



iToilet



Deliverable D1.1 (public version)

User Requirements Analysis showing three priority levels

Project Number	AAL-2015-1-084
Project Name	iToilet
Duration	April 2016 – September 2018
Coordinator	TU Wien
Document ID	Deliverable D1.1
Release Number /Date	V11-Public /14 September 2016
Checked and released by	TUW
Document Type	Project Deliverable
Original Due Date	June 2016 (PrM 3)
Dissemination Level	Public
Main Editor	NIMR
Contributing Partners	NIMR, CS, TUW
Reviewed by	CC/Unger

Abstract

This document is Deliverable D1.1 “User Requirements Analysis showing three priority levels” of the iToilet (ICT-enhanced Toilet Supporting Active Life) project within Call 2015 of the Ambient Assisted Living Joint Programme.

Deliverable D1.1 contains the gathering of user requirements and the prioritised findings. This version of D1.1 is a public issue not containing some details which will be published first in a conference paper and are therefore not contained in the public version.

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The iToilet project is Co-funded by the European AAL Joint Programme and national funding agencies in Austria, Hungary, Italy and Slovenia.

Version	Date	Changes	Name	Organisation
1	19.05.2016	Initial Creation	Peter Mayer, Paul Panek	TUW
2	30.05.2016	Added methodology	Theresa Lüftenegger, Ramona Rosenthal	CS
3	09.07.2016	Added results and conclusions	Tamás Pilissy, Anna Sobják	NIMR
4	11.07.2016	Checking, corrections	Gábor Fazekas, András Tóth	NIMR
5	13.07.2016	Comments	Peter Mayer, Paul Panek	TUW
6	14.07.2016	Comments	Theresa Lüftenegger, Ramona Rosenthal	CS
7	29.07.2016	Detailed results	Tamás Pilissy	NIMR
8	05.08.2016	Finishing	Tamás Pilissy	NIMR
9	12.08.2016	Finishing	András Tóth	NIMR
10	02.09.2016	Comments	Theresa Lüftenegger, Ramona Rosenthal	CS
11	09.09.2016	Corrections, finishing	Tamás Pilissy	NIMR

List of Authors

Anna Sobják, Tamás Pilissy, Gábor Fazekas, András Tóth NIMR

Ramona Rosenthal, Theresa Lüftenegger CS

Peter Mayer, Paul Panek TUW

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1 Executive Summary

The iToilet project of the Active Assisted Living (AAL) Joint Programme of the European Union aims to develop an ICT enhanced toilet system, which is able to empower older persons to live more independently and with increased dignity. The iToilet project can support older people in domestic- and in institutional environment. iToilet also aims at reducing the workload of the care persons when providing personal assistance on the toilet. The project is based on an existing height and tilt adjustable toilet module. This sample type serves as base for adding several significant enhancements and services (e.g. control via voice, recognition of and adaptation to user preferences when entering the toilet room, recognition of potentially dangerous situations (e.g. a fall), and other functionalities (e.g. interface to care documentation, providing guidance to persons)).

The DoW of the iToilet project describes Task 1.1 within WP1 as follows:

User Requirements and Participatory Design [lead: NIMR; CS, TUW, all]

The initial activity of T1.1 is the setting up of the user research bases (URB) in Vienna and in Budapest involving primary, secondary and tertiary users. The URB will contribute to the elaboration of user requirements and will carry out participatory design activities. (e.g. groups of older persons will discuss and try mock-ups of different solutions for user identification for automatic adaptation of the toilet system). The collected user requirements will be prioritised (high, medium, low priority) in order to facilitate the technical development.

As preparatory step a draft Informed Consent form was agreed with the lead NFA in April 2016.

A common methodology for user recruiting and the user's needs interviews was prepared in the first work phase of the iToilet project. This methodology was implemented in the local user interviews in Austria and Hungary with potential users, caregivers and the healthcare organizers and representatives of financing bodies about their opinion of user's needs.

The deliverable from this task is due in project month 3 (July 2016) as Deliverable D1.1: User Requirements Analysis showing priority levels (Public).

In this report are documented: the main methodological aspects, the steps taken to prepare the interviews, the recruitment of participants, the main findings and observations of the interviews and the complementary information derived from questionnaires. In the chapter 0 a prioritized summary of the results is given.

2 Introduction

The intensive and continuous user involvement is a key for the success of the iToilet project. The user centred approach starts right in the beginning of the project by gathering user requirements by the two user partners NIMR and CS at the User Research Bases (URB) in Budapest and Vienna.

This document presents the methodology, results, and main findings and observations of the interviews and questionnaires with iToilet potential primary-, secondary-, and tertiary users. The interviews were conducted in the National Institute for Medical Rehabilitation in Budapest in May and in June 2016 in Vienna in the MS Day Care Center of Caritas Socialis.

These interviews and questionnaires were planned to investigate and explore the following issues related to the iToilet project:

- technical difficulties in using the normal toilet
- potential solutions for these technical problems
- opinions about the presented iToilet concept
- strengths and weaknesses of the iToilet concept
- usefulness of additional services
- recommendations

Additionally, the interviewed people were encouraged to provide any own ideas for the improvement of the sample iToilet, including any new ideas what the iToilet could offer its future users. In order to assess user's needs and detect possible, user-driven improvements a focus-group method was introduced as a common method for all project partners.

2.1 Purpose of this document

The main objective of the report at hand is the gathering and prioritisation of the user requirements for the iToilet project. The outcome of the work reported here will be important input for the technical specifications.

The report starts with an overview of the iToilet project, it then describes the two user research bases (URB) located in Vienna and in Budapest. In the next section the approach for gathering the user requirements covering also inclusion and exclusion criteria, justifications and considerations regarding the business aspects are outlined. Afterwards the results from the user questionnaires and interviews carried out at the URBS are presented and discussed. A prioritisation is given and conclusions /recommendations are provided as input for the technical specification (Task T1.2 in WP1).

The Annex contains templates used for the questionnaire, guidelines for the interviews and questionnaires, informed consent forms, ethical approvals and support material (photos, technical sketches, ...)

