

# POSEIDON

PersOnalized Smart Environments to increase Inclusion of people with DOWn's syNdrome

## Report Advisory Committee meeting

Fraunhofer IGD premises  
Darmstadt, 17th February 2016

### Purpose of meeting

The purpose of the meeting was to

- Present the POSEIDON project to the AC
  - Ethics, Privacy, Personalisation
  - POSEIDON services
  - POSEIDON framework to encourage other system developers to develop services for persons with Down syndrome
- Get feedback from the Advisory Committee

### Participants

Advisory Committee

- Anna Contardi
- Markus Dederich
- Arne Manzeschke

The consortium

- Terje Grimstad, Karde
- Gro Marit Røddevand, Karde
- Juan Augusto, Middlesex University
- Alexandra Covaci, Middlesex University
- Dean Kramer, Middlesex University
- Andreas Braun, Fraunhofer IGD (welcome address)
- Silvia Rus, Fraunhofer, IGD
- Eva Schulze, BIS
- Anne Engler, BIS
- Lars Thomas Boye, Tellu
- Lasse Brustad, NNDS
- Christine Schniersmeier, ADS

### Introduction

To demonstrate the co-creation of the POSEIDON-system between the project and the persons with Down syndrome, the project shows videos from workshops in Oslo and Mainz and pilots in Germany (pre-pilot, pilot 1 and extended pilot) and from the Down syndrome congress in Augsburg autumn 2015). The videos showed snapshots from the development process and from the use of the POSEIDON-system.

Immediately there were some questions about the Interactive table. What do the users prefer? It is part of the project to investigate if the table is a positive asset for the primary users. From the pilot,



some families liked the size because it was at a fixed place and it supports big gestures in the learning situation, which some regards as a means for quicker learning. The table creates stability in the learning situation. However, some families regard the size and space consumption as negative. The general feeling is that the table fits better in schools and special homes where there are several primary users.

Presentations of the members of the Advisory Committee

[Prof. Dr. Arne Manzeschke](#)

Institut Technik-Theologie-Naturwissenschaften an der Ludwig-Maximilians-Universität München

- Main interest: Assistive technologies and ethics.

Arne Manzeschke made some opening remarks about ethics. Applying ethics opens up spaces of opportunities. It raises serious moral questions. How we decide about these questions decides about who we are, what kind of human beings we are and in which society we live in. Ethics should be conceived as the methodologically controlled way of reflecting serious moral questions. There is an ethical conflict between self-determination and care. This conflict is apparent in POSEIDON where the project wants to support inclusion and independence for people with Down syndrome, while carers and family want to have some kind of control. The key become to find the right balance. There are several levels of decisions and responsibilities: Societal, organisational and individual levels. If we could get designers of technology to think about the ethical and social implications of their designs before they become a reality, the world might be a better place.

[Prof. Dr. Markus Dederich](#)

University of Cologne, Faculty for Human Sciences, Department for Special Education and Rehabilitation.

- Main interests: Disability studies and technological issues (which he reflects from a pedagogical and philosophical point of view)

Dederich regards the POSEIDON project as an important European initiative to support inclusion, independence and a higher quality of life for people with Down syndrome. He acknowledges the effort that are being done by the interest organisations in Europe, and regards POSEIDON as an instrument, which can add to and increase the meaning and scope of their work.

[Mrs. Anna Contardi](#)

Manager of the Italian Down syndrome association (AIPD) and general secretary of EDSA (European Down Syndrome Association)

- Main interest: To get persons with Down Syndrome into ordinary work.

Has worked for the Italian association AIPD since 1981. General secretary of EDSA since 2014.

AIPD is involved in many projects, national and international, addressing the needs of people with Down syndrome. Anna Contardi is interested in new technologies and to support inclusion and independence for people with Down syndrome.

The mission of EDSA is to promote the development of a network of associations for Down syndrome in all European nations, respecting the diversity of cultures and peoples, the common denominator being the improvement of the quality of life for persons with Down syndrome and their families. EDSA has 37 member countries and 2 associated members. EDSA has a close cooperation and open discussions with its members. EDSA is a network that do not have employees. EDSA points to opportunities.

