

DELIVERABLE

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D2.4 Use Cases / User Stories

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Abstract (for dissemination)	The document presents a preliminary output from the project's work on user stories related to requirements and needs experienced by people with mobility impairments when trying to negotiate the built environment. A user story consists of a sentence in the everyday language of the end user that captures what that user does or needs to do. This description serves as the basis for defining the functions which a technical system (e.g. a software application) must provide to meet real-world demands. The deliverable documents the 57 user stories collected so far; these will be further refined and new ones added in the subsequent, agile development process in which end user representatives will take a key role.
Keywords	Accessibility, wheelchair users, mobility impairments, user stories, use cases, user requirements, personas.

Statement of originality

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

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Executive Summary

As called for by the European Commission when defining "Collective Awareness Platforms for Sustainability and Social Innovation", CAP4Access is guided by the principle that the community of target users is to be at the centre of the development process, i.e. it is to be involved in all major components of the project. This is reflected in the project's work on user stories, discussed in this deliverable. The document will present the basis and point of reference for all development work to be carried out in the project. Our user stories revolve around issues which are at the heart of CAP4Access project, i.e. accessibility of the built environment for people with mobility impairments.

For the purpose of RTD within the project, a user story consists of a sentence in the everyday language of the end user that captures what that user does or needs to do. It is the short, simple description of a feature told from the perspective of the person who desires the new capability. With this description a development team is supposed to be able to identify the user, an action and a request; a user story thereby serves as the basis for defining the functions which a software system must provide, and it facilitates requirements management. A user story captures the 'who', 'what' and 'why' of a requirement in a simple, concise way, often limited in detail by what can be hand-written on a small paper notecard.

The deliverable documents 57 user stories collected so far, clustered into seven groups which align with the project's seven research strands: Collective tagging; Participatory sensing; Quality assessment of crowdsourced data; Integration of PSI and shared data; Routing and navigation services; Visual analytics; and tools for awareness raising and collective action. The selection is not intended as comprehensive or final; rather, it is meant as starting point for subsequent development process via engagement with end user communities and in close interaction with the agile development of tools that meet real-world needs of all CAP4Access target audiences. The user stories developed up to this point are based on published research evidence and on the experiences of several partners of the consortium, who have already begun to actively engage with the community of disabled persons.

The present document has been drafted in parallel with D3.2 ("Technical Design"), which marks the start of the project's technological development phase. In the weeks and months after submission of both deliverables, user stories and RTD across CAP4Access' seven research strands will be integrated in a highly iterative process of agile development. As far as the tasks in WP2 are concerned, this process will include:

- Prioritising user stories in close coordination with WP3;
- Assessment of prioritised user stories according to well established criteria for the quality and fitness-to-use of user stories (INVEST), in close coordination with the partner responsible for the research strand in question;
- Conversion of user prioritised stories into use cases by the task leaders with responsibility for the research strand in question;
- Revision of user stories / addition of new user stories throughout the project's pilot phase.

1 Introduction

1.1 User Stories

A guiding principle of the CAP4Access project, and of collective awareness platforms in general, is that the community of persons concerned must be involved in the project from beginning to end. Participatory research needs to go beyond collecting data from or about end-users and must include end-users in all phases of the research process beginning with defining the research challenges up to the exploitation of research outcomes.

This principle is echoed in the slogan “Nothing about us without us”, which came into use in disability activism during the 1990's and is now a widespread demand of the community of disabled persons world-wide. This slogan communicates “the idea that no policy should be decided by any representative without the full and direct participation of members of the group(s) affected by that policy”. It is a translation of the much older Latin phrase “Nihil de nobis, sine nobis”, which has its origins in Central European political traditions of more than 500 years ago and which subsequently became an epithet for democratic norms. The slogan “Nothing about us without us” is usually associated with people with disabilities but is also used by other groups that are often marginalized from political, social and economic opportunities. (Wikipedia)

In the context of the CAP4Access project, putting the “Nothing about us without us” principle into practice means that the research and development of the project's methods, instruments and tools will take place in constant and close interaction with the very people with whom the project concerns itself: the mobility impaired. The CAP4Access tools and methods will not be ones that have arisen solely in the mind of a researcher or a developer based on an idea he or she finds important or because the tool fits nicely into a particular field of research. To ensure that every new CAP4Access tool is something that the potential users actually need, one from which they can benefit and something which they will put to good use, the user's input must be sought every step of the way. A new tool, no matter how innovative or interesting, is meaningless if it isn't used by those whom it is meant to benefit. Many a well intended research project has come up with an interesting result that ultimately ended up in the wastebasket, because the people for whom it was intended had no use for it.