2.2 Suggested Readers

This document is recommended reading for all iToilet partners and in particular for those involved in the iToilet system design, development and evaluation. The public version of this document also is intended as useful information for external readers interested in the topic of user requirements in innovative toilets and bathrooms.

2.3 Relationship to other documents

The deliverable D1.1 at hand is based on the current version of DoW. The outcome of D1.1 will serve as input for the upcoming deliverable D1.2 “Functional and Technical System Specifications” and will also be considered for the deliverable D1.5 “Ethics, legal issues and safety in iToilet project”.

3 Overview on iToilet

This section gives an overview about vision and purpose of the iToilet project as communicated to users during the interviews. The text is mostly based on the DoW.

3.1 Vision of the iToilet project

The iToilet project addresses the needs of older (or physically challenged) persons when using a toilet by envisioning a supportive ICT enhanced toilet adapting to the individual user needs of older end-users. The project also addresses the needs of care persons when providing assistance to primary users in the toilet room.

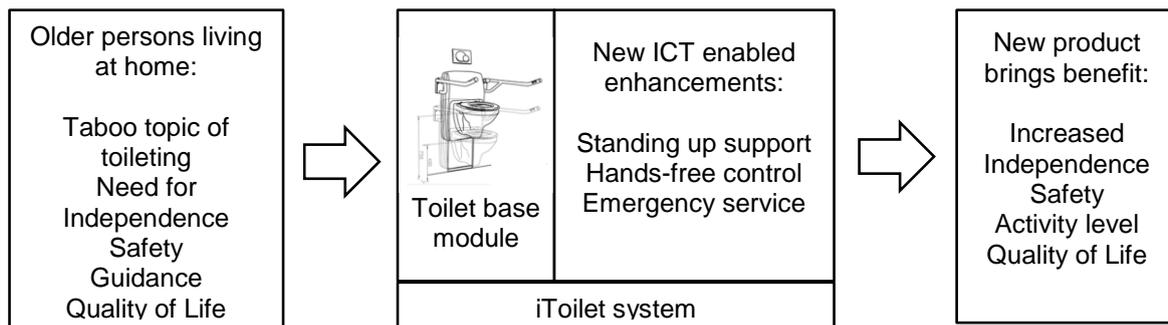


Figure 1: The iToilet project: Tackling user needs to create an ICT enhanced toilet that supports older persons living at home an independent and active life

The enhanced iToilet is based on two versions of mechanically adjustable toilets of project partner SAN:

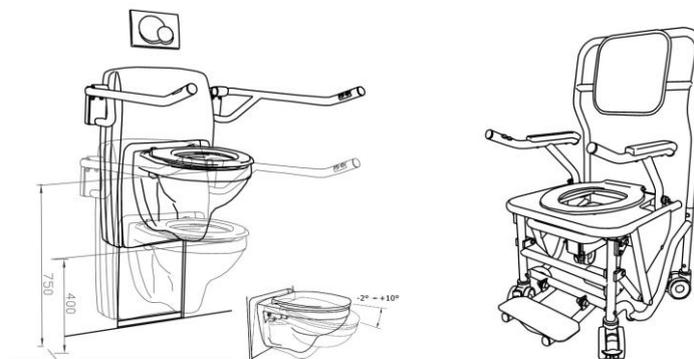


Figure 2: Left: A stationary height-adjustable and tilt-able toilet system (Lift WC) from SAN will be extended with various ICT based enhancements. Right: A mobile or semi-mobile toilet version (produced by SAN) which can be moved over existing toilet bowls can also be equipped with iToilet technology

The iToilet consortium aims at developing an advanced integrated prototype of an assistive toilet that is able to adjust its height and tilt according to user preferences. It will be equipped with a state of the art ICT system including sensors (e.g. position, movement, weight), inference of normal and abnormal situations (e.g. a fall) and integrated modules for speech input and automatic adaption of the toilet to the individual needs of the current user. The iToilet toilet system also will provide emergency call procedures and interfaces to care documentation systems.

3.2 User groups and expected benefits

The envisaged toilet system will bring benefit to different user groups:

Primary end-users’ dignity and independence, by its ability to enhance body stability when sitting on the toilet (individually adjustable optimum height, hands are free for handles), by supporting the sitting down and standing up process (dynamic adaptation of tilt and height), and by increased safety via emergency detection.

Secondary users/care persons, for which the burden on their shoulders when assisting the end user will be reduced when support is provided by the toilet itself.

Tertiary users, e.g. care institutions, because the toilet will not only enhance the care service offered to the clients but also will enhance health and well-being of the employees by reduced physical demands during personal assistance provision (e.g. transfer wheelchair / toilet).

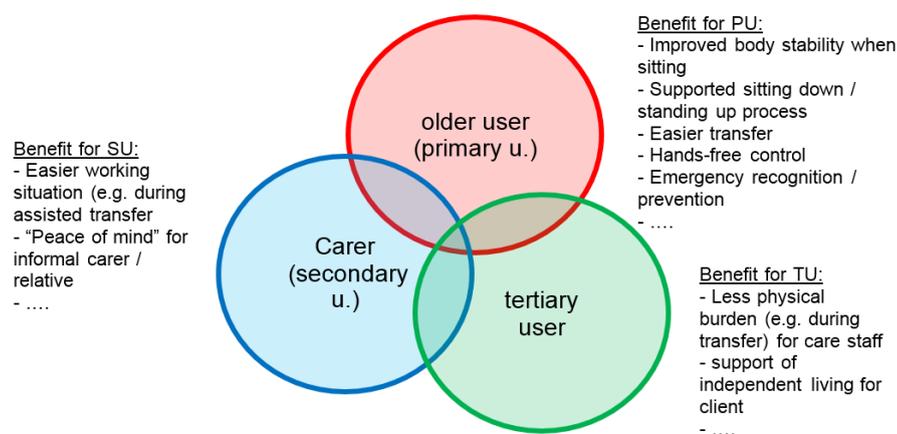


Figure 3: Some of the targeted benefits to be brought to different user groups

3.3 Intended usage at home & evaluation in institutions

While the iToilet project focuses on supporting older persons living at their own home, the exploitation considers not only the private but also institutional market and care provision services.

