

AAL Project

NITICS

Networked Infrastructure for Innovative home Care Solutions



WP4: System elements integration and field trial

D4.1: End-user groups differentiation

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Executive Summary

The current deliverable is proposing the organization of the elderly end-users in different groups according to a disability criterion. In the context of WP4.1 disability is defined as an impairment of the independent/autonomous, performance/execution of any of the activities described in relation to the key-functionalities, which, at its minimum severity 1) requires constant external help and/or supervision from another person and/or 2) produces significant physical and/or psychological (including emotional) discomfort. At the same time the current deliverable takes into account in section 3.4 also the legal definition of disabilities in each of the end-user countries.

Based on the developed methodology, described in section 2, we have considered three groups of disabilities: 1) health-related; 2) house-hold specific related; 3) hobby and leisure related. The end-users in each of these groups are described in more detailed in the sections 3.1-3.3. Section 3.4 is reserved for country specific disability groups. For each of the end-user groups, the detailed description considers both physical and psychological disabilities as well as a combination of the two. Additionally, the various ways in which these end-user groups can be aided by the NITICS services described in D2.2 are considered. Use cases diagrams present in a more graphical descriptive way the interaction of the end-users in the three groups with the NITICS platform.

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Terms

End-users: actors who interact with the system and have direct benefit from using the system. End-users can be Primary (end-) users or Secondary (end-users). Primary (end-) users are elderly citizens or disabled individuals included in the NITICS' target audience (see 3) whereas Secondary (end-) users are individuals who provide caregiving services to Primary (end-) users (such as formal caregivers, physicians, nurses, etc.)

Participants: in this context, participants refers to those end-users selected to participate in the field trials.

Disability: an impairment of the independent/autonomous performance/execution of any of the daily activities performed by the NITICS end-users (as considered in WP2.1), which, at its minimum severity 1) requires constant external help and/or supervision from another person and/or 2) produces significant physical and/or psychological (including emotional) discomfort.

1 Introduction

WP4 aims to integrate all system elements and set-up trials at the end users' premises. This WP will provide feedback to WP3 to perform the needed adjustments and tune-up the system, gather end-user feedback and validate the platform from WP3 and end-user services. Field trials in real-life settings will be conducted in different countries with help of the end-user organizations. Within WP4.1 which aims at "End-user groups differentiation" we have defined and organized the end-users into different groups according to their limitations (disabilities/inability) to perform certain daily activities such as personal hygiene, outdoor activities, etc. The end-user survey results in WP2.1 were taken as the basis of the categorization. Additionally, in order to consider also end-users with recognized disabilities, we have compiled a short description of the disability classes and degrees as considered by the national health organizations in each of the end-user countries.

The NITICS development strategy puts at its core **the instrumentality technology toward the facilitation and improvement of caregiving**. Consequently, there are mainly two types of end-user actors that interact with the system and benefit directly from it. Both primary end-users and secondary end-users benefit directly from the NITICS technology, but primary end-users are the 'final' beneficiaries. Secondary end-users mediate the influence of the system on several dimensions of assistance. For instance, a primary end-user (e.g., elderly citizen) may be assisted by a secondary end-user (e.g., caregiver) in performing certain daily activities or in support of certain executive physiological or cognitive functions.

2 Methodology aspects regarding the end-user groups differentiation

2.1 Primary end-users categorizations and user-groups differentiation

An important distinction has to be made clear with respect to two main operations carried out in WP4_D4_1. On the one hand, WP4_D4_1 accomplishes an operation which allows the inclusion of end-users into groups which are aligned with the purposes of the NITICS technology development, called the *user-groups differentiation*. On the other hand, WP4_D4_1 provides the bases for further analyses of the primary end-users in accordance with a series of relevant criteria, which allows for the formation of disjoint categories of end-users.

2.2 The proposed working definition of *disability*

Disability: an **impairment** of the independent/autonomous^{1,2} performance/execution of any of the daily activities performed by the NITICS end-users (as considered in WP2.1), which, at its minimum severity 1) requires constant external help and/or supervision from another person and/or 2) produces significant physical and/or psychological (including emotional) discomfort.

NOTE: Moreover, a more formal and referenced definition of the term *disability* should be identified and analyzed in comparison with the above proposed working definition of *disability*. As such, the NITICS end-user organizations identify and redact such definitions, possibly in relation to country-specific official terminology and classification. Consequently, an analysis regarding the overlapping aspects of the identified definitions expresses the commonalities with the accepted working definition of *disability* and proposes action to address potential aspects of non-concordance.

2.3 Analysis and cumulative integration of country-specific definitions of disability

2.3.1 Country-specific definitions of disability

¹ This section dedicated to the draft/proposed working definition of *disability* took into account the points set in the MoM_07nov2013_final.doc (i.e., Oana: "disability = incapacity of end-users to perform certain tasks", Jaouhar: "1) linking WP4 to WP2 and 2) relate to *reduction in ability*", Bogdan: "threshold of incapacity defines disability", Serge: "only measures addressed by NITICS to be considered", Lukasz: "take into account the worst and best when defining the *range*").

² Independent or autonomous means here: without help from another person, by virtue of one's own abilities.

Various definitions of disability are valid in each of the partner country. **Table 1**, below, presents a collection of formal or legal definitions of *disability*, in order to be further analyzed as to their commonalities and differences, and to be taken into further consideration in the construction of the working definition of disability.

Table 1. List of country-specific formal definitions of disability.

Country	Definition	Normative or legal documentation
Romania	Disabled people are defined as those individuals for whom "the social environment, lacking adaptation to their physical, sensory, psychological, mental and/or adjacent deficiencies, either limits or totally prevents equal opportunity access to living in society, and requires protective measures in support of social integration and inclusion".	Law no. 448 from 2006 with additional updates and modifications (Art. 2)
Poland	A person with a disability in the legal sense is a person whose permanent or temporary disability permanently or periodically hinders, limits or prevents the fulfillment of roles in society (such as work).	Act on Vocational and Social Rehabilitation and Employment of Persons with Disabilities
Slovenia	According to the Law on Disabled Persons Organizations: a disabled person is one who, due to congenital or acquired impairments and handicaps that are conditioned by a physical and social environment, cannot by herself / himself partially or fully meet the needs of the personal, the family and of the social life in the environment in which they live, according to the international classification.	Disabled Persons Organizations Act (Official Gazette 108/2002 of 12 12 2002, Ch. 5; Paragraph 3.
France	The law of 11 February 2005 defines disability in all its diversity. Article 2 states that "constitutes a disability within the meaning of this Act, any activity limitation or participation restriction in social life suffered in its environment by a person due to a substantial, lasting or permanent one or more physical, sensory, mental, cognitive or psychological, of a multiple disability or disabling health condition "	Article 2, 11 February 2005

2.3.2 Commonalities and differences of the various country-specific definitions of disability

In all four end-user countries a person with a disability is defined an individual which has some kind of limitation that limits or prevents her/his social life. This limitation can be permanent or temporary as well as congenital (from birth) or acquired. However, differences exist in the disability definition. In Romania, the incapacity of the social environment to offer equal opportunities to individuals living in the society is taken into account. One can imagine that in an intelligent and adaptive environment individuals classified currently to have a certain degree of disability could be considered perfectly capable to fully function in the society. In Poland, the disability definition stresses the capacity of the individual to fulfill his/her role (duty) in the society. This includes also the capacity to work and be productive not only to be able to care for one-self. On the other hand Slovenian law is centered not on role/duty but on needs and is putting personal and family needs ahead of society needs. As in the case of the Romanian legal definition, Slovenian law appears to take into account the environment in which a person activates. The law in France appears to take into account both needs and roles by expressing disability as any limitation in activity.