To ensure the CAP4Access project's adherence to the “Nothing about us without us” principle we will be working on issues, problems and solutions raised by the community of mobility impaired persons in Europe to determine which methods, instruments and tools they need and want. Through a wide array of channels we have started the process of engagement with the community in workshops, interviews, on social media and on the project's blog. The input from the community has been and will continually be crafted into a growing collection of “user stories”.

A user story is an instrument fundamental to both the SCRUM and Kanban agile software development methods, a combination of which will be used in the development of the CAP4Access software tools (see D1.1 "Conceptual and methodological framework"). As a central part of agile development methodologies user stories define what has to be built in the software project. User stories are prioritized to indicate which are most important for the system and are broken down into tasks by the software developers.

In the context of software development a user story consists of a sentence in the everyday language of the end user that captures what that user does or needs to do. It is the short, simple description of a feature told from the perspective of the person who desires the new capability. With this description a development team can identify the user, an action and a request and it thereby serves as the basis for defining the functions which a software system must provide, and it facilitates requirements management. A user story captures the 'who', 'what' and 'why' of a requirement in a simple, concise way, often limited in detail by what can be hand-written on a small paper notecard. It is usually necessary to give the user stories more body in the form of extra details or requirements that do not fit into the very concise format of the user story.

A variety of formats for user stories have been developed. What they have in common is their conciseness and their limit to one sentence. For the CAP4Access project we have chosen to use the following, commonly used, template for all of our user stories:

As a <type of user>, I want <some goal> so that <some reason>.

The quality of a user story can be determined by its adherence to the following criteria: independent, negotiable, valuable, estimable, small and testable. These criteria for a good user story were first formulated and given the acronym “INVEST” in 2003 by Bill Wake.¹

In his article Bill Wake describes the requirements that each criterion represents as follows:

- Independent: the user story should be self-contained, in a way that there is no inherent dependency on another user story.
- Negotiable: User stories, up until they are part of an iteration, can always be changed and rewritten.
- Valuable: A user story must deliver value to the end user.
- Estimate-able: You must always be able to estimate the size of a user story, i.e. what it will take to build the user story.
- Small: User stories should not be so big as to become impossible to plan/task/prioritize with a certain level of certainty.
- Testable: The user story or its related description must provide the necessary information to make test development possible.

The user stories that will be chosen as the the basis for the further development of tools for CAP4Access will be carefully evaluated on their adherence to these six criteria.

¹ Wake, B. (2003): INVEST in Good Stories, and SMART Tasks, available at: <http://xp123.com/articles/invest-in-good-stories-and-smart-tasks/>

1.2 How the User Stories were written

At this point in time we have written a total of 52 user stories and categorized them according to the research strand or strands to which their subject matter most closely correlates. The seven research strands are as follows:

- Collective tagging (see section 2)
- Participatory sensing (section 3)
- Quality assessment of crowdsourced data (section 4)
- Integration of public sector information (PSI) and shared data in OSM (section 5)
- Routing and navigation services for mobility impaired persons (section 6)
- Visual analytics (section 7)
- Methods and tools for awareness raising and collective action (section 8)

A challenge that we faced in writing the user stories was presented by the fact that the CAP4Access project is in many ways still at an early phase and much of the engagement work necessary for creating user stories is scheduled to take place in the months to come. A major component of the CAP4Access project concerns our engagement with the community of people with mobility impairments across a time span of three years. It is in the course of this time that we will be receiving a great deal more input and feedback from the community, much of which will result in revision or fine-tuning of current user stories and addition of new ones, stories which at this time we cannot yet anticipate. The user stories that we have developed up to this point are based on published (mostly anecdotal) research evidence or the experiences of several partners of the consortium, who have already begun to actively engage with the community of disabled persons, and to a very large extent on the many years of experience of SOZIALHELDEN e.V. with that same community. The set of user stories presented in this deliverable is intended, therefore, as base material for the subsequent project stages in which it will be further developed via engagement with end user communities and in close relationship to the agile development of tools that meet real-world needs of all CAP4Access target audiences.