Project: On-my-own.eu. About Job inclusion and personalised apps. Different jobs in a hotel. Videos and checklists. App is a way to become independent. Goal: to create network of hotels and to have internships for people with intellectual disabilities.

Project Euro. New technologies could be a useful instrument to help with life. The Vodafone foundation contributes with funds. House with technology. Indoor tracking, "remember to take your keys with you", if the person usually forgets his keys.

## Down syndrome associations in the POSEIDON project

### Norwegian Network for Down Syndrome (NNDS), Lars Erik Brustad

NNDS has 1000 members and 3500 FaceBook friends. Lars Erik Brustad is general secretary. Supportive board who performs the work on a no pay basis. NNDS gets some public support, about 50.000 euros per year.

NNDS is concerned about what comes after POSEIDON. NNDS would very much like that the exploitation efforts and the realisation of a POSEIDON ecosystem shall succeed. The POSEIDON ecosystem will enable more professional services to the Down syndrome community because the proposed business model will generate revenues for the associations. These revenues will be used to employ people who could keep the ecosystem up and running after the POSEIDON project ends.

Regarding the POSEIDON ecosystem, a recognition is that most people will not read long articles in foreign languages. Therefore, with editorial support, foreign publications may be translated and summaries be presented to the members of the ecosystem. This will help to increase the knowledgebase regarding Down syndrome.

Furthermore, one important task for NNDS, is to help people with Down syndrome to work on regular work places. Persons with Down syndrome need supported employment, but the problem is that this is seldom given at regular work places. In Denmark, there is a project called KLAP. KLAP is seeking funding to get people into work, and has been rather successful. KLAP has provided 1000 ordinary jobs for people with intellectual disabilities in Denmark. This experience could be shared with other countries via the use of the POSEIDON ecosystem. Important apps from all over Europe or the world can be shared and adapted to each country via the POSEIDON ecosystem. NNDS, AIPD and EDSA share the same ambitions.

NNDS is also concerned about the attitude people with Down syndrome meet in society, from politicians, from medical doctors etc. There is scarce knowledge about Down syndrome, and information is needed. In order to provide information to the society, NNDD tries to get slots in press and TV.

### Arbeitskreis Down-Syndome (ADS), Christine Schniersmeier

For more than 30 years, Arbeitskreis Down syndrome e.V. has worked for the rights of people with Down syndrome and their recognition in the society.

ADS has been very active in the POSEIDON project. ADS has organised and taken part in several co-creation activities in order to make the POSEIDON-system well suited for both primary, secondary and tertiary users.

## The overarching methodology of the POSEIDON project

1. Requirements capture
  - Questionnaires to secondary and tertiary users, responses from 500 persons
  - Interviews with people with Down syndrome, 29 persons

- Workshops with eight Down syndrome associations in Europe
  - Presentations and feedback at different events directed by the project or the participating Down syndrome associations, 8 countries
2. Based on requirement, decision of POSEIDON-services
    - Support mobility, time keeping, handling of money
  3. Technical requirements in 5 categories
    - Framework
    - Functional
    - Non-Functional
    - Design constraint
    - Hardware
  4. Definition of first architecture and framework
  5. Implementation of first prototype
  6. Implementation of second prototype to be tested in Pilot 1 end an extended pilot
  7. Conducting Pilot 1 and the extended pilot
  8. Based on results from Pilot 1 and extended pilot, update architecture, framework and POSEIDON system
  9. Run Pilot 2 with updated system

### Discussion about methodology

The Advisory Committee endorsed the methodology and noted that the number of respondents for requirements capture were sufficient to generate valid conclusions.