2.4 Primary end-users categorization criteria

The end-users can be categorized according to a varying number of guiding principles or criteria, ranging in complexity from demographic separators (or categorical identifiers) to health statuses or more elaborate criteria.

However, the first selection criterion is the criterion that defines the primary end-users of the NITICS system. Specifically, the primary end-users are the beneficiaries of the specific technologies that NITICS provides in

the area of ambient assisted living. As such, the elderly citizens and people with specific disabilities which require or can benefit from enhanced assistance in their daily lives were identified as primary end-users.

The age limit for elderly was set at 60+ yrs. of age which is roughly the minimum retirement age in the European Union. The criterion for the need of assistance is given by the existence of an impairing disability which abides by the working definition developed by incorporating end-user organizations' field data.

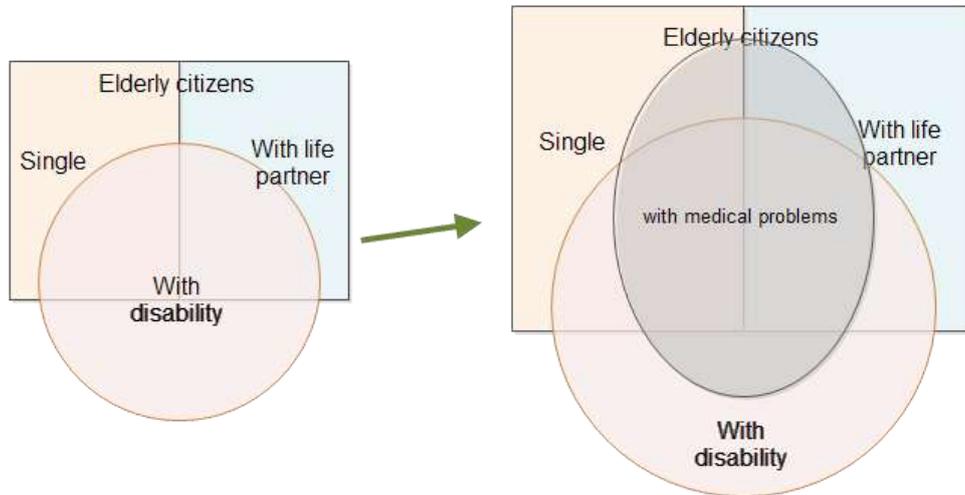


Figure 1. Venn diagram of the main end-users identifier (60+ yrs. and/or disability), a very important criterion in primary end-users selection is the existence of a disability as convened and assumed in the working definition of disability.

If the distinction single vs. with life partner is not considered, a more clearer representation of forming end-user groups after incorporating the criteria of *caregiving* and *medical condition* is made in **Error! Reference source not found.**, below:

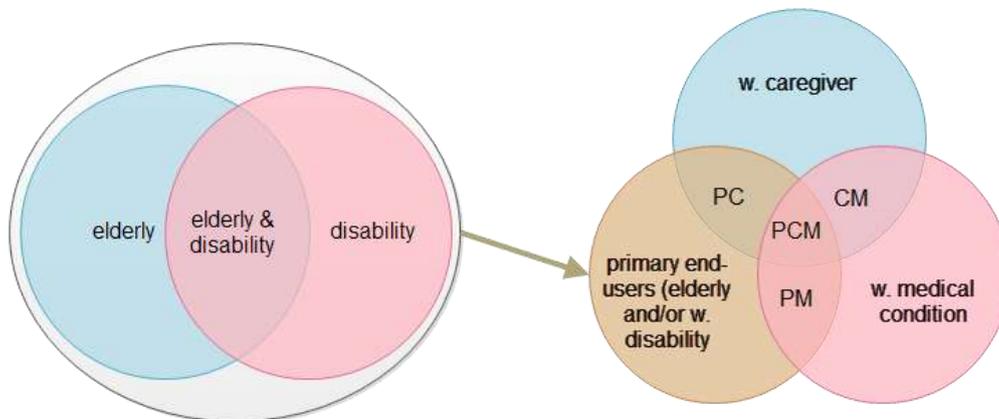


Figure 2. Venn diagram of primary end-user groups derived from incorporating the criteria of medical condition and caregiving status.

Four main groups, relevant for NITICS, are formed in **Error! Reference source not found.**, above: 1) PCM or primary end-user who have a medical condition and a disability (underlined or not by the same medical condition); 2) PC or primary end-users with caregiving services but no medical condition; 3) PM or primary end-users with medical condition but no caregiving services; and 4) primary end-users who do not have a medical condition or caregiving services.

2.4.1 Primary end-user categorizations according to the three main criteria of ‘caregiving status’, ‘medical status’, and ‘disability status’

If, in addition to the two main criteria of ‘medical status’ and ‘caregiving status’, a further differentiation is required in order to sort the primary end-users and characterize them for consequent analyses, a third criteria, regarding the existence of a ‘disability’³ can be employed.

³ As defined in section 2.2

Table 2, below, presents the list of bi-dimensional criteria which can be considered when identifying primary end-users selected for the field trials:

Table 2. List of bi-dimensional categorization criteria and their possible states.

ID	Criteria of separating into groups	Criteria type (categorical)
	Existence of caregiving services	YES / NO
	Existence of a medical condition	YES/NO
	Existence of a disability	YES/NO
	<i>Existence of age limiter (60+)</i>	YES/NO

Table 3, below, is a continuation of **Table 2**, and provides the list of possible combinations of the different possible instances of the criteria in **Table 2**.

Table 3. Formation of disjoint categories of primary end-users according to the three main criteria of ‘disability’, ‘medical condition’, and ‘caregiving status’.