The intention is to develop a toilet system for private and for institutional use. Field evaluation in an institutional setting ensures the involvement of a relevant number of end-users living at home with a significant diversity while at the same time guaranteeing professional support by experienced experts.

3.4 User centred approach

iToilet follows a strictly user centred approach. The user involvement covers among others requirements collection, participative design, laboratory trials and evaluation of the prototype system in the field. The two user sites located in in Austria (Vienna) and Hungary (Budapest) will carry out this task and are called User Research Bases (URB).

3.5 Market Approach

The commercialisation of the prototype foresees a modular product which allows offering customisation of the product functionality according to the individual customer’s needs and wishes. This concept is also sustainable as it allows adding future developments (e.g. assistance for persons with dementia).

The ICT enhanced assistive toilet module is the core. Around this core, the consortium plans to set up several services. These services (e.g. care documentation, fall detection) bring added value for institutions and the formal care personnel in institutions as well as for end-users in a private setting (e.g. fall detection service including connection to emergency centres; inference of long term usage changes of toilet use)

Beside the commercial exploitation, the final project prototype and the gained knowledge will also be used for further RTD activities beyond the completion of the project, e.g. guidance for mild cognitive impairment (MCI).

4 Description of the User Research Bases

This section intends to describe the background of the two user partners CS and NIMR in Vienna and Budapest. From the users at the two institutions the User Research Bases (URB) are formed.

4.1 Test Site at partner CS in Vienna

CS is a large care provider in Vienna operating stationary care stations, offering mobile care in private homes and running day care centres supporting older persons living independently at home.

The opening hours of the MS-Day Care Centre are Monday to Friday from 8.00 a.m. to 4.00 p.m., except public holidays and weekends. Its clients are people with MS syndrome and different physical/motoric and/or cognitive restrictions. The goals of the day care centre are to provide an ambulant management of a follow-up treatment instead of stationary rehabilitation, to provide preventive measures against social isolation and improving domiciliary treatment and extending it through specific relieve of relatives. The services offered to achieve these goals are manifold, e.g. rehabilitative neurological care, physiotherapy, MS-specific therapy, walking training, occupational therapy (self-help training, computer-assisted cognitive training, sensitisation training), music therapy, continuous specialized medical care, creative activity etc.

The overall number of day guests is approximately 60 to 65, approximately 20 guests per day. They visit the centre twice a week on average but some guests visit the day care centre more often and make use of the whole weekly program. Nearly all visitors have a therapeutic indication. Many of the guests are using their visits to take a shower, because they need help with personal hygiene, or for medical treatment like changing bandages. The other time is spent in the lounge or in the dining room, after lunch some go to the cafeteria on the ground floor. The staff (nurses, nursing auxiliaries, civil servants, trainees) helps to support the guests if needed. For discussion rounds, games and other creative activities (e.g. painting) an animator/reactivation assistant is in charge. Apart from the therapy units another fixed time is lunch at noon.

Concerning toilets, daily guests use those toilets suitable for them. For one it is the bigger space, for others the more suitable door handles, etc. Sometimes they just choose the one which is empty. What all guests have in common is that in their everyday life toilets play really a crucial role. Thus many daily guests are experienced in developing strategies to avoid going to the toilet, which means not drinking enough or even taking tablets to dehydrate.

The clients and professionals of CS have long term experiences with a basic version of height and tilt adjustable assistive wall mounted toilet and are the originator of the iToilet project vision as they expect an even bigger added value if the current version is enhanced with the additional functionality.

4.2 Test site at partner NIMR in Budapest

The user partner NIMR is the leading rehabilitation hospital and rehabilitation research centre in Hungary. It was established in 1975 in the border of Budapest. It has about four hundred beds for in-patients, a day-time hospital and several out-patient services. The Department of Rehabilitation Medicine of Semmelweis University is located in the Institute. NIMR is involved in the training of physiotherapists, occupational therapists and other health professionals, as well. The rehabilitation process is executed by a multi-disciplinary team.

The Institute has special departments for patients with spinal cord injury, traumatic brain injury, stroke and other neurological conditions, patients post trauma, amputees. During rehabilitation, patients undergo a personalized physical strengthening training while they are prepared for active, self-supportive life. For these aims patients can use the gym, swimming pool (hydro-therapy), obstacle course for wheel-chair users and ergo-therapy lab with a completely furnished demo apartment that has been modified for disabled people. In this apartments patients can practice self-supporting in the bathroom and the kitchen. More than half of the patients undergoing rehabilitation here are above sixty. Usual treatment period is 6 weeks, but some patients return later for reconditioning.

4.3 Characteristics of URBs

The aim of iToilet is to help active living at home of elderly people, therefore user groups in both countries were set up with that in mind. If we compare toilet use at home and in an institutionalized environment we would find more similarities than differences, since at both places the user is alone and would preferably be remain alone during using the toilet. The main differences in an institution (supposing an intelligent toilet) are as follows:

- More than one custom settings need to be stored
- More add-ons and switchable functions are needed due to the diversity of users
- Intervention in case of emergency/problem: the toilet should try to solve the problem itself by recognition and analysis of the situation (home use) or simply alert the caregivers with detailed description of the problematic or emergency situation (institutional use)

From the above it can be concluded that problems of users living at home are definitely and completely included by the problems of users living in an institution.

At CS, most patients have MS which causes similar symptoms as elderly age (e.g. musculoskeletal weakness and ataxia, incontinence and cognitive impairment). Since CS is a day care centre, all patients are living at home, furthermore they attend therapies regularly over a long period of time (many years in most cases) so CS is a perfect place for recruiting many involved users who may have problems in toilet use at home.

As for NIMR, there are in- and outpatients of diverse ages, but since the total number of patients at a time is about 500, it will not be an issue to find proper users for testing and commenting iToilet. It was decided that only returning inpatients (who come for reconditioning) will be recruited because attendance frequency of outpatients is rather erratic and they have longer experience about living at home with disabilities that is evidently missing in case of fresh patients. The length of a usual rehabilitation session can guarantee that there is enough time to complete a series of test with the same user group, but having the same users during the assessment of user requirements and in the latter tests is not feasible. To resolve this issue, discharged patients of the user group will continuously be substituted with patients who have similar disabilities.

