

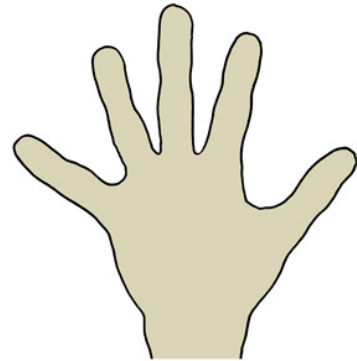
PROJECT DELIVERABLE

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Summary: In this report the results from the three kinds of evaluation of the HANDS software are brought together in order to obtain a common evaluation and conclusion. The report suggests some conclusions and recommendations from HANDS to a future research and agenda. It also suggests a plan for the further exploitation and co-operation among the partners after the project period has been presented below.

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Testing the Hands tools: Bringing three strands together

One of the major themes in the research papers and in the deliverables is the description of how the HANDS project may lead to results which are useful for teenagers with autism in their everyday life. The expectation and the goal of the project is that teenagers with autism will be able to benefit a lot from software systems like the HANDS tools in their daily routines and that the proper use of such tools can contribute significantly to the integration of young people with autism in society. It is, however, still an open question to which extent such goals (including the obvious socio-economic and societal implications of their realisation) can in fact be obtained. From a more general point of view, it is the expectation that the HANDS project will lead to a deeper understanding of the potential in using software tools for such social purposes. A plan for the further exploitation and co-operation among the partners after the project period has been presented below. Clearly the HANDS project has also made it clear that there is a number of problems, which should be studied in more details.

In the following we shall first of all give an overview of the general methodological setup which has been used in HANDS. In order to do so it will be described how the interaction between the three lines of research has been organized within the project. It will be explained how a constructive dialogue between researchers from the traditions of cognitive psychology, education studies and persuasive design studies can give rise to a common conclusion and a very rich evaluation of the potential of the HANDS toolset.

1.1 An overview of the HANDS Research Strategy

During the first reporting period, the design and implementation of prototype 1 of the HANDS tools were prepared with inspiration and ideas from the three scientific traditions (cognitive psychology, education studies, and persuasive design). First of all the system requirements were formulated from the three perspectives by the three respective university partners (ELTE, LSB, AAU). This was done not only based on theoretical consideration, but the formulation of the system requirements was also carried out under inspiration from dialogues with the four partner schools.

The system requirements from the university partners should be seen as input to a partner forum in which the schools were given a central role. This partner forum (discussion group) was led by AAU-researcher Morten Aagaard. As chairman of the group it has been his obligation to lead the discussions in the group and to make sure that the discussions end up in a reasonable agreement. It is important to remember that the choice of the resulting set of requirements should not only reflect the theoretical perspectives from with the three university partners are working. It has been even more important for the consortium that the requirements reflect the ethical and educational values held at the four partner school. This way the process can - to some extent - be said to be inspired from the idea of user participatory design and also from the idea of value sensitive design. In fact these

perspectives have been seen as more and more important during the project period. The consortium has renamed the partner forum as The User Participatory Design Group (UPDG) in order to make the emphasis on such ideas even stronger.

The figure below illustrates the general idea. It is evident that the partner discussion group (UPDG) has had a very important role to play in the process. The work in the discussion group has not in itself given rise to any detailed description. However, it will be fair to say that the work in the discussion takes form of a rational debate aiming at consensus in the group.