Category	Combination of categorization criteria	Caregiving services	Medical condition	Disability
Category 1	caregiving/medical/disability	1	1	1
Category 2	caregiving/medical/-	1	1	0
Category 3	caregiving/-/medical	1	0	1
Category 4	caregiving/-/-	1	0	0
Category 5	-/medical/disability	0	1	1
Category 6	-/medical/-	0	1	0
Category 7	-/-/disability	0	0	1
Category 8*	-/-/-	0	0	0

* NOTE: group 8 is only included because it is a result of combination of criteria; it is not an actual group to be included in the field trials since none of the criteria is met

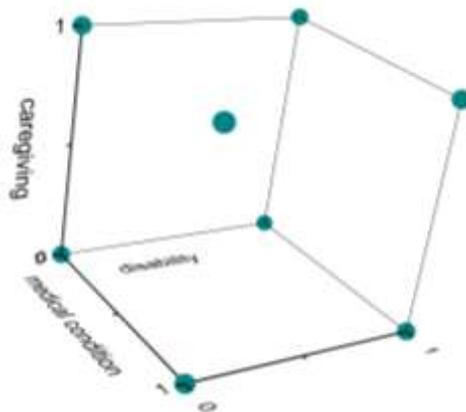


Figure 3. 3D plot expressing the primary end-users groups formation according to the 3 main criteria of disability, medical condition and caregiving statuses.

2.4.2 Premises for participants’ end-user groups differentiation and, consequently, participants selection

The main objective of WP4.1 is **to identify primary end-users groups in each partner country according to their disability**. This objective, in turn, implies the following 3 main stages: 1) the centralization and the

cumulative integration of various formal (country-specific) definitions of disability; 2) obtaining cross-country partners' consensus on a working definition of disability; and 3) the development of a measurement instrument for disability which allows the inclusion of participants in the field trials. The 3 main methodological stages are followed by 2 consequent operational stages which cover the formation of primary end-user groups and their identification and distribution into the defined primary end-user groups.

2.5 Categories of disability

As stated in the objective of WP4.1, the existence of a disability, which is directly related to the existence of an imparity in the normal daily functioning of an individual, is a crucial criterion in the formation of end-user groups for the field trials.

An important distinction must be made between what is understood as *type* of disability, as opposed to other classification of disability, such as *area* of disability. If a disability is considered with respect to which part of a person's functioning, psychological or physical, is considered, then, three main possible combination or types of disability arise. On the other hand, if areas of functioning are considered, the number of possible disabilities varies according to the number of possible combinations of the affected areas. For instance, a person's disability may affect an area of social interaction but it may affect also (or only) an area of self or autonomous care. More specifically, a person may be classified as disabled with respect to his/her ability to interact with others because of physical problems (such as vocal chords damages after an surgical excision, or because of other physical limitations) or because of psychological problems (such as memory problems regarding remembering known individuals, or because of emotional problems such as in various forms of emotional disorders, or even in some personality disorders such as is the case of the paranoid avoidance of others). As such, classifying a disability in accordance with the *area* of functioning or other similar measures must be made with extreme care.

According to what part of a person's biological functioning is affected, there are mainly two types of disabilities which may affect a person: physical and psychological disabilities. Often times, a person is affected by a combination of both, meaning that that person can be impaired both in terms of his/her psychological functioning (e.g., ability to reason, ability to express, ability to connect etc.) and in terms of his/her physical functioning (e.g., ability to perform certain physical movements). NOTE: extended arguments referring to the underlying medical conditions of disabilities may be useful here for purposes of clarification.

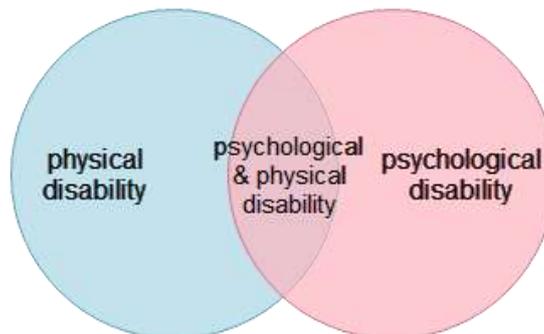


Figure 4. A person with disabilities may be affected physically, psychological or both.

2.6 The end-user groups differentiation

In WP4, a series of conditions derived from WP2 and WP3⁴ are taken into consideration in the selection of participants. A such, the participants (end-users) are either 1) elderly people (senior citizens over 60⁵ yrs. of age) or 2) disabled people whose current state can be described as being characterized by a *disability* (as defined above). In addition, the disability of the field-trials participants is assessed in relation to **those domains of current/daily activities which are relevant for the key-functionalities** identified in WP3.

⁴ Since WP4 provides feedback to WP3 in order to fine tune-up the functionalities, WP3 also provides a reverse feedback to WP4. The WP3to4 feedback serves to orient the secondary (follow up) WP4 investigations on end-users' satisfaction and on developing additional, if needed, end-users' use case scenarios.

⁵ See "Age: 60+ and Work status: retired OR Disabled: yes" in NITICS_WP2_D2_1_R_P_2v3.doc.

2.6.1 WP2 quantitative data relevant for establishing the key-services and, consequently, for the selection of participants (end-user groups differentiation)

The classification of end-users in groups is based on a) existence of one or more disabilities as defined in section 2.2 and b) the key-services offered by the NITICS platform and outlined in D2.2 of WP2. Considering the first criterion, we have taken into account the main findings of the end-users surveys performed in WP2. These are summarized, from a quantitative perspective below.

Out of the 154 primary end-users, ages 60-92 (majority was 65), as many as 68% of the respondents reported chronic health conditions and 40% experience some reduced mobility issue. More than 50% of the respondents are relatively self-sufficient in most of the activities but they still would welcome some help in cooking, cleaning, and health related activities (especially men). Only 25-30% of these have currently available help. 53 of the seniors receive some irregular support (mainly from family members) and only 11 have a permanent dedicated caregiver. 77% of the elderly socialize on regular basis but they choose mobile over Facebook (internet in general) to stay in touch with other people. Touchscreen devices were rated the most difficult to use. 67% of the survey participants would agree to have an automatic lock installed, 72% would agree to a portable sensor (72%) and a fall-detecting sensor (69%). The most controversial features are video cameras at home (33%) and a screen used for gathering information and enabling communication.

The above information together with the feedback obtained from caregivers lead to a list of relevant functionalities and services for the NITICS platform. Key-services were then further selected through a voting procedure. Voting for key-services each partner could give a note from the range 0 – 3 (3 - definitely yes (very useful); 2 - rather yes; 1 - rather no; 0 - definitely no or checked that the service was impossible from technical reasons). Selected key-services are presented in detail in D2.2: and presented briefly in the next section.

2.6.2 WP2 findings relevant to establishing the methodological guidelines

WP2⁶ identified 6 main areas of services which are addressed by the system:

1. Health services → falling down detection
2. Health services → home diagnostic
3. Socializing and daily activities → reminders
4. Socializing and daily activities → mobility patterns
5. Safety and security → automatic door locks, accessible to emergency services
6. Safety and security → living environment securing (checks and notifications of door locks, windows locks etc.)

Consequently, WP4.1 takes into account the above identified areas and develops procedures for differentiating between end-users groups.

3 Development of end-user groups

Table 4. Areas of functioning relevant for the end-users groups formation in relation with the type of disability involved.