In a nutshell: user groups at the URBs consist of patients visiting institutions who have some kind of disability causing problems in using the toilet and basically live or lived at home with their disability. Therefore, in iToilet the experience of old users from living at home is combined with the benefit of professional institutional services.

4.4 Approach to user requirements collection at the URBs

The approach for preparing, carrying out and analysing the user requirements started already very early in the project and was a main topic on the agenda of the kick off meeting in Vienna. Among others following main points were covered:

- Differences and complementarity of the test partners were discussed and a joint approach was defined
- Focus of the users to be recruited at both sites was defined and discussed.
- Inclusion, exclusion criteria were discussed and also the number of users to be recruited was selected
- A justification of the opinion poll method, and formulation of the questions to be asked
- Arguments were added where needed to justify the decisions taken considering also alternatives and the potential influence these decisions may have for the business plan
- Information and appropriate support material about the envisaged technical functionality was provided by the technical partners SAN, SmCo, CC, SYN and TUW
- The approach was selected in a way which allows to fulfil:
 - The mission of iToilet to support active life of older persons living at home while testing / evaluating at institutions
 - The gathering of user requirements which by nature can only be done by a limited number of users ensuring (e.g. by recruiting participants in a synergetic way) that not only “our” users but also other more general user groups are considered
 - Including primary, secondary and tertiary users
 - Collecting quantitative data on problems and possible solutions
 - Collecting open (qualitative) input to the related topics

After collection of the user requirements in Hungary and Austria a draft version of D1.1 was prepared by NIMR and CS. The preliminary findings were presented and discussed during the full consortium meeting in Budapest in July 2016. Afterwards a detailed evaluation and the finalisation of D1.1 was done.

5 Methodology – User Requirements

The growing field of assistive technologies' development demands a distinct evaluation of user needs and/or requirements, in order to enhance the products' usability for end users (Choi, & Sprigle, 2011). This is achieved by a participatory approach from the beginning of the technical development which allows an involvement of users and the identification and verification of their needs. (cf. 3.4 User centred approach). These are determined by methods such as user surveys/questionnaires, focus groups, interviews, observations, scenarios and use cases, future workshops or the evaluation of existing systems and usability testing (Choi, & Sprigle, 2011; Maguire, & Bevan, 2002). For the current iToilet project focus group interviews were conducted to collect user requirements, similar to Zsiga, Edelmayer, Rumeau, Péter, Tóth and Fazekas (2013). Focus group interviews are well established methods in the PAR and assistive technologies' field for the user requirements evaluation (Choi, & Sprigle, 2001; Maguire, & Bevan, 2002; Venne, n.d.; Zsiga et al., 2013).

End users were invited to identify users' needs in two countries (Hungary, Austria). Concerning this current iToilet project, end users are defined as primary users (elderly people), secondary users (formal and informal caregivers) and tertiary users (other stakeholders, such as insurance companies and health care providers). (cf. 3.2 User groups and expected benefits). This is consistent with a multi stakeholder approach discussed in literature (Fuhrer, 2001; Fuhrer, Jutai, Scherer, & DeRuyter, 2003). Moreover, the hierarchy of end users and the importance of their expectations is valued (Fuhrer et al., 2003). Therefore, the emphasis on primary and secondary user requirements should be displayed during the process of identifying these. This is achieved by emphasizing the distribution of focus groups interviews on these user groups. The in- and exclusion criteria for the three user groups are presented in the following chapter. Thereafter, the procedure of focus group interviews, data collection and analysis, as well as user requirements results are described.

5.1 In- and Exclusion criteria for the three user groups:

1) Primary users:

Inclusion criteria

- Age above 60 years (for MS patients above 45 years)
- Able to transfer him/herself from wheelchair to toilet in the case of wheelchair user
- Able to learn how to use an iToilet
- Signed informed consent

Exclusion criteria

- Legal incapacity or restricted legal incapacity
- Able to walk without walking aid

2) Secondary users:

Inclusion criteria

- Professional caregiver
- Informal caregiver

- Spends at least four days a week with primary users

Exclusion criteria:

- No professional experience related to health care in field (e.g. healthcare manager)

3) Tertiary users (from organizations in health care, social insurance, health insurance fund, retirement pension insurance):

Inclusion criteria

- Health Professionals or people working in areas related to health care
- Registered organization in health care
- National establishment on patients' advocate

Exclusion Criteria

- Experience less than half year
- Private nursing service

5.2 Data collection prior to interviews

The collected data prior to the interviews include personal data (confidential – the cross reference of IDs and names is kept separately from the other data and stored securely at CS and NIMR), if there is a mobility aid required for daily living and FIM (Functional Independence Measure) data, in order to get an understanding of the user's functioning regarding dependency or independency in daily life.

5.3 Main characteristics of the participants

After applying inclusion and exclusion criteria at NIMR (Budapest) and CS (Vienna) an overall of 40 users at NIMR and 45 users at CS could be identified meeting the defined criteria. Out of them 41 primary users (NIMR: 20; CS: 21) took part in the interviews. The age of primary users ranged between 60 (47 with MS) and 89. FIM scores ranged between 53-119 and most of them used wheelchair (17, walking stick: 16) as walking aids.

Number of Participants	URB Budapest	URB Vienna
Primary Users	20	21
Secondary Users	9	12
Tertiary Users	5	7
Total	34	40

5.3.1 Main characteristics of the primary users in Hungary

This section will be publicly available in a later phase of the project.

5.3.2 Main characteristics of the secondary users in Hungary

This section will be publicly available in a later phase of the project.

5.3.3 Main characteristics of the tertiary users in Hungary

This section will be publicly available in a later phase of the project.

5.3.4 Main characteristics of the primary users in Austria

This section will be publicly available in a later phase of the project.

5.3.5 Main characteristics of the secondary users in Austria

This section will be publicly available in a later phase of the project.

5.3.6 Main characteristics of the tertiary users in Austria

This section will be publicly available in a later phase of the project.