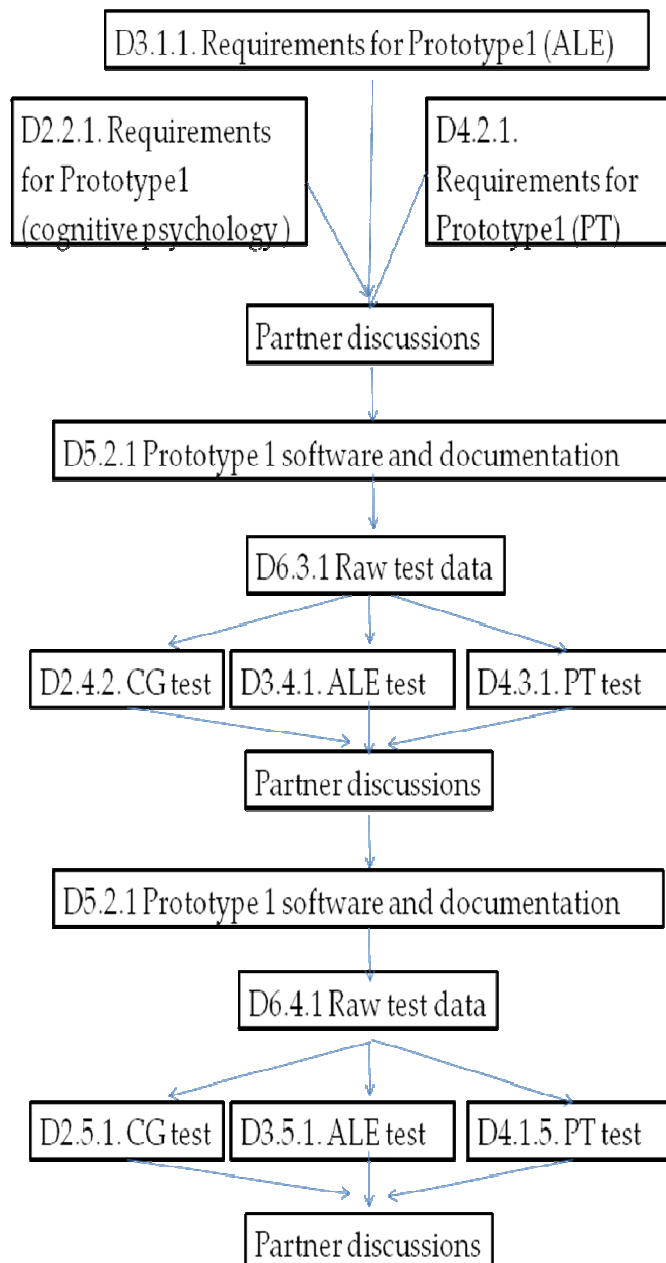


Figure 1: The overall procedure used in the system design and system evaluation within the Hands project. This procedure involves clear aspects of user participatory design and also clear aspects of value sensitive design.

The test of the HANDS tools will highly focus on what is going on at the schools and in general in the interaction between the individual teenager and his or her teacher. And clearly the data are collected at the schools after criteria decided by the university partners. It is crucial that the deliverable D6.3.1 and D6.4.1 are catalogues of all test results and other evaluation data – seen as raw data. These data will later be analyzed from the perspectives of psychology, education, and persuasive technology, respectively. These perspectives are, of course, very different. However, each analysis has to be brought into the partner discussion group (UPDG). When the analysis is presented as part of the rational debate in UPDG there will be a certain homogeneity, which will make it possible to formulate a general evaluation uniting the results of the evaluation activities across the evaluation sites. Again this is an important result of the partner discussions.

In the next chapter, we shall try to show how the results from the three kinds of evaluation can be brought together in order to obtain some common conclusions. In chapter 3, we shall present some attempts in the HANDS consortium at formulating a research agenda related to the Hands project. One of the first major steps in this respect will be the collection of results and open research problems in a book on HANDS. In chapter 4, we shall present a plan for the further exploitation and co-operation among the HANDS partners, after the end of the HANDS project.

Integrated Test Results and Conclusions

The results of the tests obviously have different kinds of implications. First of all, some rather general conclusions regarding the HANDS potential as such are presented. Secondly, conclusions regarding the use of HANDS in a school setting and the role of the teachers in the use of HANDS are brought forward. Thirdly, conclusions regarding the technical side of the HANDS software are included.

On the basis of the studies mentioned above, the following general conclusions can be drawn on the effectiveness and visual design of the HANDS Mobile toolset:

- The visual user interface of the HANDS Mobile toolset has been designed adaptively, that is, in accordance with the specific attentional needs of adolescents with ASD. This conclusion assumes that the actual visual settings of the user interface are set carefully according to the specific needs of the individual user. These are pre-requisites of any successful intervention.
- In case of *specific, much-focused psycho-educational interventions*, such as supporting adolescents with ASD in performing specific social or daily-life behaviours that are problematic for them, HANDS Mobile toolset has proven to be a *highly efficient medium of intervention*, at least in a very short term. In such situations, HANDS-assisted intervention *can be significantly more effective* than traditional

(‘paper and pencil’) support tools. Again, this conclusion assumes that the decision to use the HANDS toolset is made on the basis of careful consideration of the individual user’s specific needs for support, and the actual focus and content of the intervention is set and designed on the basis of such considerations *and* a professional understanding of principles of psycho-educational intervention and support in ASD.