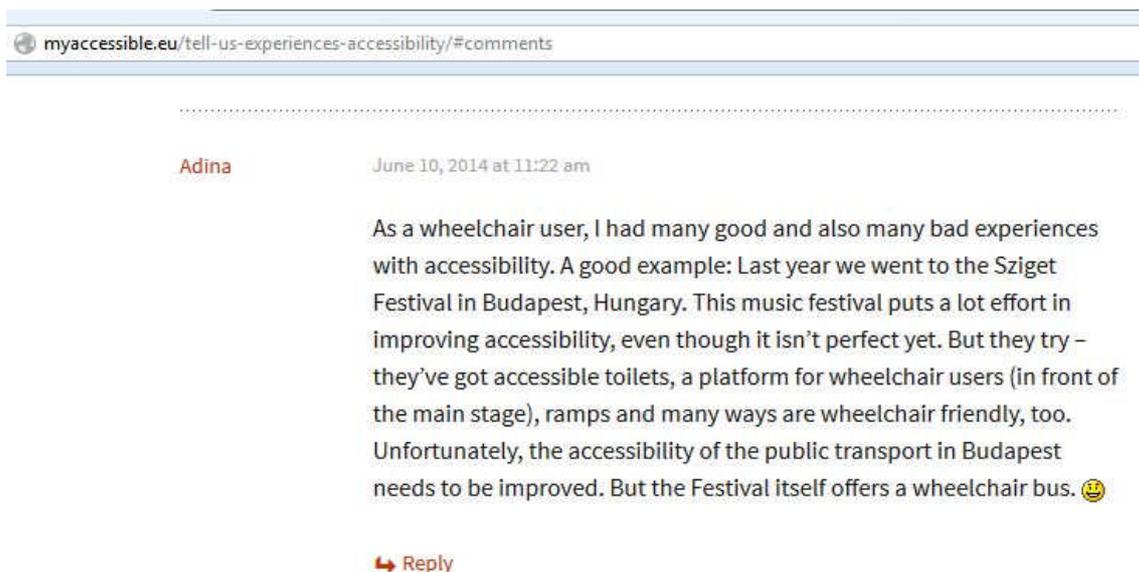
Different accessibility issues and possible solutions have, for example, been discussed by active Wheelmap users and mappers for several years on Wheelmap's user forum. An example of one of these discussions, regarding an issue which requires a rather complex solution, concerns the question of providing a tool for rating and finding wheelchair accessible toilets in public places. The discussion, whose content we have incorporated into a user story, can be seen here:

<http://wheelmap.uservoice.com/forums/31554-general/suggestions/2322754-filter-zeige-nur-orte-mit-rollstuhl-wcs>

Because much of the input for the current user stories has been taken from Wheelmap user input, several of the user stories explicitly mention Wheelmap. The potential solution could however also be provided by another, existent or to-be-developed, tool. We have mentioned Wheelmap in these cases only to provide a tangible example, to help in making the user story as concrete as possible.

The social media channels used by SOZIALHELDEN e.V., such as Facebook and Twitter, also provided a means for gathering input from the community long before the begin of the CAP4Access project, and will continue to do so during the course of the project. Last but not least, an appeal for community feedback published on CAP4Access' recently launched website for community engagement, MyAccessible.EU, resulted in very useful feedback from which several user stories could be crafted.

An example of one such reply to our appeal: "Tell us about your experiences with accessibility" can be seen in the screenshot below:



We will continue to cull information for revision of current and addition of new user stories from all of these channels as well as from new activities, as the level of community engagement is heightened in the four pilot sites in the months to come. This will enable the project to meet the requirement, as expressed by Bill Wake's in his INVEST criteria for a good user story (see above), that user stories must be negotiable, i.e. "can always be changed and rewritten until they are part of an iteration",

1.3 User Stories and Use Cases

The terms "user story" and "use case" are often used interchangeably. The degree of difference between the two is an everlasting debate². In this document we use the two terms for two very different things. In the context of this document:

- a **user story** is about a need in a user's day-to-day life. This need is considered as a requirement for the tool that is to be developed and exists whether or not software is built for him or her.

² For example, see <http://www.stellman-greene.com/2009/05/03/requirements-101-user-stories-vs-use-cases/>

- a **use case** is about the behaviour that is built into the software to meet those needs, the sequence of actions of "how" something is done. It typically has a lot of detail and describes everything that the developer needs to build in order to meet the user's need. A good comparison are the scripts written for videos, describing each scene individually, in sequence.