5.4 Dependency/independence of the primary users

The Functional Independence Measure (FIM) was used to measure the level of dependency/independence of the primary users participating in the survey. FIM is a widely used outcome measure scale in rehabilitation. It aims to assess the level of independence. It has 6 subsections, measuring self-care, continence, transfers, locomotion, cognitive functions and social functions. These six sections involve altogether 18 items. Each item can be scored from 1 point (the worst) to 7 points (the best, means totally independent). The minimal full score is 18, the maximum full score is 126. Subjects scoring under 54 are highly dependent, scoring between 54-108 are partially dependent, scoring above 108 are independent, but it does not mean that they do not use technical aids, it just means they do their daily activities without external help. Of course, behind the summary score it can remain hidden, that in certain functions the subject is independent, while in others dependent, for this reason the summary score gives only an impression about the subject's overall dependency level. For a detailed assessment the certain sections should be taken into consideration separately.

Regarding the Hungarian primary users FIM score was between 53 and 122, mainly the wheelchair users scored lower. Participants covered a wide range of dependency/independence. There were not highly dependent subjects, because according to the inclusion criteria primary end-users must be able to walk (with a technical aid) or use a wheelchair. For this reason bedridden subjects were not involved in the survey. The FIM assessment showed that participants had medium to high level of independence, but it must be emphasized that those, who reached a relatively high score (above 108) could reach it only using walking aid.

FIM scores of the Austrian primary users were between 89 and 119. It means, they were fully or almost independent. Of course it does not mean that executing ADL functions did not present them any problem, but they could do it with mild or without assistance.

Detailed FIM scores can be found in the appendix (chapter 11.2).

5.5 Presentations: slides and movies

The objective was that a set of knowledge (aims of the project, technical problems in toilet

use, additional functions) was shared by all members involved in the focus groups. A set of slides were used for presentation of the iToilet concept and watched by the participants together. All of the group members and interview moderators saw the same presentation at the same time. The presenter adapted his speech to the level of understanding of the audience.

The presentation was based on a PowerPoint slideshow, which was the same in the two countries, in the audience's respective language. The presentation also contained two movie clips about the sample iToilet. The first 2 slides presented the international iToilet project, the institute and local members of the project. The third slide gave an overview of the water closet's history and progress from the beginning to these days. The fourth slide depicted the most commonly known technical problems in toilet use. The fifth slide presented the aims of the iToilet project (describing the potential functions and showing the usefulness of an iToilet in domestic- and in institutional environment). The sixth slide showed the base type of iToilet, a stand-up and sit-down support toilet in a short video. On the movie clip it was shown how the standing up and sitting down are supported, and how the height and tilt angle of the toilet seat can be customized. The seventh slide contained a computer animation clip about a wall mounted iToilet with height and tilt adjustment, flush and bidet function operation by buttons placed on the handrail. The slides from eight to ten presented the additional functions that had been imagined by the consortium (user identification, application of customized settings, control the toilet by spoken commands, fall detection, emergency call, etc.). The last two slides contained the plan for the requirements collection and invited the participants to the focus group interview.

5.6 Focus group interviews and questionnaires

This section will be publicly available in a later phase of the project.

5.7 Ethical and confidentiality issues

The focus group interview is considered as data collection, for this reason the approval of the local ethics committees was sufficient at both locations. Each subject had got a number and only this number was entered on the questionnaire sheets. There is a reference list with number and the names of subjects, which is stored separately and securely at each institution. This was approved by the ethics commission of CS at 31th of May, 2016, and 18th May, 2016 at NIMR respectively.

5.8 Information sheet and Consent form

Informed consent was signed by each participant (primary-, secondary- and tertiary users). They had the right to withdraw their consent at any time without explanation. An office assistant attended the session and participants agreed to have their voice recorded for the purposes of the study only.

5.9 Interviewer teams

5.9.1 The Hungarian interviewers' team

Description of the team that prepared and conducted the interviews:

- Medical doctor (neurologist and PRM specialist: Gabor Fazekas)
- Psychologist (Focus Group Interview specialist: Edit Révay)
- Occupational therapists (Györgyi Stefanik, Edit Meszaros, Rita Navay-Dorner, Anna Sobjak)
- Engineers (Andras Toth, Tamas Pilissy)

Role of team members in the interview procedure:

- Medical doctor: supervise the team and introduce the session
- Psychologist: review and improvement of the interview questions/questionnaire, training of the interview moderators
- Occupational therapists: moderating the interviews, transcription of voice records to textual reports
- Engineers: providing the demonstration, moderating the interviews, providing technical assistance, transcription of voice records to textual reports

Technical aspects (recording the session, time constraints, schedule, location for interviews):

- All participants were invited to the auditorium of NIMR. If it was necessary, transfer was provided.
- Members of the focus groups watched the presentation together without demonstration.
- Focus group interviews were made in 6 specific groups.
- The whole program, including the presentation, the focus group interview and the questionnaire filling, lasted 2 hours.
- The discussion was recorded by the means of microphones and laptops.

5.9.2 The Austrian interviewers' team

Description of the team that prepared and conducted the interviews:

- Nurse manager of day care center: Ramona Rosenthal
- Occupational therapist: Theresa Lüftenegger
- Nurse assistant: Franziska Sonntag

Role of team members in the interview procedure:

- Nurse, nurse assistant and occupational therapist provided the demonstration and moderated the interviews in different combinations

Technical aspects (recording the session, time constraints, schedule, location for interviews):

- All participants were invited by CS
- There were 5 groups of primary users on 5 days a week (due to time constraints of the participants) - led by nurse assistant, assisted by occupational therapist
- There were 2 groups of secondary users – one formal caregiver and one informal caregiver on 2 days provided and led by the nurse assisted by the nurse assistant
- There were two groups of tertiary users on 2 days led by the nurse
- Members of the focus groups watched the presentation after that guided interviews and discussions were conducted including the questionnaire filling.
- The whole program, including the presentation, the focus group interview and the questionnaire filling, lasted 2 hours.
- The discussion was recorded by the means of microphones and notes.

5.10 Data analysis of interviews

This section will be publicly available in a later phase of the project.

6 Results

6.1 Results of the focus group interviews

This section will be publicly available in a later phase of the project.

6.1.1 Primary users in Hungary

This section will be publicly available in a later phase of the project.

6.1.2 Secondary users in Hungary

This section will be publicly available in a later phase of the project.

6.1.3 Tertiary users in Hungary

This section will be publicly available in a later phase of the project.