- Appropriately used on a regular basis in a longer run (months), the HANDS toolset seems to have some more general positive effects on developing social and daily life skills in teenagers with ASD. From our studies, we cannot (yet) positively tell whether these effects may be significantly stronger than those of applying traditional means of psycho-educational intervention, but our results suggest that they are at least at the same level. Again, these longer-run positive effects pre-assume a careful consideration whether applying HANDS-based mobile cognitive support is appropriate in case of the given individual, and also a careful composition and continuous monitoring of the specific details and contents of the interventions based on expertise in evidence-based psycho-educational approaches to autism.
- It should further be emphasised that these potential beneficial effects all seem to depend on
 - a. the individual’s specific needs, strengths, weaknesses, motivations and attitudes;
 - b. the pedagogical approach and expertise of the teacher;
 - c. the institutional and professional culture of the school;
 - d. and most probably on several further factors related to the socio-emotional context of the pedagogical intervention.

These factors were not quantitatively investigated, but qualitative research findings from other teams of the HANDS Consortium strongly suggest their relevance.

The tests support the following conclusions regarding the role of the teachers and the schools in the further development of mobile persuasive tools for young people with ASD:

- The teachers should use tunnels system and similar methods from persuasive design. Such methods should be further refined and developed. The users of such systems should make use of the existing best practice examples developed during the HANDS project and available on the HANDS system.
- Teachers should develop interventions for HANDS and similar systems based on recognition of the fact that student awareness of needs and internal motivation for change of behaviour is a key mediating factor. Rather than starting from a position of “teacher knows best”, they should work collaboratively with children and young people to identify interventions, that the child or young person themselves assents to.

- In school based implementations of such systems, strong consideration should be given to increasing the autonomy of the child or young person in terms of their level of control over the interventions that are developed for them in HANDS like systems. Although some level of adult supervision and facilitation will always be required in school based implementations, the balance should be “tipped” further towards the child’s own control of the development of interventions.
- The data also suggests that the schools’ perspective on teaching social and life skills to its students can be a limiting factor for developing the use of support tools outside the school, with the eventual aim of student autonomy.
- Consideration should be given to implementing and testing HANDS-like technology within Further Education and post-16 environments. This could be extended to Higher Education and workplace settings where there would be an equivalent focus on life skills, although this would depend on the status and function of intermediaries such as Higher Education support staff in mediating the use of HANDS-like technology with young people with ASD.
- Consideration should also be given to placing greater emphasis on the role of parents in mediating the use of a HANDS like technology. Where parents were more involved in the planning stage of HANDS, i.e. deciding what, how and when to put scenarios and interventions onto the HANDS tool, teachers felt more and more informed and confident in their decisions about what to put on the HANDS system. Where parents were involved in implementing and supporting their child’s use of HANDS with the teacher, the child had someone outside of school to turn to when they had technical or otherwise difficulties with using the HANDS tool and phone.

The test results also support the following conclusions regarding the technical side of the systems:

- HANDS like systems should include a specific Smartphone application that allows easy access to the CoMe server application via a well designed “app” interface on the Smartphone itself. This will facilitate the ability to more rapidly update interventions on HANDS or similar systems, leading to greater flexibility.
- Experiences across three of the test school sites provide further evidence that students’ relation to HANDS is shaped by their identification with the Smartphone and the other phone features.
- For systems similar to HANDS, developers should aim to accommodate the use of the child’s own mobile device for the mobile persuasive application. An inescapable corollary of this, given the current diversity in Smartphone operating platforms, is that any future HANDS-like system should be developed on a cross platform basis.
- The software specification and development function should be *very tightly aligned* to the user perspective. The software must a) load rapidly, b) react to use inputs rapidly and c) function highly reliable. Furthermore, technical factors such as battery lifetime and charging the phone remain problematic. Clearly achieving these reliability parameters will be dependent on a combination of hardware and software factors.