### Ethics, privacy and security

#### Discussion about tracking of people with Down syndrome

POSEIDON has this function due to safety reasons. Secondary users get an opportunity to monitor the motion of the person with Down syndrome. This creates some kind of safety for the person with Down syndrome and a reassurance for the secondary user. In the requirement capture phase, the project interviewed 29 persons with Down syndrome and asked if they think it is ok that the parents know where they are. They had no objections to being tracked, however, not always. They wanted to have some secrets; the secondary users should not know everything. Therefore, the POSEIDON-system give the primary user the option to turn tracking on and off.

This raises the question of giving consent or not, of the primary user having the competence to give consent? It is the same discussion as for tracking people with dementia. It is a bargain between safety and freedom. Down syndrome is different from dementia. Due to the diversity of people with Down syndrome, some of them have a complete regular competence ability, and many of them can express what they mean (but they are very easy to lead/manipulate), but some of them cannot present preferences. People with dementia will at some point in time not be able to express their preference.

The Advisory Committee expressed that the POSEIDON solution of letting the person with Down syndrome turn the tracking on and off, is a good compromise between safety and freedom. Today, turning off the tracking function is definite. Neither the secondary user nor the POSEIDON-system will be able to monitor the primary user. However, it is possible to implement the POSEIDON-system to track the person without disclosing this information to the secondary user. This was considered a better solution than the one implemented today. E.g., in emergency cases where the person with Down syndrome disappears, the police may ask for information about position.

## Ethics

Arne Manzeschke presented shortly the Meestar system. It is an instrument of ethical evaluation. It provides Ethical-normative guiding principles for the use of ambient assisted living systems (<http://www.ttn-institut.de/node/1581>).

German version for download: <http://www.ttn-institut.de/sites/www.ttn-institut.de/files/Abschlussbericht%20Ethische%20Fragen%20im%20Bereich%20altersgerechter%20Assistenzsysteme.pdf>

English version for download: <http://www.nks-mtidw.de/infomaterial/ethical-questions-in-the-area-of-age-appropriate-assisting-systems>

## POSEIDON presentation of Ethics, privacy and security

Professor Dr. Juan Augusto of Middlesex University, UK, presented the ethical principles followed by the POSEIDON project.

Deliverable D2.4 Safety, Privacy and Ethical Considerations is a document compiling all safety, privacy and ethical main considerations to be observed. It will be followed independently in dedicated actions within other WPs given their importance on the acceptance of the final product and the impact of the project as a whole. Interim reports will be delivered in months: 3, 21 (after pilot 1) and 31 (after pilot 2).

The document has an emphasis on:

- Person, including the areas with need for support and targeted aid given
- Technology, including requirements for a successful and safe use
- Research, including modalities for involving people with special needs.

We have created a framework to guide development of technology in this area with ethical considerations embedded in the development process. The framework is based on the eFRIEND ethical framework, which was created for Intelligent Environments in general.

Jones, Simon and Hara, Sukhvinder and Augusto, Juan Carlos (2014) *eFRIEND: an ethical framework for intelligent environments development*. **Ethics and Information Technology**, 17 (1). pp. 11-27. ISSN 1388-1957. Springer Verlag.

The considerations are mapped to requirements to the POSEIDON-system:

- 7 Framework requirements,
- 20 Functional requirements,
- 10 Non-functional requirements,
- 4 Hardware [H] constraints
- 6 Design [D] constraints

These principles are informed by the Intelligent Environments Manifesto proposed by Augusto et al (2013a) that advocates the development of systems in a manner, which is aligned with a number of explicitly defined user-centred principles:

- P3—deliver help according to the needs and preferences of those who are being helped
- P5—preserve the privacy of the user/s
- P6—prioritize safety of the user/s at all times
- P9—adhere to the strict principle that the user is in command and the computer obeys

Augusto, J.C., Callaghan, V., Kameas, A., Cook, D., Satoh, I. (2013) *Intelligent Environments: a manifesto*. **HumanCentric Computing and Information Sciences**, 3:12, Springer. DOI: 10.1186/2192-1962-3-12 URL: <http://www.hcisjournal.com/content/3/1/12>

#### General principle 1: Non-Maleficence and Beneficence

- *The system should avoid causing harm to any of the users*
- *The system should proactively seek for opportunities to assist users*
- *The system should actively benefit users by enhancing their welfare and quality of life*

POSEIDON aims to enhance the welfare and quality of life of its target users by enhancing their autonomy, independence and social inclusion. It incorporates measures to avoid any risk of harming the user.