6.1.4 Primary users in Austria

This section will be publicly available in a later phase of the project.

6.1.5 Secondary users in Austria

This section will be publicly available in a later phase of the project.

6.1.6 Tertiary users in Austria

This section will be publicly available in a later phase of the project.

6.2 Results of the Questionnaires

This section will be publicly available in a later phase of the project.

6.2.1 Primary users

This section will be publicly available in a later phase of the project.

6.2.2 Secondary users

This section will be publicly available in a later phase of the project.

6.2.3 Tertiary users

This section will be publicly available in a later phase of the project.

7 Analysis of Findings

The collected user requirements are analysed and prioritised (high, medium, low priority) in order to assist the technical specification.

7.1 Findings of the interviews

This section will be publicly available in a later phase of the project.

7.2 Findings of the questionnaires

This section will be publicly available in a later phase of the project.

7.3 Resulting user requirements categorized in three priority levels

This section will be publicly available in a later phase of the project.

7.3.1 Final combined results

As outlined in the DoW all top priority items from user requirements and 50% of the medium priority items will be targeted in development. The medium priority requirements were selected based on the expertise of the iToilet user partners NIMR and CS (4.3). The final iToilet user requirements are listed in the table below:

Combined High priority user requirements	
1	bilateral (general stability and support), removable/foldable handrails (wheelchair)
2	height adjustment (in a wide range) and tilt adjustment
3	fall detection, emergency recognition and emergency call
4	simplicity (few, straightforward buttons on both handrails)
5	fixed toilet paper holder (on both handrails)
6	sit down and stand up support
7	custom settings (tilt and height) w. user identification

Combined Medium priority user requirements	
1	self-sanitizing seat and bowl
2	shelf/tray area
3	upgradability, modularity
4	automatic or button operated flush
5	care documentation
6	spoken commands
7	individually formed toilet seat
8	voice guide
9	automatic dispensing of toilet paper

10	bidet with dryer
11	urine meter /analyser

8 Conclusion and outlook

8.1 Conclusion

Members of the primary user groups in Austria and in Hungary have heterogeneous diagnosis and dependence levels, thus one could assume that they also might have different needs in toilet assistance. Although we have found differences in their needs (e.g. such as specific toilet height for “TEP-users” or optimal height for MS-clients to start the transfer), the iToilet target users have the same primary needs overall: as much physical and as tailored help to all kind of moving and posturing tasks in toileting as possible.

When it comes to differences in (i)Toilet use at home or institutions, the results imply that most of the user requirements are valid at both settings. Differences might only occur concerning the duration of arriving of the assistance. (e.g. institutions – immediate assistances vs. home – takes time till the ambulance/relatives/neighbours are arriving). This might be seen as a difference for user needs, but might have no influence on technical user requirements. Already in the user requirements customisation and modularity emerge as a proof for that a one-for-all iToilet system is a hardly feasible technical approach.

Secondary and tertiary user groups looked at toilet use scenarios from a much wider perspective, nevertheless they come to the same conclusions about user requirements as the primary users themselves.

Concluding, the differences of the user groups were diminished by the needs they have. This is seen by the priority rankings of the user requirements.

There were quite a number of comments that can be regarded as serious problems but iToilet cannot do anything to solve them. E.g.:

- Constructional problems like not enough room around the toilet bowl, hard to approach the toilet by wheelchair and rollator
- The toilet is sometimes too far, a room-toilet would be needed.
- Financial questions like support from social insurance

8.2 Outlook

The results of the user requirement analyses (D1.1) will be delivered as input for the functional and technical specifications (to be carried out by all partners in Task T1.2) aiming at deliverable D1.2 “Functional and Technical System Specifications”.

The next upcoming steps in the user involvement will be the discussion and approval of the D1.2 which will form Milestone M1 and the start of the participatory design activities in WP1 testing early prototypes.

9 Literature

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10 Definitions, Acronyms and Abbreviations

AAL	Ambient Assisted / Active and Assisted Living
CC	Project partner Carecenter
CMU	Central Management Unit (for AAL programme, located in Brussels)
CS	Project partner Caritas Socialis
DoW	Description of Work of the iToilet project
FIM	Functional Independence Measure
ICT	Information and Communication Technology
iToilet	AAL Project, ICT-enhanced Toilet Supporting Active Life
MCI	Mild Cognitive Impairment
MS	Multiple Sclerosis (MS)
NCP	National Contact Person (usually at NFA)
NFA	National Funding Agency
NIMR	Project partner Országos Orvosi Rehabilitációs Intézet
PrM	ProjectMonth (PrM1=April 2016)
PU	Primary User, old persons or persons with a disability (see also SU, TU)
SAN	Project partner Santis
SmCo	Project partner Smart Com
SU	Secondary User, informal and professional care persons (see also PU, TU)
SYN	Project partner Synthema
TEP	Total endoprosthesis
TU	Tertiary User, e.g. institutions, insurance, ... (see also PU, SU)
TUW	Project coordinator TU Wien
URB	User Research Base (URBs are located at the two user test sites NIMR in Budapest and CS in Vienna)
WP	Work package of the iToilet project

11 Annex

11.1 Questionnaire summaries

This section will be publicly available in a later phase of the project.

11.1.1 Primary users in Hungary

This section will be publicly available in a later phase of the project.

11.1.2 Secondary users in Hungary

This section will be publicly available in a later phase of the project.

11.1.3 Tertiary users in Hungary

This section will be publicly available in a later phase of the project.

11.1.4 Primary users in Austria

This section will be publicly available in a later phase of the project.

11.1.5 Secondary users in Austria

This section will be publicly available in a later phase of the project.

11.1.6 Tertiary users in Austria

This section will be publicly available in a later phase of the project.

11.2 Main functional characteristics of primary users

11.2.1 Hungary

This section will be publicly available in a later phase of the project.

11.2.2 Austria

This section will be publicly available in a later phase of the project.