A user story is easy to read and very short, written so that anyone can understand it. Use cases, on the other hand, are much longer and describe a complete interaction between the software and the user, and possibly other systems. It is written so that it can be implemented by developers and ultimately contains a complete description of every interaction between the user and the software that one is planning on building.³ For example, a use case for tagging a place of interest might include the following elements: "Look up the location. Assess its accessibility. Open the POI on the map. Select the relevant accessibility rating. Enter the rating".

Our past and future efforts at community engagement will result in a very large number of user stories, representing an extensive, though not exhaustive, collection of issues that are important to people with mobility impairments in Europe. This vast array of user stories will have to be prioritized as it will not be possible to develop solutions for all of these issues. A variety of factors, such as the universality and urgency of a problem and the feasibility, scalability and sustainability of the respective tool will be considered in the prioritization. As it becomes clear which user stories will be used for further development into software tools, detailed use cases can be written based on the needs communicated by the user stories. Since the development of the individual tools will begin consecutively over a period of time and will not be carried out in parallel, this means that individual use cases can only be written as each tool enters into the initial development phase. The use cases will be written by the task leaders who are also responsible for the relevant user stories (see section 1.5 below).

1.4 Personas

The tools and methods to be developed for the CAP4Access project will be targeted at a wide range of users, of differing nationalities, generations, abilities and backgrounds. When creating a tool for such a wide range of users one may be tempted to make the tool's functionality as broad as possible so that it will take into account the needs of as many people as possible. Extensive research in interaction design, however, has shown that to create such a tool is in most cases not a good idea. When a tool's functionality is widely extended to include too many different types of users, this typically results in a tool which ultimately pleases no one.⁴

The key is to choose the right individuals for whom to design a specific tool. An instrument that is very helpful in achieving this is the "persona"⁵. Personas are a powerful tool for

³ Stellman, A. and Greene, J. (2009): Requirements 101: User Stories vs. Use Cases, available at: <http://www.stellman-greene.com/2009/05/03/requirements-101-user-stories-vs-use-cases/>

⁴ Cooper, Alan, Reimann, Robert and Cronin, David (2007³): About Face – The Essentials of Interaction Design, p. 77.

⁵ Adlin, Tamara and Pruitt, John (2010): The Essential Persona Lifecycle, Your Guide to Building and Using Personas. p. 1

communicating the needs of different types of users and for prioritizing which users are the most important to target in the design of form and behaviour of a tool.

Furthermore, personas help to:

- Determine what a tool should do and how it should behave. Persona goals and needs provide the foundation for the design effort.
- Communicate with stakeholders and developers. Personas provide a common language for discussing design decisions and also help keep the design centered on the user at all times.
- Build consensus and commitment to the design. Because personas resemble real people they are easy to relate to. Having personas makes it easier to be certain that everyone is on the same page and is using the same language.
- Measure the design's effectiveness. Design choices can be tested on a persona, providing a powerful reality-check for designers trying to solve design problems. This allows design iteration to occur rapidly and inexpensively at the whiteboard. This results in a stronger overall design that can then be tested with real people.

An added positive effect of personas is that for everyone involved in designing and developing the tools it is easier to be interested in and committed to the solution when one has the feeling of creating something of benefit for an actual human being.

Personas are user models that are represented as specific individuals. They are not real people but are based on observations of real people. They should be based on facts that have been well researched with regard to the potential users of a product. Despite their depiction as specific individuals, personas are archetypes, representing a certain type of user. They are, however, not stereotypes: personas should be typical and believable, but must not represent biases and assumptions that are not substantiated by factual data.⁶

In this context personas bring issues of social and political consciousness to the forefront. In developing personas particular demographic characteristics must be chosen with care. The personas which we have developed for the CAP4Access project therefore reflect the diversity of our target group with regard to nationality, ethnicity, age, ability and geographic location.

Just as previously discussed with regard to the development of user stories, a challenge we faced in the creation of personas for this project was the fact that the project is still in its initial stage. With increasing community interaction at the different pilot sites the personas as they stand now will be put to the test.

We have developed the personas for this project around the basic facts of their person - such as gender, age and profession - the relevant behaviours they exhibit in their daily life and the needs they have in order to pursue certain goals related to the topics of the CAP4Access project. The characteristics of the personas as they are presented at this time is based largely on information gathered from our experience with people with disabilities previous to the begin of the CAP4Access project. At this point it is impossible to anticipate all of the characteristics that may prove to be important in the course of our activities with users and

⁶ Cooper, A., Reimann, R. and Cronin, D. (2007)

the international community. It may well be that certain attributes of the personas will need to be changed in order to better reflect the reality of our international target group. During the development of a certain tool it may also be necessary for the developers to know more details about a persona for whom they are developing a tool. Or it may even be necessary to add or delete a persona, depending on what our experiences “in the field” are. Thus, the personas as they are presented below are subject to change as our project progresses and we gain more and more relevant information on whom exactly CAP4Access should be developing its tools for.