The project has an Ethics Advisory Committee, comprised of experts on ethics, data protection and on the target users (representatives of Down Syndrome associations in the participating countries).

#### General principle 2: User-Centricity

- *Users should be placed at the centre of the development process*
- *The type of technology and associated services should be agreed with users in advance*
- *The system should be designed and implemented in accordance with users' wishes, ambitions and values*
- *The systems should be customisable to dynamically evolving individual needs, preferences and requirements*

The POSEIDON project aims to develop assistive technology in joint collaboration with primary users and their carers at every stage of the development process.

Primary and secondary users' wishes, values and needs are taken into account through detailed requirements gathering and analysis via surveys and face-to-face interviews with secondary and primary users.

From this information, a clear understanding has been gained of primary users' living situations and daily living competencies, levels of proficiency using existing technology, together with the range of physical, sensory and cognitive difficulties they experience, including areas such as motor skills, speech, writing and learning disabilities.

The POSEIDON system aims to address these challenges by providing context-specific help, information and intelligent assistance which is appropriate for different situations.

#### General principle 3: Multiple users

- *The system should be aware of the different needs and preferences of all individuals in a multi-user environment*
- *The system should consider how to balance the competing rights, preferences and requirements of different users*

POSEIDON is specifically designed for a multi-user environment and incorporates the needs and requirements of various stakeholders, including:

- primary users (people with DS),
- secondary users (parents / carers) and
- tertiary users (for example, personal assistants, support workers, specialist teachers, healthcare professionals, employers and local authorities).

The project acknowledges that these requirements and preferences may need to be balanced and/or prioritized, and that they may change dynamically over time.

#### General principle 4: Privacy

- *Users can specify privacy levels and preferences for different services*
- *Users decide on, and can change, levels of acceptable recording, monitoring and tracking of activities*

The results of the requirements analysis confirm that privacy is of high importance to potential users of POSEIDON and must be guaranteed in usage outside the home. POSEIDON accordingly aims to ensure that no user's privacy is violated. Users and their carers will have the ability to adjust privacy levels and to specify which personal data can be accessed and for what purposes it can be used.

Fr6—When live, support the privacy of end-users. Provide optional user privacy settings to enable customization

Fun10—Users should be able to decide on, and vary, the level of privacy at a specific point in time

#### General principle 5: Data protection

- *Users have access to the sensitive information stored about them and can decide what can be done with this information*
- *Users can determine levels of information-sharing and disclosure*
- *The system should seek informed consent to secondary uses of personal data by 3rd parties*
- *The system should adhere to recognised principles and good practices of data protection*

While the effective use of POSEIDON makes it necessary to collect and analyse personal data to provide appropriate tools for different situations, data protection principles will be adhered to regarding informed consent for data collection, controlled access to secondary uses of personal data, and storage of (un)necessary data according to specified time limits.

Fr9—Safeguard user data at the server-side with appropriate backup. Optional user settings to customize data storage requirements

Fun12—When live, users' information security should be protected

NF10—Context-related data should be stored for no more than 6 months

Fun11—Users should be able to decide the type of information stored in the devices used

#### General principle 6: Safety and security

- *The system should protect users and their information*
- *The reliability and stability of systems must be ensured*
- *The security of data transfer must be ensured*
- *Adequate security measures and standards, appropriate to different environments, must be provided*

The use of a tablet device in a public setting by vulnerable users raises potential safety issues. Location and context awareness features will help the user to tackle difficult situations where they feel insecure or unsafe. Interfaces should provide a quick and reliable communication channel in order to call someone for help. Location-tracking via GPS and emergency connectivity enable carers to know the current whereabouts of their protégés, their previous locations, and enable them to check that they had reached their destination safely. Primary users will be able to contact the carer if they get lost or have problems finding their way and need help.