Groups	Generic/ broad category of activity	Specific activity	Key-service addressing the problem
Health-related	Health crisis or problem interventions	Taking first aid measures etc. Calling for help	Falling down detection
	Health monitoring	Recording physiological parameters	Home diagnostic
	Health activities	Exercising Medicating	Reminders Reminders

⁶ The summarizing document is NITICS_WP2_D2_2.doc drafted on the basis of SSW's synthesis of key-services

Household specific / related	Daily / regular chores Non-regular	Buying various items Cleaning Cooking / preparing food Eating Home repairs	
Hobbies & leisure	Socializing	Talking Playing society games Watching TV, listening to radio Utilizing PC / other technology Gardening, landscaping Tailoring etc.	

3.1 Health-related disability

3.1.1 Description of the end-user group

The end-users in this group are characterized by various health conditions which can be psychological (e.g. memory loss due to Alzheimer, degenerative dementia, etc), physical (reduced mobility) or combined nature and which is limiting their daily activities. In this case, of the limitation in daily activities, the condition can be considered as a disability or impairment as defined in section 2.2.

The health condition of the elderly interviewed in WP2.1 was estimated through 6 questions of which four were of the categorical type and two of open type. For example, in Romania, a number of 48 elderly, representing 78.7% of all respondents, reported one or more chronic diseases. Reported diseases of health status were accompanied by about 52.5% of reports of mobility problems. Overall, 68% of the respondents reported permanent health complaints. Many people suffer from visual and hearing deficiencies and have some kind of heart condition (e.g. high blood pressure, ischemia). Other quite often encountered medical conditions were related to rheumatoid arthritis, rheumatism and osteoporosis. These are expected to be associated with mobility problems.

All the above as well as other less encountered health problems (e.g. hemiparesis, hypertonia) can be grouped under physical disabilities. End-users in this group are expected to benefit from the following future services of the NITICS platform: (a) direct services like falling down detector and home health monitoring, (b) indirect services which are based on an alarm triggered by the platform which is signalling the caregiver that her/his help is needed (running errands, household activities, etc).

Additionally, end-users in the survey groups exhibited also psychological health conditions which constituted a disability for daily life activities. One such example are end-users with Alzheimer disease which, in addition to possible physical impairments, also exhibit memory loss problems and dementia symptoms. In this case, depending on the degree of the health condition, the NITICS platform can help them overcome daily problems by issuing reminders for: regular drug administration, daily chores, etc. Alzheimer end-users can at the same time, depending on their condition, benefit also from all services outlined under the mobility related disability group.

Still, another end-user group can be constituted by elderly with diabetes. This group is not expected to necessarily have mobility problems, unless in advanced cases with neuropathy or even more severe complications like amputation. Because diabetes increases the risk for many serious health problems, the end-users in this category can benefit from NITICS services by using the home monitoring service which measures body parameters. They can also use the reminder service to not forget measuring their glucose levels and taking their pills or doing the insulin shots. Additionally, for the insulin dependent elderly in particular but also for the other diabetic users the falling dawn detector is essential during hypoglycemic episodes. Also, monitoring their daily mobility patterns is important in detecting anomalies which can indicate additional complications.

3.1.2 Diagram of Use Cases

A series of use-cases can be developed taking into consideration the interaction between the end-users in this group and the NITICS platform. The diagram below presents the interaction of the mobility disabled group and the diabetic end-user group with the NITICS platform.

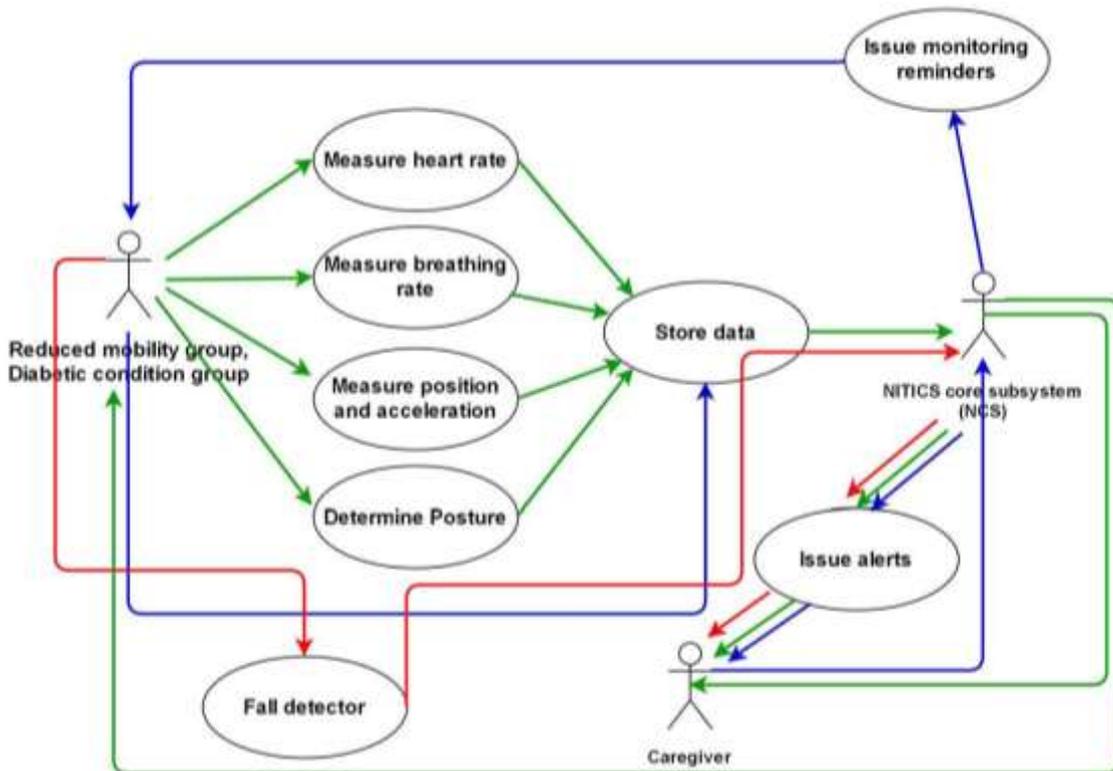


Figure 5. Interaction of the health-related disability group with the NITICS platform.

3.2 House-hold specific related

3.2.1 Description of the end-user group

Areas of functioning characterizing end-users in this group are related to house-hold activities. As all surveys clearly demonstrate, people (not only seniors but all adults no matter what their disability is) are determined to keep the most possible level of self-sufficiency and independence in their daily lives. House-hold chores belong to this area in which assistance is mostly needed but not always available.

Elderly examined in WP 2.1 basically declared themselves as very independent and reported no serious need for support. Nevertheless, as it was also stated in the WP 2.1, we were not able to find out from the questionnaire's results whether with the help being at hand they would find it at least comfortable. There might also exist some cultural determinants that can hinder the answer to that question. What is obvious, that to most of the elderly respondents assistance in daily house-hold chores is not available (among those who claim they do not need help there are in fact only 25-30% of them to whom that help is available).