One of the most critical tasks in the modeling of personas is identifying user goals and expressing them succinctly. User goals serve as a lens through which designers must consider the functions of an innovation, tool or product. All humans have motivations that drive their behaviours; some are obvious, and many are subtle. It is critical that personas capture these motivations in the form of goals. The goals of the personas are shorthand notations for motivations that not only point at specific usage patterns but also provide a reason why those behaviours exist.

However, if you ask a person directly what their goals are, he or she will usually not be able to articulate them accurately or may not be prepared to speak about them honestly. Therefore researchers need to carefully interpret goals from observed behaviours, answers to other questions, nonverbal cues, and clues from the environment. This too will be an important task as we refine the current personas in the course of our increasing involvement with the community of people with mobility impairments Europe-wide.

1.5 Next steps

The present document has been drafted in parallel with D3.2 (“Technical Design”), which marks the start of the project's technological development phase. In the weeks and months after submission of both deliverables, user stories and RTD across CAP4Access' seven research strands will be integrated in a highly iterative process of agile development. As far as the tasks in WP2 are concerned, this process will include:

- **Prioritising user stories** in close coordination with WP3;
- **Assessment of prioritised user stories according to the INVEST criteria** (see section 1.1) in close coordination with the partner responsible for the research strand in question;
- **Conversion of user prioritised stories** into use cases by the task leaders with responsibility for the research strand in question;
- **Revision of user stories / addition of new user stories** throughout the project's pilot phase (i.e. until M30).

2 Collective tagging

2.1 Toilet pressure

Persona category: wheelchair user

Issue: Needs to find a toilet nearby.

Solution: collect and share information about wheelchair accessible toilet

As a <wheelchair user> I want to know where I can find an accessible toilet nearby so I can use it when the need arises.

Requirements: simple criteria and rating, OSM-tag

2.2 To trust or not to trust

Persona category: tool user

Issue: Different mappers have differing opinions on how to rate the wheelchair accessibility of certain places.

Solution: provide an instrument / method for dealing with conflicting crowd-sourced information within different platforms and/or rating systems

As a <tool user> I want to be able to judge which mapped information is more accurate when conflicting crowd-sourced information is provided so that I decide which one to trust more. (see also 2.3)

2.3 Parking

Persona category: tool user (tourist, wheelchair user, accompanying parent)

Issue: When I travel somewhere by car I need to know if and where there are handicapped parking spaces available at my destination

Solution: a tool that gives information on suitable parking possibilities for people with a disability

As a <tool user> I want to know if and where a public place has reserved parking for people with a disability so that I can plan accordingly.

Requirements: number and location of parking spaces,

2.4 Temporary event information

Persona category: wheelchair user

Issue: How can I know how accessible the different areas of a temporary event, such as a music festival, are?

Solution: provide a tool to enable the gathering and sharing of accessibility information for a temporary event

As a <wheelchair user> I want to know if a music festival is wheelchair accessible so that I can decide whether or not to attend.

Requirements: wheelchair accessibility of different aspects: restrooms, parking, different areas of the venue, catering. (Collective tagging only applies to reoccurring events at the same locations. Organiser can share information as well.)

2.5 Accessible shopping

Persona category: wheelchair user

Issue: Although the entrance to a store may be wheelchair accessible the aisles in the store are not always wide enough for a wheelchair.

Solution: provide a tool that gives information on the accessibility of the interior of a building

As a <wheelchair user> I want to know if the inside of a store has aisles that are wide enough to navigate with a wheelchair so that I can decide whether or not to enter the store.

2.6 Inaccessible hotel areas

Persona category: tourist

Issue: I don't know if the hotel I am booking for my next vacation is fully wheelchair accessible. What hotel owners consider to be wheelchair accessible and what they advertise on their website is not always reliable.

Solution: a tool that gives detailed information on the accessibility of a hotel as a whole

As a <tourist> I want to have reliable information on the wheelchair accessibility of the entire hotel so that it doesn't turn out that entire parts of the hotel are inaccessible to me.