- HANDS-like technology should come pre-loaded with personal trainer-like functions which are set to remind the user to charge their phone. Furthermore, a charging protocol should be implemented by the key intermediary working with the child with ASD, focusing on ensuring that they regularly charge their device.
- Additionally, HANDS-like technology should be specified to minimize battery drain, thus maximising the charging life span for the user.

Towards a future research agenda

As the HANDS system has proven to be effective and the research on its efficiency successful, we see two major directions for future research agenda that would take the current project and its results as starting points. These two major directions are related to potential extensions of target groups, and to improving development and test methodologies.

3.1 On potential extension of user/mediator groups

(1) The relative success of the current HANDS project and system opens the way to extend the target groups of HANDS and/or its future versions *within the field of autism spectrum*. At least two potential further ‘segments’ of the autism spectrum appear as considerable candidates for such a further extension: (a) *lower functioning / younger children* than the subjects involved in the current HANDS development, and (b) *high functioning teenagers and young adults who live/study/work in an inclusive environment, and not in autism-specific institution (school or daily home, etc.)*. While a future version of HANDS could support social communication and relatively elementary self-management skills in the former potential target group, it could assist the individuals in the latter potential target group in their daily independence and effective learning and working.

Naturally, extending a future version of HANDS to any or both of these potential target groups requires careful analysis of pros, cons, risks and potential benefits as well as ethical considerations, but it can be argued several ways that both directions are promising.

(2) Both potential extensions of the HANDS target group raise the issue that involving new beneficial groups may necessitate to *find adequate novel mediator groups* – that is, well-trained support persons, who are able to tailor and manage the contents of the HANDS mobile system in accordance to the individual needs and challenges. *Parents* as potential mediators appear as plausible candidates in both groups, while kindergarten nurses may also play such a role in younger children group. Other professionals, such as social workers, too, may play this role in case of the high functioning teenager and adult groups.

Any of these possibilities come to reality; there can be no doubt that *well-designed extensive training programs must be elaborated and implemented* in order to make these mediators ready for the task. These training programmes have to involve not only knowledge on the appropriate support practices for individuals with ASD, and on the technical details of managing contents in the HANDS system, but on the ethical principles and rules concerning such a support activity.

(3) Beyond finding further target groups within the autism spectrum, it is a reasonable research goal to identify such *groups beyond the autism spectrum*, too. As argued in this document at section 1.2, such further potential beneficial groups include

- people (older children, adolescents and adults) with Attention Deficit / Hyperactivity Disorder (ADHD);
- mainly adults with Developmental Intellectual Disabilities;
- adults with early phase and/or mild form of Alzheimer Disorder;
- people with traumatic brain injury, mainly with frontal/prefrontal brain injuries.

As these groups show some cognitive/behavioural difficulties partly analogous to those shown by individuals with ASD, we can reasonably expect that HANDS system can be made appropriate for their cognitive support as well.

Again, naturally, extending a future version of HANDS to any of these potential target groups

- requires a careful analysis of pros, cons, risks and potential benefits as well as ethical considerations;
- necessitates finding adequate novel mediator groups;
- and makes it indispensable to elaborate and implement well-designed extensive training programmes for these mediators.

3.2 On research methodology for efficiency testing of assistive ICT for groups with special needs

(1) As HANDS seems to be a useful assistive tool for some individuals with ASD, but not for all of them – similarly to other ICT-based assistive tools, as reviewed in part 2 of this document – it seems to be an important research task to attempt *to profile successful cases* of application. Within the HANDS project, such an attempt has been made with considerable success by the ALE research group, but certainly wide space has been left for clarifying the specific conditions, both within and around the individual that render ICT-assisted intervention/support successful versus unsuccessful.

(2) We strongly believe that the overall mixed-mode research strategy within the HANDS consortium, in general, as well as the multi-method, multiple-levels quantitative efficiency testing within the Cognitive Psychology Work Package have proven to be highly

productive within the current HANDS project. This success raises the possibility and need for *elaborating a general methodological model for testing assistive ICT tools for groups with specific needs*.