11.3 Informed Consent Forms

11.3.1 English Consent Form

Informed Consent

1. I, _____, agree to participate in the research project "iToilet" for the purpose of designing and testing an ICT enabled toilet.
2. I have been given sufficient information about this research project and its goals. The purpose of my participation as an interviewee and test person in this project has been explained to me and is clear.
3. I know that I can contact at any time the responsible person, whose address is on the information sheet I got, with any questions about the project and my participation.
4. My participation in this project is voluntary. There is no explicit or implicit coercion whatsoever to participate. I have the right not to answer any of the questions. If I feel uncomfortable in any way during my participation, I have the right to withdraw at any time without consequences for me.
5. I understand and accept that I will not be paid for my participation.
6. My participation will not cause any costs for me.

Addon:

- YES NO I allow the recording (by audio/video tape) and taking
o o photographs of the interview and tests. This material will only be
used for scientific purposes within the project and not used for
any other purpose without my permission.

Place and Date

Signature of Subject

11.3.2 German Consent Form

Einverständniserklärung

- 1) Ich, _____, erkläre mich bereit, im Rahmen des Forschungsprojektes „iToilet“ an der Entwicklung und Erprobung einer intelligenten Toilette teilzunehmen.
- 2) Ich wurde über das Projekt und dessen Ziele ausreichend aufgeklärt. Der Zweck meiner Teilnahme als Auskunftsperson und Testperson wurde mir erklärt und ist mir klar.
- 3) Ich weiß, dass ich mich bei Fragen oder anderen Anliegen wegen meiner Teilnahme jederzeit an die auf dem Informationsblatt genannte Person wenden kann.
- 4) Ich nehme freiwillig an der Erprobung teil. Es wurde keinerlei Druck auf mich ausgeübt um mich zur Teilnahme zu bewegen. Ich weiß, dass ich keine Fragen beantworten muss. Ich kann die Zustimmung zur Teilnahme jederzeit ohne Gründe zu nennen zurückziehen und dies hat keinerlei Folgen für mich.
- 5) Ich wurde darüber informiert und bin damit einverstanden, dass ich für meine Teilnahme keine finanzielle Entschädigung erhalte.
- 6) Die Teilnahme an der Studie ist für mich mit keinerlei Kosten verbunden.

Zusatz:

- JA NEIN Ich bin damit einverstanden, dass Teile der Befragung und Erprobung aufgezeichnet und photographisch festgehalten werden. Die dabei gewonnenen Daten werden nur innerhalb des Projektes und nur zu wissenschaftlichen Zwecken verwendet. Eine Verwendung des Materials zu anderen Zwecken bedarf meiner vorherigen Zustimmung.
-

Ort, Datum

Unterschrift

11.3.3 Hungarian Consent Form

BELEEGYZÉSI NYILATKOZAT

Az iToilet felhasználói igényeinek felmérésében történő részvételben.

Alulírott
tájékoztatást követően beleegyezem, az iToilet Projektben a
felhasználói igények felmérését célzó interjúban való részvételbe.
Valamint, hogy az interjúról hang és képfelvétel készüljön.

Kérdéseimre választ kaptam.

Dátum:

Születési év, hónap:

Aláírás:

11.4 Informed Consent Information Kit

11.4.1 English Information Sheet



Information Sheet iToilet

You are invited to join a research study to look at improvements by an ICT enhanced toilet. In the following we have collected a short summary on the project for your information. **If you have any questions or want to talk about your participation, please feel free to contact the**

Responsible Contact Person:

Ms. XY

Phone:

Available Monday-Friday **8:00-16:00**

What is iToilet?

iToilet is a research project funded by the EU and national research funding organisations. There are (3 Austrian)(2 Hungarian) and (4)(5) other European parties involved. End users like you are participated in Austria and Hungary.

The goal of the project is the development and test of a toilet system able to support easier usage of a toilet.

The project is scheduled for the time from 1 April 2016 to 30 September 2018.

How is your participation planned?

At first, ideas and information from all participants will be collected in an interview to gain prioritised requirements for the development.

In the course of the project you will be asked several times to discuss and assess some particular functions to help guide the development.

Finally, in early 2018, the functional toilet system will be available for testing over a test period of some weeks in **the institution**. We ask you to make use of the new toilet whenever possible during the test period.

Before and after the test period you will be asked again some questions to help us evaluate the developed solution.

All activity will take place in **the institution**.

How does iToilet work?

The basis is formed by a motorized, height adjustable and tilt-able toilet seat and a few sensors which detect your presence and the position of the seat. Commands for adjusting the toilet can be given by speech control and buttons.

You will get a small identification card to signal your presence to the toilet and to hold your personal preferred settings.

The following functionalities will be part of the evaluation:

- Detecting your presence in the toilet
- Adjustment of the seat position by speech or buttons
- Measurement of the seat position
- Storing of usage and timing information
- Detection of emergencies like e.g. falls

IMPORTANT: The iToilet-system also comprises an emergency call function but for your safety in case of an emergency you still can use the traditional nurse call also!!!

Will there be any costs involved for me?

Your participation will not cause any costs for you. On the other hand, unfortunately, we are not able to pay for your effort.

What happens with the recorded data?

All data recorded during your participation will be kept strictly confidential. Your personal data will be used only in anonymised format and for scientific purposes.

You can at any time have a look on the data by addressing the above mentioned contact person and also request its deletion.

Can I stop my participation whenever I want?

Yes. You are participating on a totally voluntary basis and you can withdraw at any time – without the need to give a reason and without further consequences for you.

Are there any foreseeable risks?

The base toilet is a certified product and will be assessed for safety again before the tests are started. This study involves the mechanical adjustment of the toilet seat position while sitting during the testing. If you feel uneasy about this you should not participate. There may also be other risks that we cannot predict but we expect no increased risk compared to using a standard toilet.

Who is involved in the iToilet project?

TU Wien – Centre for Applied Assistive Technology (Austria)

CS Caritas Socialis – an MS day-care centre (Austria)

CareCenter Software GmbH – a company delivering care documentation (Austria)

Santis Kft. – the company producing the toilet (Hungary)

Smart Com d.o.o. – a company producing computers (Slovenia)

Országos Orvosi Rehabilitációs Intézet – **here the tests are done** (Hungary)

Synthema srl – a company producing the speech recognition (Italy)

11.4.2 German Information Sheet

Informationsblatt iToilet

Wir laden Sie ein, uns bei einem Forschungsprojekt für eine intelligente Toilette zu unterstützen. Im Folgenden haben wir ein paar Punkte zu Ihrer Information zusammengestellt. **Sollten Sie weitere Fragen haben, können Sie sich gerne bei der im Projekt für die Erprobung verantwortlichen**

Kontaktperson:

Frau [XY]

Telefon: [xxx]

Montag-Freitag 8:00-16:00

melden.