Requirements: possibility for different accessibility ratings for different parts of the hotel, such as rooms, dining room, sports and wellness facilities, lobby, public restroom

2.7 Cooperations with partners and allies

Persona category: tourist

Issue: Planning a vacation is difficult when one has to glean accessibility information out of the mass of tourist information.

Solution: an instrument that gives information on the wheelchair accessible locations and sites of a city that are interesting for tourists

As a <tourist> I want to find information regarding wheelchair accessible tourist sites so that I can plan my trip more easily.

Requirements: data standards, API

2.8 Mum I am bored!

Persona category: young wheelchair user and their parent

Issue: Needs to find accessible places to go with children for recreation and leisure and nearby parking

Solution: collect and share information about wheelchair accessible places to go and activities for children & young people.

As the <parent of a disabled child> I want to know about age appropriate accessible activities and places of recreation so that I can go there with my child.

Requirements: simple criteria and rating, OSM-tag, Blue Badge Data

2.9 Temporary information

Persona category: wheelchair user

Issue: How can I find up-to-date information on the current accessibility of a building, e.g. when there is construction work being done at the moment?

Solution: collect and share information about *temporary* accessibility related features

As a <wheelchair user> I want to know whether a building is accessible in spite of temporary conditions (e.g. construction work) that might have an impact on accessibility so that I won't be faced with unpleasant surprises.

Requirements: ability to create and display accessibility related tags together with contextual information of a temporary nature

2.10 Leisure time activities

Persona category: wheelchair user

Issue: Wants to find accessible leisure activities (e.g. cooking classes, gym courses)

Solution: collect and share information about wheelchair accessible leisure activities

As a <wheelchair user> I want to know where I can find an accessible cooking class or accessible gym classes so that I can plan my leisure time.

Requirements: simple criteria and rating, OSM-tag

2.11 Where can I go with my child?

Persona category: parent

Issue: Needs to find accessible places to go for children for recreation and leisure and nearby parking places.

Solution: collect and share information about wheelchair accessible places to go and activities for children & young people and link to parking information (Blue Badge  & crowdsourced)

As the mother of a disabled child I want to know about activities and places to go with my disabled child that are accessible for recreation and leisure activities and nearby places to park.

Requirements: visualization to appeal to young people – e.g. Youth Wheelmap Interface, suitable for multiple information channels & parking information

3 Participatory sensing

3.1 Emotional responses to public space

Persona category: wheelchair user, mapper

Issue: Desire to provide subjective feedback on local built environment

Solution: provide functionality for choosing a degree of emotion from an emotion-specific slider-scale for particular spaces

As a < wheelchair user, mapper > I want to be able to record a response/feeling to the accessibility of a particular space so that I can contribute to improving that space.

Requirements: must provide “locale of interest” or geographical boundary of a particular space, notification system, sliding scale for recording emotional response

3.2 How do the people feel? Subjective evaluation of objective features

Persona category: policy maker, activist

Issue: I want to understand how features of the built environment affect how people with mobility needs feel about those features

Solution: allow for subjective assessment of features of built environment

As a < policy maker, activist> I want a means of viewing how different built environmental features are perceived by those with special mobility needs so that I can improve accessibility policy

Requirements: should allow finding of particular features on a map; should enable searching of tags for similar spaces and/or sentiments

3.3 Sharing objective stress measure information

Persona category: Tool User

Issue: I want to record objective information about my physiological reactions in particular spaces

Solution: provide functionality which collects data from external physiological sensors (e.g., heart rate monitors)

As a < tool user > I want to record my physiological reactions in the built environment so that I can gain a greater understanding of how the built environment affects human physiology and health

Requirements: should allow for consistent connection between external device and phone

3.4 Subjective responses to objective features (tool user version)

Persona category: tool user

Issue: I want to be able to provide a subjective assessment of an area that I have just also provided some objective data for using some form of sensor.