(3) Such a general model, in our conviction, should involve specific practices in order to avoid occasional within-project interferences between (a) development and testing, and (b) between testing practices in different involved disciplines.

(4) Finally, as integrated analysis of log-data (electronic footprints) and psychometric data, elaborating refined methodological models for such integrative analyses of these data sources would certainly be a highly useful research goal.

3.3 Preparations of a Book on the Results of HANDS and the Open Question Discovered in the Project

Based on the discussions among the HANDS partners there is a high degree of agreement on what would be important to study further in this context. This common understanding has led to the following proposal of a scientific book dealing with the most central research issues related to the HANDS project.

Following an approach by IOS Press, a Dutch academic publishing house, the HANDS consortium has signed an agreement to publish a book about the experiences and outcomes from the HANDS project by December 2012.

3.3.1 General Outline of the Book

The book will form part of the IOS's series: *Ambient Intelligence and Smart Environments* (AISE). The book will include chapters on (subject to editorial confirmation):

1. Introduction – Wider context of assistive and ambient technology, use of mobile devices, E-inclusion, and technology design strategies
2. ASD - the need for inclusion and approaches to E-Inclusion
3. Persuasive Design Theory (for mobile devices) and its application to psycho-educational settings
4. Experiences with implementation – technological and pedagogical factors, including case studies of “success stories”
5. The Ethics of Persuasive Design in Psycho-educational settings including specific issues around the use of GPS

6. Persuasive Design in Action – relevant factors
7. Mixed Mode Methodology / Recommendations for the use of persuasive mobile design with young people with cognitive and social impairments

3.3.2 Some Key Highlights Expected in the Book

Autism and Technology

The book will show how the specific cognitive, behavioural and motivational patterns characterising individuals with autism spectrum conditions lead to specific needs for support and inclusion, and what are the core approaches to exploit information and communication technology for fulfilling these needs. Accordingly, a short introduction is given to the most important basic facts about Autism Spectrum Disorders (ASDs) first where biological foundations, in interaction with some social factors, lead to atypical patterns of key human abilities. Consequently, individuals with ASD often show severe difficulties in social engagement, social participation, as well as in daily life management. These difficulties, in turn, give way to a very high risk of social isolation and marginalisation. We also examine briefly the kinds of specific problems and needs for support, relevant to teenagers with ASD. We present a short overview of the existing key approaches to using ICT tools to support individuals on the Autism Spectrum, with an emphasis not primarily on technological, but on functional aspects. A map of this highly specific but growing field is outlined, with the HANDS system located on it.

The experience of using HANDS

When covering experiences in the HANDS project, there will be a focus on the teachers using the HANDS mobile tool and what we have learned about the challenges and potential of using persuasive cognitive support tools with young people with ASD in educational settings. These include “product” orientated experiences, encompassing technical, usability, and functionality issues. For example, the use of the HANDS mobile tool in school highlighted the importance of flexible screen layouts. This was found to be particularly important as some children had a preference for text based layouts whilst others had a preference for image based layouts. This led to the development, in the second HANDS prototype, of a flexible layout design tool that allowed for case by case variation of the balance between text and images on any intervention screen. “Process” orientated experiences included the lessons learned from the implementation process itself, particularly with regards to the extent to which HANDS was incorporated into existing pedagogical practice as well as challenges and difficulties associated with achieving a successful integration. For example, the use of the HANDS mobile tool in school highlighted the importance of battery life and indicated the need to develop a charging protocol on a child by child basis. This frequently involved liaison with parents and development of strategies for use of HANDS across both home and school.

This experience will be illustrated with examples drawn from the direct experience of the teachers and other professionals working with the HANDS mobile tool. In other words, it will illustrate how teachers as professionals can creatively reflect on their own practice in the context of the introduction of a new technology tool. Such reflections will be contextualized in a framework based on the work of Schon (1985) and will make use of the concept of the "reflective practitioner" in illustrating how teachers think about and solve issues involved when working with children with ASD, and the role potentially played by the technology when addressing such issues.