Was ist iToilet?

iToilet ist ein von der EU und nationalen Forschungsförderungen gefördertes Forschungsprojekt an dem 3 österreichische und 4 europäische Partner beteiligt sind. So wie Sie nehmen Nutzer und Nutzerinnen in Österreich und Ungarn teil.

Ziel dieses Projektes ist die Entwicklung und Erprobung eines Systems, das in der Lage ist, die Benutzung einer Toilette zu erleichtern.

Das Projekt ist für die Zeit von 1. April 2016 bis 30. September 2018 geplant.

Wie sieht Ihre Beteiligung aus?

Zuerst werden Ideen und Informationen von Testpersonen in einer Befragung gesammelt und daraus priorisierte Anforderungen für die Entwicklung abgeleitet.

Im Laufe des Projekts werden wir Sie mehrmals bitten, einzelne Funktionen zu diskutieren und zu bewerten um damit die Entwicklung zu steuern.

Schließlich wird Anfang 2018 das System für eine Testperiode von mehreren Wochen in [der Einrichtung] eingebaut und erprobt werden können. Wir bitten Sie, während der Testzeit wenn möglich immer die neue Toilette zu benutzen.

Vor und nach der Testperiode werden wir Sie bitten, wieder einige Fragen zu beantworten, um uns eine Bewertung der entwickelten Lösung zu ermöglichen.

Alle Aktivitäten werden in [der Einrichtung] durchgeführt.

Wie funktioniert das iToilet System?

Das Grundsystem besteht aus einem motorisch in der Höhe und Neigung verstellbaren WC-Sitz und einigen wenigen Sensoren, die Ihre Anwesenheit feststellen und die Position des Sitzes messen. Die Verstellung der Sitzposition kann über Sprachbefehle oder mit Tasten erfolgen.

Sie bekommen eine kleine Karte, die dem WC Ihre Anwesenheit mitteilt und Ihre persönlich bevorzugten Einstellungen festhält.

Folgende Funktionalitäten werden in der Erprobung zum Einsatz kommen:

- Feststellen der Anwesenheit im WC
- Verstellung der Position des Sitzes durch Sprache oder Tasten
- Messung der Position des Sitzes
- Erfassen typischer Bedienungsabläufe und Zeiten
- Überwachung auf Notfälle wie z.B. Sturz

WICHTIG: Das iToilet-System bietet auch eine Notruf-Funktion, im Notfall können Sie aber zu Ihrer Sicherheit auch weiterhin den herkömmlichen Schwesternotruf verwenden!!!

Ist die Teilnahme für mich mit Kosten verbunden?

Die Teilnahme an der Erprobung ist mit keinerlei Kosten verbunden. Leider ist es uns aber auch nicht möglich, Ihre Teilnahme finanziell abzugelten.

Was passiert mit den aufgezeichneten Daten?

Alle Daten, die im Zuge der Erprobung gesammelt werden, werden streng vertraulich und nur in anonymisierter Weise behandelt und nur für wissenschaftliche Zwecke verwendet.

Sie können gerne jederzeit über die genannte Kontaktperson Einsicht in diese Daten nehmen und auch ihre Löschung verlangen.

Kann ich aus der Erprobung vorzeitig wieder aussteigen?

Ja. Sie nehmen freiwillig an der Erprobung teil und können Ihre Teilnahme am Projekt jederzeit – ohne Angabe von Gründen und ohne weitere Konsequenzen – vorzeitig beenden.

Gibt es vorhersehbare Risiken?

Die Basis Toilette ist ein zertifiziertes Produkt und wird vor den Tests nochmals auf Sicherheit geprüft. Die Tests beinhalten die Verstellung der Sitzposition während der Benutzung, daher sollten Sie nicht teilnehmen wenn Sie sich dabei unsicher fühlen. Wir können weitere Risiken nicht ausschließen aber erwarten keine erhöhte Gefährdung im Vergleich mit einer normalen Toilette.

Wer arbeitet am Forschungsprojekt iToilet mit:

TU Wien – Zentrum für Angewandte Assistierende Technologien

CS Caritas Socialis – [hier findet die Erprobung](#) statt

CareCenter Software – der Hersteller der Pflegedokumentation

Santis Kft. - der Hersteller des verstellbaren WC Sitzes (Ungarn)

Smart Com d.o.o. – eine Firma die Computer herstellt (Slowenien)

Országos Orvosi Rehabilitációs Intézet – ein Rehabilitationszentrum (Ungarn)

Synthema srl – eine Firma für Spracherkennung (Italien)

11.4.3 Hungarian Information Sheet

A Résztevők tájékoztatója az iToilet felhasználói igényeinek felmérésében történő részvételhez

Az iToilet projekt az Európai Unió által támogatott kutatás. Célja, a mozgásukban akadályozott személyek számára könnyebben használható, a fejlett technológia eredményeit felhasználó „okos wc” fejlesztése.

A felhasználói igények felméréséhez interjúkat készítünk, lehetséges felhasználókkal, ilyen személyeket gondozókkal, illetve az ellátásuk szervezésében dolgozókkal.

Az interjú során hang és képfelvétel készül. Ebből írjuk meg a jelentést, amit azután a mérnökpартnerek a fejlesztéshez felfhasználnak. Ebbe személyazonosításra alkalmas adatok nem kerülnek.

Az interjúk során először bemutatunk néhány létező fejlett technológián alapuló wc-t, gondolatébresztés céljából. Ezután beszélgetés következik ezek használhatóságáról. Az interjú időtartama előreláthatólag másfél óra.

A vizsgálatot végző vezető elérhetősége:

Dr. Fazekas Gábor

Telefon:

Helyettese:

Mészáros Edit

Telefon:

11.5 Photographs



Presentation of the iToilet project before the Hungarian focus group interviews