Fr5—When live, support the safety of the end users

Fun2—System should provide immediate access to phone call

Fun5—System should keep track of user's position when travelling outdoors

Fun27—Carers should have possibility to request location of primary user

Fun28—Carers should be able to contact the primary user

H9—Device level access security should be present

NF5—Network level security for mobile component

#### *Specific consideration on Reliability*

Given that users may be dependent on the POSEIDON system outside the home, it must be robust, stable and reliable.

Fr17—When live, framework components should have robustness and fault-tolerance comparable to non-vital commercial systems

NF11—The system should be available 24/7, except for short periods of downtime for maintenance such as system upgrades

NF12—When live, system should be reliable enough so that its services are working and available at least 95% of the time

NF13—When live, maintainability should be such that the time to get the system restored after major failure is less than 1 day

NF14—When live, technical support should be available

Fun6b—Should provide comprehensive outdoors navigation services

#### *General principle 7: Autonomy*

- *The system should support and enhance the independence and autonomy of its primary users*
- *Users should have the freedom to override or “switch off” the system at any time if its performance is negatively perceived*
- *Users should be trained to operate the system to the extent they wish*
- *Users can determine for themselves degrees of protection, privacy and information-sharing*

The survey and interview data suggested a strong wish on the part of the target users to be more independent, and less reliant on carers and relatives. A high priority for POSEIDON, therefore, is to provide context-specific assistance to support autonomy and independence in the above areas. Enabling tasks to be completed independently without the need for assistance will potentially boost users' self-esteem and confidence.

Autonomy, however, as previously discussed, also means users being able to control technology. POSEIDON will be adjustable to individual preferences and personal needs. Users will be able to customize the system, within their framework of capabilities or with the help of their carers. While default settings will be provided, POSEIDON will include the ability to override those defaults. The system will allow for some functions to be switched on or off, in line with different needs and competencies. Functions do not have to be used all the time, or in situations where support is not needed. It is recognised that too many choices and functions working at the same time could make it difficult for the user. Users, ultimately, will thus have the ability to scale back, or turn off the system if they feel bothered by it.

NF1—System should promote user's autonomy and independence

Fr8—Support for optional interface customization to suit the end-user's needs

Fun9—The system functionality should be customizable

Fun19—The system should assist with activities supporting independence and integration

D7—Special consideration given to the way time is represented and communicated

Fun15c—Third User-level contexts to be considered are: socializing, healthcare, managing money



### General principle 8: Transparency

- *All users should be clearly informed of the pros and cons of the services offered by the system, including system capabilities, potential weaknesses, vulnerabilities and negative consequences*
- *Users should be given notice of the existence of intelligent environment activity in an open manner*
- *Background data processing, monitoring and surveillance should be made visible to users, where possible*

To be in the control of the system, users need to understand its (re)actions, feedback and possible uses.

Potential weaknesses, limitations and vulnerabilities in the POSEIDON system will be made transparent to users, including system operations, data collection and use, and surveillance activities.

NF8—System should be open and transparent to users with respect to expected system functionality and weaknesses

Fr11—Documentation must be provided to enable project participants and third parties to develop POSEIDON components

Fr22—Extensible, allowing integration of new functionality not yet foreseen

Fun31—Provide confirmation that system has processed a request so user knows what is going on

### General principle 9: Equality, dignity and inclusiveness

- *The system should provide help regardless of age, technical background and ability*
- *Affordability, fair provision, accessibility of technologies should be ensured*
- *The system should accommodate different levels of cognition and competence*
- *The system should reduce social isolation and not substitute for human care*

POSEIDON will be designed simply enough so that it can be used by the widest possible range of users with different potential levels of competence and cognitive ability. The system kits will be financially affordable and available in various price categories with different payment options.