The matter of non-availability of assistance is strongly correlated with the problem of feeling safe. Senior respondents declare however they have a person to rely on in emergency cases. One of the key functionality of the NITICS system responds ideally to this need of safety. The system of alarm detectors/sensors could be used not only to inform caregivers about the position/location/trials of an elderly person but also to guarantee the safe closure of all windows, doors as well as deactivation of electronic devices (electronic cooker, iron, etc.)

The highest rate of independence is shown by elderly in dressing (123 respondents – 80%) and in reading (120 respondents – 78%). Relatively, aid is mostly needed (or is essential) in cleaning the house (49%) and in daily errands (45%).

Being so active and so self-motivated, seniors – end-users in this group, would probably benefit from NITICS services related to locating small personal objects (who wouldn't?) like glasses, keys, mobile phones, remote control and others. Reminders doesn't seem to be a hot issue in the questionnaire, nevertheless the NITICS functions easing the everyday errands and helping to organize the to-do-lists as well as shopping lists hasn't shown the full potential in the survey's results. NITICS Virtual Assistant programmed by the caregiver could

not only remind about things to do or buy but also could take care of varied diet and provide senior with easy recipes, give hints about the way and time of cooking and eating.

3.2.2 Diagram of Use Cases

End users needing assistance in their everyday activities around the house can be supported by the NITICS platform in many ways. Some of them are presented in diagram below.

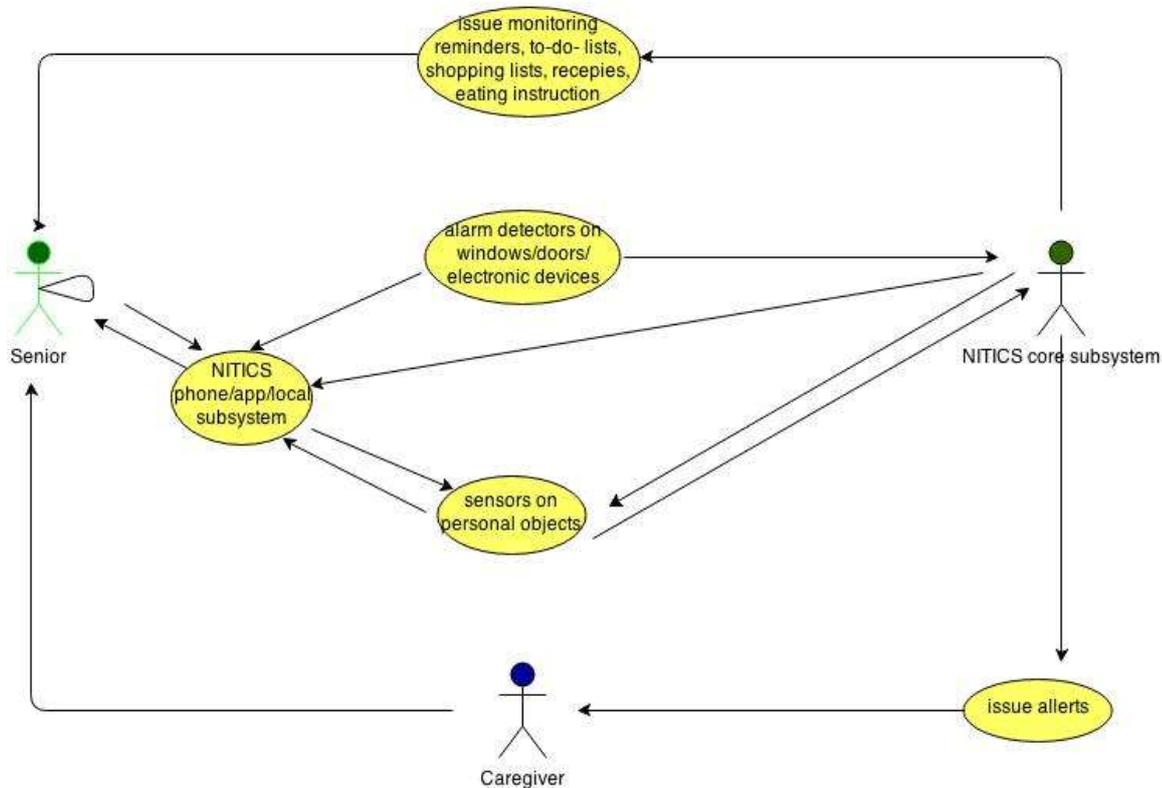


Figure 6. Figure 6: Interaction of the house-hold related disability group with the NITICS platform.

3.3 Hobbies and leisure related

3.3.1 Description

The end-users in this group have characteristics that affect their daily life including their potential hobbies and/or leisure time respectively. The characteristics concern their body functions, their body structures, their activities and participation with regards to the Disability classifications and criteria. One third of the end-users interviewed in the WP2.1 in Slovenia have a combination of two or more of the disabilities that affect their daily routine.

End-users in this group are expected to benefit from the future services of the NITICS platform, especially services of: (a) home health **monitoring**, (b) **reminders** or an indirect services which are based on an alarm triggered by the platform which is signalling the caregiver that her/his help is needed (running errands, household activities, etc) and (c) service enabling the **socializing** and daily activities.

Against the general belief that the senior people prefer to have a quiet and peaceful life, living at home and undisturbed, the NITICS research (WP2) shows quite the opposite. The 77 per cent of the participants and about 55 per cent in Slovenia respectively, socialize on daily basis or a few times a week and use the services that are offered by different organizations for socializing or sport activities (senior clubs, clubs for sports or cultural societies, Third Age University, travel societies, religious societies, etc.). When considering the willingness of the respondents to get in touch with others through personal contact or through the internet, most of the seniors did not give any details on why they would not see themselves contacting others online and those few who did, pointed mainly to the lack of interests and appropriate skills. Considering the research and the suggestions given by the secondary users adopting a TV screen/ mobile phone for some of the services might be a good idea - some device that the seniors are already familiar with or are already using in their daily life.

In the Slovenian survey about 50% of the primary users reported they suffer from some chronic conditions like diabetes, partial deafness, cardiovascular disease, osteoporosis, rheumatism, other degenerations, sight disorder, high cholesterol, hdl-arrhythmia, high blood pressure, bronchitis, asthma, arthritis and allergies. These chronic conditions are accompanied by about 30 % of mobility problems; overall about 51 % of the interviewed elderly reported permanent health complaints. The daily activities impended by their condition or disability are running errands, moving inside or outside of their home, cleaning and driving.

For example to help the seniors with regard to their hobbies and leisure: services should be enabling the **socializing** and daily activities through media or devices familiar to the user. That might include: Medically or other professionally lead **physical activity** (from simple as stretching to more complex as prescribed by doctor, yoga class, etc.) – using a TV set, connected to internet or PC; Tablet PC; IPTV; **reminders** using fixed or mobile telephone; smart phone; PC; Tablet PC; IPTV - for medical appointment, other health related activities, (connected to driving **service** / driving to activity) or reminders in connection with hobbies and leisure activities: concerts, games, sports,...for general public but of interest to the user (connected to driving **service** / driving to activity); using IPTV for **social activities**, playing social games, for conversation with family, friend, carers, professionals – providing larger picture and sound adaptation and with using a (IP)TV remote control.