Additionally, the use of the HANDS mobile tool will be presented by teachers working with individual children (teacher-child dyads). These portraits will include: i) a sketch of the teacher and their classroom including their overall experience of and attitude towards ICT in the classroom, ii) a sketch of the child and their strengths and weaknesses, iii) the particular child's problem(s) that the teacher focused on when using HANDS, iv) the teacher's experience of using HANDS and how it related to their existing practice, with a particular focus on challenges and difficulties, v) the teacher's perception of the difference HANDS made to the child and the problem(s) in focus, vi) links with parents and the home, including the use of the HANDS mobile tool outside of the school, vi) the teacher's recommendations for future development and implementation of mobile ICT for young people with ASD.

Reference will also be made to institutional and structural issues and the potential role that they can play in mediating successful engagement with new technologies in the classroom.

Ethics

The HANDS-project may be described as a research project studying the transforming effects of state of the art information- and communication technology on the social life of a group of vulnerable young people. As promising as this may sound, the mixture of research, new technology and young and vulnerable people evidently calls for careful consideration of the ethics of such endeavors. From the very outset of the HANDS-project an ethical board was formed with the purpose of discussing general ethical questions related to HANDS, of ethically evaluating the requirements of the systems supposed to be tested and used by children and young people with an autism diagnosis, and of ethically evaluating all clinical tests involving children and young people with an autism diagnosis. In the course of the project the Ethical Board of HANDS has processed several applications for testing and has been closely involved in discussions of a number of ethical aspects of the project.

We will discuss the specific ethical questions and problems of involving young people with an Autism Spectrum Disorder (ASD) in a research project such as HANDS as well as the ethical questions and problems associated with the use of the specific technologies in HANDS.

Methodology, Evaluation Outcomes and Future Recommendations

We will present an overview of the complex empirical methodology by which efficiency and applicability of the HANDS system have been tested. We will summarise the main results from these tests; and explore vistas for future developments and wider applications for both the HANDS system and the test methodology. The first part of the chapter is devoted to a brief outline of these contexts and methodological dilemmas and to an overview of the scheme of the multi-mode methodology that has been designed for testing efficiency and applicability of the HANDS system. As this scheme is based on both a share of labour and cooperation between methodologically basically autonomous research streams, the second part of the chapter introduces briefly the designs and methods used by the three disciplinary strands. Important aspects of the overall design has been that the Cognitive Psychology stream applied quantitative methods, while Applicability in the Learning Environment and Persuasive Design strands used mainly qualitative methods. All streams, however, have had access to the same shared database of raw data, and they have communicated closely during analysis and interpretation. There will be a brief overview of the major research findings – both of those that arose from the contribution of the specific research streams, and of those that arose genuinely from integrated interpretations. Throughout this, specific attention has been paid to the benefits from cooperative acts between the three research streams. This review of main findings suggests that, with adequate institutional and technological background and pedagogical embedding, the HANDS system is an efficient element in the toolset for supporting *some* teenagers on the Autism Spectrum, as its use is able, *in selected cases*, to enhance their social, self management and daily life skills. Also, the specific, complex research design outlined previously has proven to be highly productive to reveal positive effects as well as their contextual preconditions and some limitations. Based on these results, we focus on future perspectives in three ways: what are the vistas for further development of the HANDS system; what are the promising directions for widening the target group(s) of potential users; and in what ways could the overall successful methodological approach be further improved.

A plan for the further exploitation and co-operation

The HANDS partners have discussed how the results of the HANDS project and the software developed during the project period can be used in the future for the benefit of young people with an autism diagnosis, who need to be better integrated in society. The conclusion of these discussions is that a new organization should be formed. This organization should continue and further develop the efforts made in the HANDS project. *HANDS Open* has been chosen as a name of the new organization in question. This name should be seen as an indication of the intention to extend the use of the tools and the work with the further development of the methods to more schools for young people with autism.

The background for the formation of HANDS Open is a common understanding of the intellectual property rights (IPR) related to HANDS. Since all partners have contributed to the establishment of the scientific results as well as the development of the HANDS tools, all partners have some IPR related to HANDS. However, since the co-operation in HANDS has been rather close, it makes no sense to make statements deciding precisely which partners should be entitled to which intellectual property rights. For all practical purposes, it makes more sense just to place the rights in question in the fellowship of partners. The idea is that HANDS Open, for all practical purposes, should function as the joined owner of the HANDS results and the HANDS software.