Accessibility and inclusiveness will also inform design and usability. In tune with user requirements, the system will avoid the need for fast reactions, fine motor skills and manual dexterity. It will be generally symbol-based, rather than text-based, using gestural interaction where appropriate. POSEIDON will have an attractive design and user interface that is fun and simple to operate.

NF9—The system should provide help regardless of age and technical ability

H1—Cost of tablet should be less than €...

H2—Cost of virtual reality set less than €...

H3—Cost of adding interactivity to the table less than €...

NF17—Motivating to use

D2—Interface preferably based on symbol, icons and animations

D3—Take into consideration aesthetical features (colours, fonts, contrast, etc.)

D4—Consider design heuristics

### Specific consideration on Social inclusion

One of the most important requirements to emerge from survey data was the facilitation of communication and socializing with others, in order to reduce the risk of social isolation that people with DS face, and increase their independence. Social inclusion was in turn found to be closely related to mobility and travel independence, a major factor in feeling independent and less reliant on others.

Fun7—System should be proactive (instead of reactive) in the following situations: issuing reminders in the areas where the primary user has indicated more help is welcomed (candidates: planning trips, during travelling from A to B)

Fun15a—First User-level contexts to be considered are: travelling, communicating

Fun15b—Second User-level contexts to be considered are: studying, working, well-being

Fun16—When live, ‘safety net’ plan for foreseeable situations (e.g. bus does not arrive and no connection)

Fun18—System should provide support for further social integration at leisure time

Fun24—Include photos of faces for known people in the communication tools

Fun25—Organize photos collection for social interaction and sharing, and support for other functionality, e.g. notable landmarks while in transit to aid orientation

Fun29—Carers should have possibility to request emotional state of primary user for two-way reassurance that there are no problems and to ensure primary user feels supported

D5—Give priority to plans involving public transport

D6—Trip planners should focus on the next few steps and use familiar landmarks to guide

### Discussion about guidelines for ethics

There is a tension between Primary user and Secondary user. 50% of POSEIDON requirements addresses ethics. None of these requirements changed after Pilot 1.

The question was raised: what are the ethical grounds for the principles? The POSEIDON-systems are co-designed with the users. Maybe we should have included more decision makers in the requirements capture process. We started with a questionnaire. From human daily life and up. Not from philosophy and down.

The 9 principles presented seem to cover all critical questions. Principles are coming from experiences and publications. Arne Manzeschke expressed admiration for the framework. He remarked that ethics can be confusing. The Advisory Committee appreciates the bottom up approach.

Other questions were discussed. How does family life change because of POSEIDON and technology? There are indications, from POSEIDON and other experiences where assisted technology is used, that carers situation’s becomes a little relieved and carers experiences less stress. A critical question is if the persons with Down syndrome, the primary user group of the POSEIDON-project, are left alone. DSA, the UK Down syndrome association, has during the proposal process and the project, been clear that the POSEIDON must not lead to reduced support for the target group. The concept of autonomy has changed. If autonomous, they do not need help. The technology must also educate the helper. Anna Contardi stated that there is a difference between autonomy and independence. Technology without help does not function. The whole meeting endorsed this statement. There is a huge difference between “We train the people to ask for help” and “We train the people not to ask for help”. The opinion of the Advisory Committee and the POSEIDON project is that we should train people with Down syndrome to ask for help. It is not realistic that they are trained so well, and that the technological system function so well , that they do not need help.

The Advisory Committee was curious to know about the project’s relation to the Down syndrome community. Mr. Brustad from NNDS and Anna Contardi talked about the support from EDSA. The general feeling is that communication with the Down syndrome community in Europe is good. The project has also run two workshops with Down syndrome association from eight European countries in addition to the three countries that participates in the project.

Arne Manzeschke: It might be helpful for the review process to point to differences between Germany, Norway and UK. Different contexts.

Regarding the usefulness of the interactive table, Markus Dederich did note that research is also about failure E.g. maybe the table does not play the role as we thought in the beginning.