Solution: provide notifications for users to provide particular subjective assessments after having contributed an objective measure

As a < tool user > I want to supplement my provision of objective data with subjective responses so that I can give a more accurate picture of a particular area of the built environment

Requirements: ability to provide notifications

3.5 Subjective responses to objective features (data user version)

Persona category: policy maker, activist

Issue: I want to compare crowdsourced objective information on the built environment with crowdsourced subjective emotional responses

Solution: provide ability to isolate, for some given map area, features where there is overlap between objective and subjective crowdsourced information provided by users

As a < policy maker, activist > I want a means of looking at subjective and objective data provided so that I have a better understanding of how the two types of data are correlated

3.6 Comparing the reported subjective well-being of those with and without mobility issues to those without

Persona category: policy maker, activist

Issue: I want to know how the well-being of those with mobility issues compares to the well-being of those without such issues in the same location

Solution: In addition to collecting data from those with mobility issues, also collect data on sub-samples of those without such issues, publicize this and make such data available

As a < policy maker, journalist > I want to compare the well-being of those with and without mobility issues so that I can understand the degree of loss (or gain) in well-being as experienced by those with mobility issues compared to the general population

3.7 What I feel

Persona category: tool user

Issue: I find the emotion categories provided by the app too limiting and would like to suggest my own categories of emotions to map

Solution: Allow an option for feedback and/or specifically solicit suggestions for other categories to include in the sentiment mapping

As a < tool user > I want to suggest new categories of emotion to be recorded so that I can adequately reflect my own subjective experiences

3.8 Automatic Sensing

Persona category: electronic wheelchair user

Issue: I do not have the ability to use current tools for data collection, but I would like to participate.

Solution: Create devices which collect suitable data on the fly

As an <electronic wheelchair user> I want to have a tool which I only need to switch on and off and which automatically collects information with regards to accessibility

4 Quality assessment of crowd sourced data

4.1 Premium entries

Persona: user

Issues: can I trust the information on accessibility which is being provided?

Solution: show if the information provided is based on validated data

As a <user> I want to know if the data I am relying on has been validated by a knowledgeable source.

4.2 Multiple ratings

Persona: mapper / wheelchair user

Issues: I have the choice of three hotels, all are presented on the map (e.g. Wheelmap) as being accessible. I would like to choose the hotel about which the grading is most up-to-date and has been confirmed by as many other users as possible.

Solution: show from when the information provided (tag) is / show how many users have viewed and confirmed the grading / show whether the information provided (tag) is confirmed by another data source (e.g. booking.com)

As a <user> I want to know which of a number of objects (hotels) is most likely to turn out to be accessible once I get there.

5 Integration of public sector information (PSI) and shared data in OSM

5.1 Spread information

Persona category: data owner

Issue: wants to optimize its service for mobility impaired people

Solution: combine PSI with crowd sourced information

As a <data owner> I want to share my information on Wheelmap so I can help people impaired in their mobility.

As a <data owner> I want to implement Wheelmap on my website so I can provide a better service.

5.2 Data integration

Persona category: policy maker

Issue: How can I put my city's accessibility data to good use?

Solution: a tool for integrating PSI into OSM

As a <policy maker> I want to make municipal accessibility information available to a wider public so that more people can make use of this information.

5.3 We need these data

Persona category: activist

Issue: How can I convince data owners to donate their data to Wheelmap?

Solution: provide an instrument that addresses potential big data donors in an appealing way

As an <activist> I want to be able to convince data owners to share their data with Wheelmap.org so that the map becomes more comprehensive.

Requirements: showing the potential audience for their data, pointing out the benefits and giving best practices

5.4 Public transport basis city information

Persona category: tourist

Issue: When I travel to a new city I do not know the details about travelling by public transportation with a wheelchair in that city.

Solution: a tool providing public sector information on the accessibility of local public transportation

As a <tourist> I want to know what awaits me with regard to public transportation in a new city so that I am not presented with unpleasant surprises.

Requirements: where to get on the subway, how to alert the driver, which vehicles are accessible, how to access a ramp,

5.5 It's about time

Persona category: wheelchair user/person with a stroller, walking frame

Issue: want to know when the next low-floor public bus/tram is coming

Solution: timetables/schedules with information on accessible vehicles

As a <wheelchair user/person with a stroller> I want to know when the next low-floor bus/tram is coming, so I spare time to wait too long at a station.

5.6 Doctor I am coming

Persona category: wheelchair user

Issue: I want to know where I can find an accessible doctors office, exceeding information about mere physical access to accessible facilities and applicances e.g. scales, weights

As a <wheelchair user> I want to where I can find an accessible doctors office that I can not only access but also be examined and receive treatment.

As a <wheelchair user> I want to know where I can find an accessible doctors office that I can not only access but also be examined and receive treatment.

6 Routing and navigation services

6.1 Offline medium

Persona category: tourist

Issue: What places are accessible to me in the city I am visiting?