The formation of HANDS Open

All HANDS partners have been invited to join the HANDS Open organization, and all partners have in fact agreed to join. HANDS Open will be led by a board. The agreement is that all partners can appoint one member of the board. The partners have also elected Morten Aagaard, Aalborg University, as chairman of a working group for HANDS Open. The chairman is going to lead HANDS Open through its first period. The partners agree that one of the first obligations for the working group will be to formulate proper and formal regulations for the organization assisted by the office for legal matters at Aalborg University.

New members of HANDS Open

It should be possible to include new members in HANDS Open by unanimous decisions of the board. Such new members could be schools for young people with autism or research units with the ambition to further develop the HANDS ideas and techniques further. It could also be companies wanting to market the HANDS products (the software, the courses etc.).

The purpose of HANDS Open

HANDS Open is supposed to deal with a number of rather different challenges. The work carried out within the organization will include activities regarding the present HANDS

software and activities as well as the further development of the software and the further development of the use of the HANDS ideas and techniques.

One major task to be carried out within the HANDS Open cooperation has to do with the HANDS server. It is very essential for the use of the HANDS software that the server is active and constantly under supervision and maintenance. During the project period this work has been carried out at Aalborg University where the server is presently placed. This will continue after the end of the project period. If Aalborg University at some point in the future should wish to stop this activity, it will be the obligation of the board of HANDS Open to find an acceptable solution regarding the server. (In fact, the present leaders of the computer department of Aalborg Municipality have already indicated that they might be ready to accept the obligation of hosting and maintaining the HANDS server, if it turns out to be needed in the future.)

It will also be an important task for the HANDS Open organization to develop the HANDS tools and techniques further. In particular, the educational perspectives will be important. The HANDS tools should be seen in an e-learning context. It is essential that the teachers are trained in the use of the HANDS tools and the use of the data stored on the HANDS server. For this reason, one very important challenge for HANDS Open will be to establish a certified education for experienced practitioners employed at schools for young people with autism (see below).

It should also be mentioned that it will be an important challenge within the HANDS Open organization to investigate the potential extension of HANDS or its spin-offs to other groups in need for cognitive support, especially groups with needs somewhat analogous to those of people with ASD.

Furthermore, it will be important for HANDS Open to establish more research in order to develop new ICT tools, which can be relevant along with the HANDS tools which have already been developed. One such project could be that of "Human sensing", which has already been preliminary discussed among the HANDS partners (- see <http://www.humansensing.blogspot.com> and Rosalind Picard's paper on sensor use and individuals with autism, "Future Affective Technology for Autism and Emotion Communication", www.media.mit.edu/affect/pdfs/09.Picard-PhilTranRoyalSocB.pdf). In addition, it is essential that the HANDS Open cooperation pay due regard to the ethical issues involved in the HANDS techniques. In particular, it is important that the procedures involved in the treatment of person sensitive data is constantly monitored in order to make sure that no personal right and no personal integrity is being violated.

Finally, it will be important for the cooperation within HANDS Open to establish further relevant business contacts in order to explore the commercial potential in the HANDS software and the HANDS techniques. In the present situation, the companies already related to the HANDS project, do not want to invest in the further development of the

HANDS software and the HANDS techniques etc. however, this might have to do with the general financial climate. It is conceivable, that things may be different in a better financial situation, which will hopefully occur soon again.

Towards a certified education for experienced practitioners employed at schools for young people with autism

The main idea in HANDS is that the individual teacher at a school for young people with autism should tailor individual tools for each of her or his students, and that the teacher should benefit from the fact that the use of the tools are monitored at the HANDS server when supervising her or his students. Given that this is the case, it is obvious that the training of the teachers at the schools is essential for the success of the HANDS ideas. One of the conclusions in the HANDS project is that too little emphasis has been put on the training of the teachers in the use of the HANDS software and techniques. For this reason it will obviously be a good idea to establish a certified HANDS education for experienced practitioners employed at schools for young people with autism. This education should obviously equip the teachers with sufficient knowledge and sufficient technical skills in order to use the HANDS toolbox to tailor individual tools and in order to make use of the data stored on the HANDS server. Furthermore, it should be a substantial part of this education to make the participants aware of the ethical problems and challenges involved in treating person sensitive data carefully and respectfully.