## POSEIDON services

At the end of the project, POSEIDON will have provided the following prototypes, which will be made ready for commercialisation (see: <http://www.poseidon-project.org/product/>)

- App for users with Down syndrome  
This app supports daily planning and traveling. The main menu gives the user with Down syndrome the following options:
  - Routes – Start navigation by using planned routes or a new route.
  - Map – View current position on Google Maps.
  - Calendar – View planned events and add new events.
  - Preferences – Turn on/off position tracking and choose colour themes.
- Web for carers  
On this web site the carer can make personal calendar events and shopping lists that will appear on the user's smartphone with photographs, voice messages, signs and possibly videos. The carer can also track the user's position and mark important places on the map.
- Home Navigation app  
The Home Navigation app aims at helping people with Down syndrome to learn how to walk a route. This computer app offers functionalities for both the carer and the user with Down syndrome.
- Money Handling apps
  - Money Handling Training  
Money Handling Training app (on PC) aims to train the users in handling money so that they are better prepared when they go shopping. Click on the item below to learn more about the app.
  - Money Handling Assistance  
Money Handling Assistance is a shopping app (on smartphone) that supports the users on the spot – when they are out shopping.
- Social network for primary and secondary users  
The social network, or what we actually regard as the POSEIDON ecosystem, is a web based service which acts as one single point of access to share and get all high quality relevant information (news, research, practical info, experiences), apps and e-learning for secondary and primary users of Down syndrome.

The social network will encourage socialising for the primary users. Discussions will be moderated to monitor language and inappropriate statements. In addition, the POSEIDON services supports mobility by making appointments and provide support for traveling for visiting friends or leisure activities. The primary users can also enter appointments by themselves.

There is an emphasis on clean and simple human-computer interfaces, responsive design, personalisation features and context-awareness.

In addition, POSEIDON will provide an infrastructure/framework for third party developers to develop apps/services and set of apps/services for the target group.

### Discussion about POSEIDON services

The initial set of services were well received by the Advisory Committee. The requirements capture make the selection of services a natural one.

The personalisation mechanisms in the POSEIDON web for carers are relevant and provided in a fairly simple way.

There were some questions raised about the usability of the interactive table, but results for the pilots indicates that the primary users like it. Questions about price and size. Maybe the large version for schools and social homes, smaller versions for home. Could a tablet do the job equally well? No conclusion reached.

The functions for setting up a route and augment the route with personalised information like images and speech command was regarded useful. In addition, the possibility to train the route was regarded good because people with Down syndrome need several repetitions to learn a task. The route can be trained by both a PC with mouse and keyboard, and PC with the interactive table. The Advisory Committee could not advice to which one is the better solution. However, tablets and PCs are more custom than the table.

The possibility to augment calendar appointments with multimedia content was well received. People with Down syndrome are visual learners, images and videos are good for illustrating instructions. Alarms at different time intervals for reminders of an appointment, to be set up by the carer, is a useful feature.

The additional help in the mobile navigation app was also well received. The personalisation of the route with private images to illustrate waypoints is a positive asset for the navigation. This is an improvement from pilot 1, where the navigation were to closely connected to the functionality of google navigation. One potential problem with navigation help on a mobile device is that the primary user puts more interest in looking at the device than paying attention to the actual traffic. Videos and observations from pilot 1 showed that this was a potential problem. Spoken commands, through a headset, implies that the user can keep track of both the navigation instructions and the traffic. Context-awareness mechanisms like monitoring of standstill, e.g. waiting too long for the bus, and deviations from original route was also regarded as useful functions.

