 10 students at The Helen Allison School, England

Data from the HANDS server

In addition to the qualitative interviews with teachers and the students at the partner schools some of the data from the HANDS server have also been used in the discussion from a persuasive technology perspective. In principle all HANDS activity on the phones of the students will be stored on the HANDS server. For the present purpose we have extracted data concerning the use of the various HANDS functions in order to obtain an overview of the use of the tools.

Minutes from UPDG

The minutes from the UPDG contain discussions relevant for the general evaluation of Prototype 2 at the partners schools. These minutes will also be available for the evaluation of the system.