3.3.2 Diagram of Use Cases

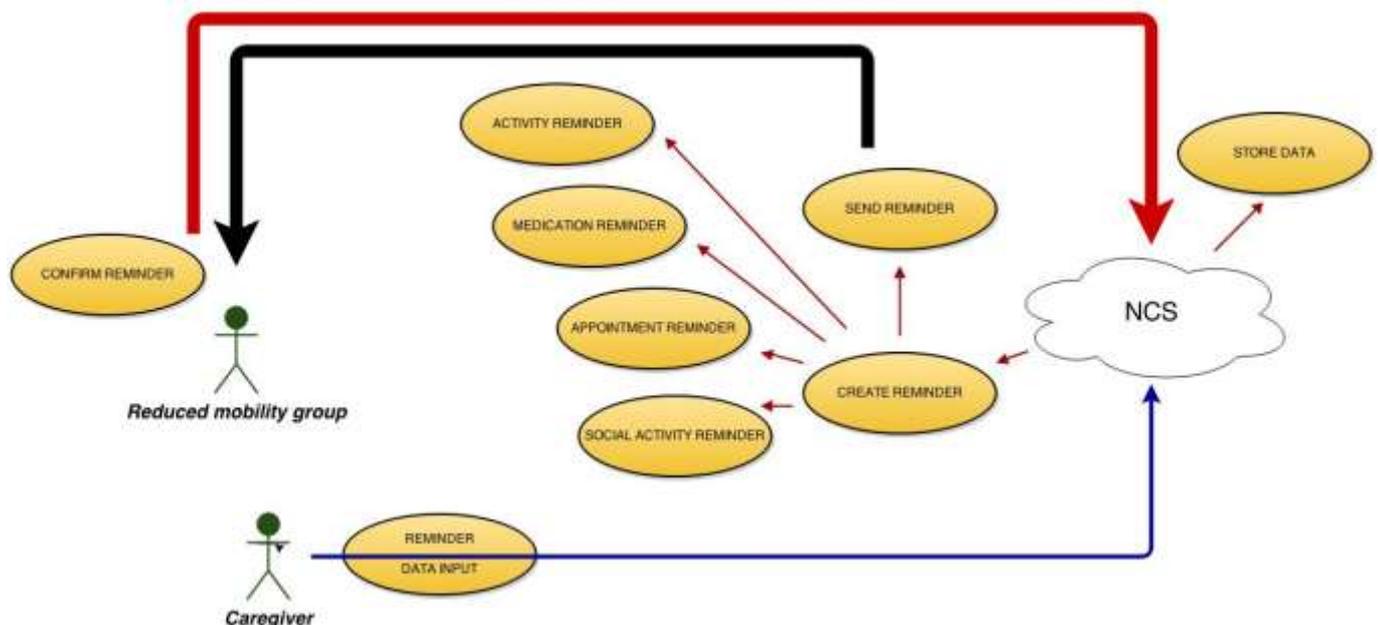


Figure 7. Interaction of the hobbies/leisure related disability group with the NITICS platform.

A series of use-cases can be developed by taking into consideration the interaction between the end-users in this group and the NITICS platform. The diagram above presents the interaction of the mobility disabled end-user group with the NITICS platform.

3.4 Country specific user groups

3.4.1 Poland

The Polish population will age at a particularly rapid rate compared to other EU countries. The results of the survey in WP2 show that, in Poland 38% of the respondents use some kind of caregiving, many of them are supported by the professional, qualified caregivers (both provided by the social care or families). The need for assistance is much larger than the actual, delivered one (only 9,8 % of all retired seniors in the society receive any external aid).

Every fourth elderly person is in the care of the members of the household, as well as every fourth itself acts as a caregiver against another inmate elderly (usually a spouse), and half (mainly people living alone – 86 % among them) does not act as a caregiver. This does not mean that the elderly people living alone do not require care; 30 % among them has a certificate of disability (this is up one third of all disabled), including one third of the severely disabled.

Respondents indicated to only one medical problem (Rheumatoid arthritis 20%, hypertonia 9%) but as it was stated in WP 2 it is very unlikely that the seniors in Poland face less health problems than in other countries especially that nearly 60% of them pointed out some kind of chronic condition.

In the view of the availability of the new technologies, the level of technological awareness and the ability to use these ICT and last but not least, the level of seniors' revenues, within our focus will be seniors living mainly in the larger cities, basically in flats. These end-user could benefit from all health and safety related functionalities of the NITICS system - those adapted to be installed in block of flats and multi-family houses.

The main pastime of the elderly people in Poland is watching TV, on average, seniors spend on it 60% more time than younger people. That would certainly allow to fully usage of the reminders potential and detectors/sensors responsible for the switching off the electronic devices.

The percentage of elderly people active in various organizations is 9.4 points - percentage very similar to other younger groups (9.6 percent). The most popular organizations among people aged 60 and more are religious organizations, social events, the groups of interests, committees, residents and Universities of the Third Age (Figure 6.4.3). The Universities of the Third Age have proven to be a huge success in Poland. Additionally, the life style in urban areas offers a rich range of different activities which is worth noticing.

Elderly not only have fewer friends than younger people, on the contrary - they have more of them, especially in the group with higher and post-secondary education.

Socializing patterns (regular, or organizational basis) and activities of the elderly provide enormous field for social dimension of the NITICS platform. Searching for the way to improve their life condition and psychological wellbeing people reach to close friends in the circles of family and friends.

3.4.2 Romania

The analysis of the Romanian survey results versus the generalized analysis of all end-users data, reveals several aspects that can be considered to impend daily life activities more for the Romanian end-users: a) 10% increase in the number of end-users requiring substantial aid with the use of notebook or tablet; b) about double increase in the number of end-users requiring substantial aid with the use of a dishwasher.

While the above disabilities are probably significant, they might not constitute a clear characteristic of the Romanian end-users due to the demographic imbalance in the end-users considered in the survey. Out of the 61 elderly taking part in the survey 40% were located in rural regions which, according to the experience of the end-user organization performing the survey, is experiencing a significant gap in IT and home-electronics skills as compared to the urban (large cities) population. This gap is probably larger than in the other participating countries.

The above end-user categories can interact with the NITICS platform by issuing a need for help request to the caregiver in charge.

3.4.3 Slovenia

About 55% primary users in Slovenia socialize on daily basis or a few times a week and use the services that are offered by different organizations for socializing or sport activities (senior clubs, clubs for sports or cultural societies, Third Age University, travel societies, religious societies, etc.).

In the Slovenian survey about 50% of the primary users reported they suffer from some chronic conditions.