One thing, which caused some debate, was the different flavours of the money training. The Italian organisation, APID, had much experience with handling money. One app is to set up a shopping list based on product images uploaded by the carer via the POSEIDON web for carers. This app calculated the correct amount and the idea was that the primary user should acquire the correct amount of money before going to the shop. However, AIPD's experience is that exact calculation is of little value. Instead, more general principles for paying should be learned. In the shop, some products may be out of stock, alternative products of same quality could have different prices. Therefore, the person with Down syndrome should always bring more money than the exact calculation show. To be able to enter the final amount in the app, and get guidance to which coins and notes should be paid, could be a valuable function. One shortage of the present money handling system is that the carer enters the prices of the products via the personalisation web. This actually may become a maintenance nightmare, prices may change overnight, and special offers may be introduced. A

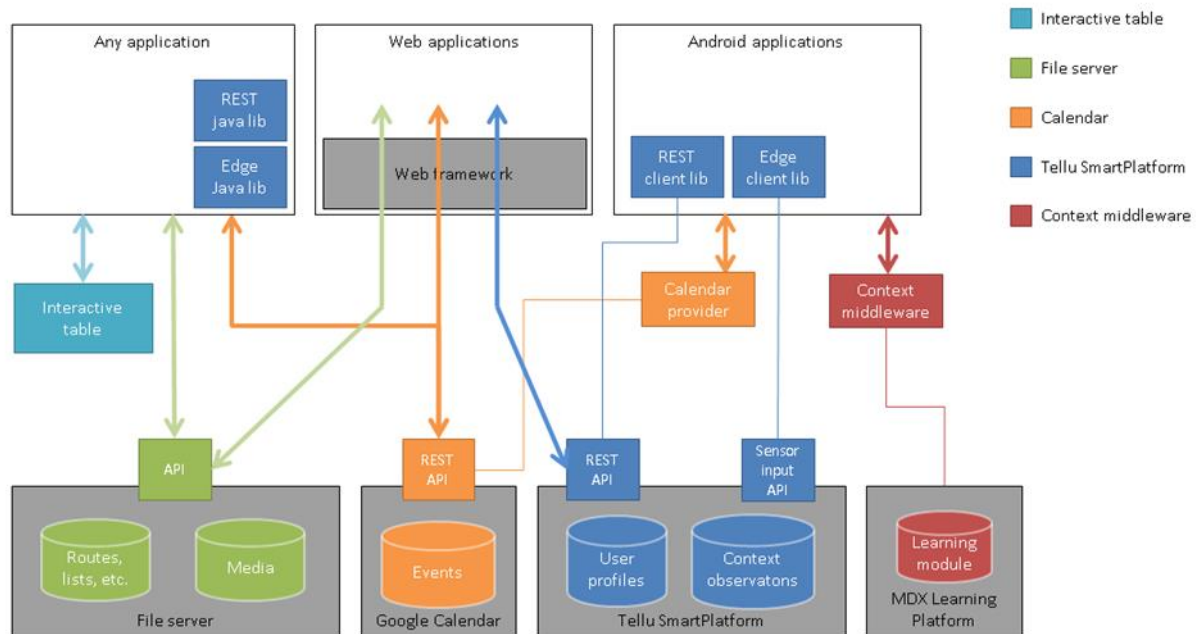
suggestion from the PSEIDON project team is to scan the bar codes for each product in the shop. This however, requires that the POSEIDON shopping app is integrated to the shop's back end system. This could be a topic for third party developers at a later stage.

## POSEIDON framework for 3<sup>rd</sup> party developers

The framework was shortly presented. The Advisory Committee acknowledged the effort, but could give little input in assessing the functionality. They just took the project's words for this being a valuable offering to system developers who want to make apps for the target group.

### Framework architecture

### Infrastructure components



## Conclusion

The Advisory Committee expressed that the project seem to be on right track, personalisation and training is regarded key success factors and it discriminates POSEIDON-system from other offerings, ethics, privacy and safety/security is well taken care of by the eFriend framework and guidelines and the number of technical requirements that are derived from eFriend.

They also made the remark that the project has to prepare well for the review in Luxembourg 18<sup>th</sup> March.

POSEIDON will organise its 3<sup>rd</sup> workshop with European Down syndrome associations the weekend 23-25<sup>th</sup> September 2016 at DSA's premises at the Langdon Down centre in Teddington, London, UK. The Advisory Committee was invited to this workshop.

The project wants to express its thanks to the Advisory Committee and the Fraunhofer IGD for hosting the event.