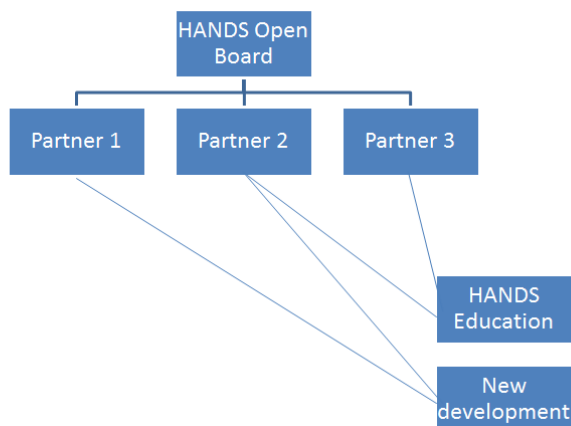
Clearly, this kind of certified education has to be established on a national basis – at least for language reasons. On the other hand, obviously many parts of the educations will be alike in spite of the language differences. In fact, this educational activity can, to a large extent, be organized and supported from HANDS Open, although this is an international organization.

Financial issues

The HANDS partners do not have to pay anything in order to become and to stay members of the HANDS Open organization. It is expected that the activities in HANDS Open to a large extent can be carried out without a common economy. One option is to make case-to-case decisions on the application for funding that might be needed. Likewise special arrangements may be needed whenever various costs related to HANDS Open have to be covered. It may be decided that companies, schools, or other organizations have to pay a certain amount in order to become members of HANDS Open. The board will have to decide how any income of this kind should be spend and administered.

The formal organizational structure of HANDS Open

The formal structure of HANDS Open is quite straight forward:



Formal structure of the HANDS Open organisation

The HANDS Open Board has the overall responsibility of the HANDS Open organization. It consists of all partners in HANDS Open. If new partners should be included the HANDS Board has to accept the new partners unanimously. This structure minimizes the organization and the scenario-oriented management decisions in a rapid changing market.

The responsibility of the HANDS Open Board is

- To manage the HANDS Open collaboration in a scenario driven manner.
- To make an overall ICT development strategy
- To confirm and support large funding applications.
- To consider new collaboration partners.
- To decide on common experiments
- To describe the overall purpose and quality of HANDS Open educations
- To confirm educations
- To manage ICT services (server, e-store, web service)
- To facilitate new initiatives

Legally speaking the HANDS Open organization consists of a “Collaboration Agreement”. Partners should be responsible for taking initiatives with respect to their capacity, their knowledge about national market conditions. Rather than letting the HANDS Open Board take such responsibility.

In that sense, the responsibility for a strong HANDS Open collaboration is in the hands of the members' initiative.

Some activities within the HANDS Open organization may have a revenue. It will be the responsibility of the HANDS Open Board to decide how this revenue should be spent or split between partners. Minor activities are mandatory, though,

- Developing a local HANDS templates
- Maintaining locally hosted websites

This way, HANDS Open is in line with the recommendations in D8.1.

A potential split of revenue between partners has to balance the local as well as global needs for HANDS. A potentially global HANDS Open organization should obviously focus on further development of the HANDS Open software.

The certified HANDS Open education is one cross-disciplinary activity expected to take place within the organization. Others could be:

- Research – experiments that require participants from several countries and several schools.
- Research – large international and interdisciplinary projects, e.g. funded by the European Commission, inspired by the work done at Aalborg University (AAU)¹ and Massachusetts Institute of Technology (MIT)².
- School driven collaboration, e.g. oriented towards the use of sensor technology.
- Exchange of teachers and/or pupils between the schools.

Further considerations regarding the practical implementation of the HANDS Open idea may be found in the Exploitation section in the Final Project Report.

¹ [Vbn.aau.dk/en/projects/humansensing\(f89a6e2f-3e08-46c1-992b-29f385c62ab9\).html](http://vbn.aau.dk/en/projects/humansensing(f89a6e2f-3e08-46c1-992b-29f385c62ab9).html)

² www.media.mit.edu/affect/pdfs/09.Picard-PhilTranRoyalSocB.pdf

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