These chronic conditions are accompanied by about 30 % of mobility problems; overall about 51 % of the interviewed elderly reported permanent health complaints.

The daily activities impended by their condition or their disability are running errands, moving inside or outside of their home, cleaning and driving.

Majority of primary users and secondary users interview in the survey suggested the use of familiar devices like mobile phone or a TV set.

4 Country specific disability classes and criteria

This sections outlines the disability criteria and classification in the end-user countries and discusses the possible NITICS services that aid these end-users.

4.1 Disability classifications and criteria in Poland

Disability can be defined as the loss of ability to perform specific social roles or functions (such as work) due to an impairment resulting from a medical condition. In terms of work disability, the functions are those related to employment. As a result, some medical conditions and subsequent impairments are likely to affect the ability to perform certain jobs but not others. In Poland person is qualified as having a disability in the legal sense where the disability falls within the provisions of the Act on Vocational and Social Rehabilitation and Employment of Persons with Disabilities.

Thus, a person with a disability in the legal sense is a person whose permanent or temporary disability permanently or periodically hinders, limits or prevents the fulfillment of roles in society.

Disabilities can be divided into the following groups:

- a. Physical disabilities
 - mobility (locomotory) disabilities
 - chronic internal illnesses
- b. Sensory disabilities
 - blindness and vision impairment
 - deafness and hearing impairment
- c. Psychological disabilities
 - psychiatric illnesses
 - intellectual or learning disabilities

In Poland, legislation regulating the issue of persons with disabilities is provided for in two separate Acts, depending on the adjudicating institution:

- a. For purposes other than disability pensions, decisions are taken by the Degree of Disability Assessment Boards,
- b. For disability pension purposes, decisions are taken by expert medical doctors of the Social Insurance Institution (ZUS) or by the Medical Boards of the Agricultural Social Insurance Fund (KRUS).

According to the Act of 27 August 1997 on Occupational Rehabilitation and Employment of Disabled and depending on the adjudicating institution, a person with a disability can be qualified as having:

- a light disability,
- a moderate disability,
- considerable disability,

or as being:

- partially unable to work,
- entirely unable to work,
- entirely unable to work and to subsist independently.

These degrees of disability are based on capacity to work, not just health. Individuals with "considerable" disability are incapable of taking up employment, but may be capable of employment in a supported work establishment or an occupational activation establishment. People with a "considerable" degree of disability require regular or long-term care or help from another person. Individuals with "moderate" disability have impairments ("infringed efficiency of the organism") but are capable of employment at a work post adapted to their needs and require only partial or temporary help from other persons. People with "light" disability have impairments, but they are capable of employment or education and do not require the help of another person to fulfill social roles. Depending on when the disability first occurred and on its kind, the legal qualification can be either permanent or granted for a limited time. "Considerable" and "moderate" disability are together called "full incapacity", and "light" disability is also called "partial incapacity".

How can the NITICS platform be used to address some of the needs of the LEGALLY disabled end-users?

According to the GUS (National Statistics Agency) Health Interview Survey in April 1996 in Poland there is a significant group of people who consider themselves to have disabilities but who are not certified to receive disability insurance; and people who are certified to receive disability insurance but whose answers indicate that they do not consider themselves to have disabilities. These two groups can be combined to define disability in different ways for different purposes. GUS calls these people "biologically disabled". One-fifth (2.7 percent out of 13.2 percent for the adult population as a whole, certified as legally disabled), are not certified for disability, i.e. not "legally disabled" in GUS's terminology. On the face of it this fraction seems alarmingly high, because it suggests that many people who should be legally classified as disabled are not, and that the coverage of benefits and programs for people with disabilities may be a problem.

What are the reasons why people with biological disabilities only do not have disability Certificates? The vast majority has never applied for a certificate, but almost one-third of these people said that they didn't know

how to apply. Especially considering that disability is concentrated among people with low educational attainment. It seems possible that greater efforts are needed to explain eligibility rules and procedures simply and clearly.

Disability is very highly correlated with age. The disability ratio for children less than 15 years of age in Poland was less than 1 percent in 2006. People past working age account for over 40 percent of all people with disabilities in Poland. In many countries, people past working age are not counted among people with disabilities because they are eligible for old age benefits rather than disability benefits. Taking the above mentioned facts into account there is no use in creating a separate category for “legally disabled” end-users in Poland. Only actual physical/sensory/psychological disability can stand for the real criteria.

4.2 Disability classifications and criteria in Romania

The evaluation and classification of people with disabilities is performed in Romania by government organizations according to the current legislation which defines both the evaluation procedure as well as the criteria in the case of adults (Serviciul de evaluare complexa a persoanelor adulte cu handicap - SECPAH) and children (General Directorate of Social Assistance and Child Protection).

The Romanian legislation was defining in 2007 a disabled person as a person who, due to physical, sensorial or mental conditions lacks the skills/ability to perform normal daily activities and thus requires protective measures to support recovery integration and social inclusion. However, recent changes in the legislation have modified this definition and since 2010 a disabled person is a person who, due to an environment which is inadequate for their particular demands from both mental and physical point of view is limited to perform partially or totally in the society, thus requiring assistance and integration. As can be seen, the current legal definition of disability is taking and adaptive environment into account, environment which can aid the disabled person to overcome its lack of ability and thus overcome its disability. In this context, developments as those pursued by NITICS are extremely important.

In Romania, disabilities are classified as light, moderate, pronounced and severe and are divided into the following groups according to the legislation:

- Physical - code 1,
- Somatic - code 2,
- Hearing - code 3,
- Deaf-mute and blind - code 4
- Mental - code 5
- Neuro-psychological - code 6
- Associates - code 7
- HIV / AIDS - code 8
- Rare diseases - code 9
- Others - code 10

The evaluation and classification of disabled persons is performed by a multidisciplinary team comprising physicians, psychologists and social workers. Based on the results of the evaluation the committee is also taking into consideration if partial or full assistance for the following types of activities is needed: personal hygiene, dressing/undressing, mobility inside the house, mobility outside the house, usage of communication means, cooking, house work, own finance administration, shopping, following medical recommendation with respect to monitoring and treatment.

The activities considered by the disability status evaluation committee outlined above are also the basic daily activities which have been taken into account also by the NITICS consortium during the elderly and disabled end-users survey and then further on during the development of the NITICS services. Currently, the following capabilities are envisaged for the NITICS platform, as described in D2.2.

Falling down detector which will enable automatic detection of a fall upon which an alarm signal/call will be sent to the caregiver. This kind of functionality is not directly lowering some barriers met by disabled people it will be useful in making them feel more secure in their daily activities. It can be primarily used by disabled people with somatic and mobility disabilities/impairments as well as by blind and people with low vision.

Home health monitoring can be used by several of the disability groups outlined in the previous section for regular monitoring of various medical conditions according to the recommendations of the physician in charge. For example, people who are left with certain impairments after a stroke will be able to regularly and even continuously monitor their EKG and blood pressure parameters in order to identify and prevent possible upcoming strokes.

Reminders can be used for mental and other disability issues as means of following a certain schedule, routine or medical treatment.

4.3 Disability classifications and criteria in Slovenia

Slovenia uses the World Health Organization »International Classification of Impairments, disability and handicap. Source: National Institute of Public Health; International Classification of Functioning, Disability and Health (ICF); <http://apps.who.int/classifications>, 28.1.2014

In brief

In 1980, the World Health Organization adopted the International Classification of Impairments, disability and handicap, which resulted in more accurate and at the same time relativistic approach. International Classification of Impairments, disability and handicap clear distinction between the work "failure ", "inability" and " handicap ". This classification is widely used in fields such as rehabilitation, education, statistics, policy, legislation, demography, sociology, economics and anthropology. Some people who use it have expressed concern that this classification was due to the definition of "disability " might still be seen as too medical and too focused on the individual and that may not adequately explain the interaction between societal conditions or expectations and the abilities of the individual. The term "incapacity" (Briefings disability includes a number of different functional limitations occurring in every population in all countries of the world. People may be disabled by physical, intellectual or sensory impairment, medical condition or mental illness. Such a failure, a condition or disease may be permanent or transitory in nature.

The term "disability" (Briefings Handicap) means the loss or limitation of opportunities to engage in community life on the same level as other people. It describes the encounter between the disabled person and the environment. The purpose of this term is to emphasize the focus of attention on the shortcomings in the environment and in many organized activities in society, for example. Information, communication and education can aid persons with disabilities to be introduced/included under the same conditions in the society.

The classification structure:

1. Body functions
2. Body structures
3. Activities and participation

1. BODY FUNCTIONS

- Mental functions
- Sensory functions and pain
- Voice and speech functions
- Functions of the cardiovascular, haematological, immunological and respiratory systems
- Functions of the digestive, metabolic and endocrine systems
- Genitourinary and reproductive functions
- Neuromusculoskeletal and movement-related functions
- Functions of the skin and related structures

2. BODY STRUCTURES

- Structures of the nervous system
- The eye, ear and related structures
- Structures involved in voice and speech
- Structures of the cardiovascular, immunological and respiratory systems
- Structures related to the digestive, metabolic and endocrine systems
- Structures related to the genitourinary and reproductive systems
- Structures related to movement
- Skin and related structures

3. ACTIVITIES AND PARTICIPATION

- Learning and applying knowledge
- General tasks and demands
- Communication
- Mobility
- Self-care
- Domestic life
- Interpersonal interactions and relationships
- Major life areas
- Community, social and civic life

NITICS services are being designed to meet the needs of elderly and disabled people who may be disabled by physical, intellectual or sensory impairment, medical condition or mental illness.

4.4 Disability classifications and criteria in France

In France, there are two terms which must be taken into account. One relative to handicap, and the other one to the lack of autonomy because of the age. The law of 11 February 2005 defines disability in all its diversity. Article 2 states that "constitutes a disability within the meaning of this Act, any activity limitation or participation restriction in social life suffered in its environment by a person due to a substantial, lasting or permanent one or more physical, sensory, mental, cognitive or psychological, of a multiple disability or disabling health condition "

The law of 24 January 1997 , which creates the specific benefit dependency (PSD) defines dependency as "the state of the person , notwithstanding the care she is likely to receive, need to be helped to the performance of activities of daily living or require regular monitoring ." This definition is also included in the Act of 1 January 2002, which replaces the PSD by the Personalised Autonomy Allocation (APA). For the Economic and Social Council, autonomy is defined as the ability and the right of a person to choose its own rules for the conduct of its actions and the risks it is ready to run, the possibility of perform without using the major physical, economic acts, psychological, social everyday life, and without help ensure the satisfaction of basic needs, the ability to adapt to its environment. Non- satisfaction of these needs is the loss of autonomy. Dependence appears when despite improvements, care and routine actions become impossible when the elderly person is unable to provide one to the satisfaction of basic needs.

AAL projects correspond to this lack of autonomy more than handicap in France as related to elders. A form/grid called AGGIR (Autonomy Gerontology Groups Iso-Resources) is used by health professionals to assess the level of autonomy from the activities carried out (totally or partially) or not by a person.

The main topics of this grid are:

- coherence: talk or behave in a logical and sensible way;
- orientation: locate in time, the time of day and location;
- body hygiene grooming: assessing the toilet top (head, trunk) and lower the toilet;
- dressing: evaluating sub-items of wrapping up, the average skin and trim the bottom;
- food: and-items due to serving and eating;
- elimination: that evaluates actually the ability of the person to manage hygiene disposal and non continence evaluated on two sub-items: urinary excretion and fecal elimination;
- transfers: lie down, sit, stand;
- travel inside: with or without technical aids;
- travel outside: in the same way as the previous item, but outside;
- remote communication: Using a telephone, remote alarm.

Less important:

- management: manage its affairs, budget, make any representations or use money;

- cooking: preparing the meal;
- the household: perform all the housework;
- transport: making use of means of transport (or order);
- purchases: Order by mail or make direct acquisitions;
- monitoring of treatment: medication adherence;
- Free time activities: having cultural, sports, hobbies.

5 Conclusions

Within WP 4.1 the elderly end-users are organized in different groups according to a disability criterion which was defined as an impairment of the independent/autonomous, performance/execution of any of the activities described in relation to the key-functionalities, which, at its minimum severity 1) requires constant external help and/or supervision from another person and/or 2) produces significant physical and/or psychological (including emotional) discomfort. In addition to this definition we have also considered the official country specific criteria for disability. In all four end-user countries a person with a disability is defined an individual which has some kind of limitation that limits or prevents her/his social life. However, differences exist in the disability definition. For example, in Romania the incapacity of the social environment to offer equal opportunities to individuals living in the society is also taken into account. Despite the differences in the criteria, end-users having an official disability certificate will be considered in the field trials as a separate category.

Based on the methodology developed within WP4.1 (see section 2), we have considered three groups of disabilities: 1) health-related; 2) house-hold specific related; 3) hobby and leisure related. For each of the end-user groups, the detailed description considers both physical and psychological disabilities as well as a combination of the two.

The various ways in which these end-user groups can be aided by the NITICS services is exemplified by use cases diagrams. For example, the end-users in the third group have characteristics that affect their daily life including their potential hobbies and/or leisure time respectively. The characteristics concern their body functions, their body structures, their activities and participation with regards to the Disability classifications and criteria. One third of the end-users interviewed in the WP2.1 in Slovenia have a combination of two or more of the disabilities that affect their daily routine. End-users in this group are expected to benefit from the future services of the NITICS platform, especially services of: (a) home health **monitoring**, (b) **reminders** or an indirect services which are based on an alarm triggered by the platform which is signalling the caregiver that her/his help is needed (running errands, household activities, etc) and (c) service enabling the **socializing** and daily activities.