Solution: offline medium showing the wheelchair accessible places interesting for tourists

As a <tourist> I want to have an offline map so I can explore an unknown city on my own.

Requirements: easily printable at home or by tourist offices on demand, specific areas of a city, customizable for specific categories

6.2 Oh wait – is that space occupied?

Persona category: wheelchair user

Issue: How can I know if the wheelchair spot on the bus I am waiting for is still available?

Solution: a tool that informs its user on the availability of wheelchair spots on the public transportation buses.

As a <wheelchair user> I want to know if the wheelchair spot on a bus is already occupied by another wheelchair user so that I know if I can get on a particular bus.

6.3 Howto: get in, get out

Persona category: wheelchair user

Issue: How do I know if I can get on and off the train, in which I have reserved a wheelchair spot, on my own?

Solution: providing a tool with detailed information on the procedure for entering and exiting a particular train.

As a <wheelchair user> I want to know if I require assistance when entering and leaving a train so that I can plan accordingly.

6.4 Seat/space reservation

Persona category: wheelchair user

Issue: Reserving a wheelchair spot on a train often involves a user unfriendly procedure

Solution: provide a train reservation procedure that is straightforward and simple

As a <wheelchair user> I want to be able to reserve an accessible seat on the train just as easily as other travelers so that taking the train is as hassle free as possible for me.

6.5 Am I late?

Persona category: wheelchair user

Issue: When travelling on a train that is delayed I don't know if I will still have enough time to change over to my connecting train, considering the extra time I may require in getting to the platform with my wheelchair.

Solution: a tool that gives information on the route and time required for changing trains at a particular train station

As a <wheelchair user> I want to know if I have a enough time to reach my connecting train when the train I am currently on is delayed.

6.6 Accessible trains/vehicles

Persona category: wheelchair user

Issue: I don't know what my wheelchair accessible alternatives are when my train trip does not go according to schedule

Solution: a tool that informs about suitable and available alternative wheelchair accessible trains

As a <wheelchair user> I want to know what my alternatives are when my scheduled train is cancelled or delayed so that I can still get to my destination.

6.7 Broken elevators

Persona category: wheelchair user

Issue: When I get off at a subway station I don't know if the lift there is working or not.

Solution: a tool which informs travelers on the state of repair of subway elevators

As a <wheelchair user> I want to know if the lift at my destination subway station is working so that I can adjust my itinerary if necessary.

6.8 MyAccessible navigation

Persona category: Tourist

Issue: How do I get to my hotel, which is close by, on foot with my suitcase and buggy?

Solution: using MyAccessible navigation app to direct me using the route with the least amount of obstacles and the smoothest surface

As a <tourist> I want to have an app so I can get from point A to point B in a city unknown to me.

Requirements: simple intuitive mobile application that can provide me with directions for accessible routes for specific areas of a city, customizable for specific categories (e.g. manually propelled wheelchair user, parent with buggy).

6.9 Getting to an accessible facility

Persona category: wheelchair user

Issue: How to determine the location of a local facility which is wheelchair accessible, and how to get there.

Solution: using MyAccessible navigation app, request local facilities of a particular type via a request to WheelMap and then direct me using the route which matches my movement limitations

As a <wheelchair user> I want to have an app that tells me where local facilities that I can access are and how to get to them.

7 Visual analytics

7.1 Operation Delta

Persona category: activist/mapper

Issue: what was the impact of an event?

Solution: providing before and after numbers for a specific event (visualisation of the before and after situation)

As an <activist > I want an informational graphic that shows the status before and after a mapping day so I can see the results of my engagement.

Requirements: customizable, should support city/region/country boundaries, info graphic, specific date or period of time, accessible via permanent link

7.2 What's the status?

Persona category: activist

Issue: My local authority does not do enough regarding accessibility and I want to give them a picture of the status quo of my city.

Solution: a tool displaying the status quo on accessibility.

As an <activist> I want my local authority to know about accessibility in my city in order to sensitise the responsible people and to make them more active.

Requirements: customizable, should support city/region/country boundaries, info graphic, specific date or period of time, accessible via permanent link (see also 7.7)

7.3 Compare region X with region Y

Persona category: journalist

Issue: how do different cities or regions compare in their accessibility of public places?

Solution: providing a visualisation of the status quo of different cities

As a <journalist> I want to have access to easy to convey information so that I can report on the accessibility of different cities or regions.

7.4 Performance check

Persona category: power mapper

Issue: how did I perform? how many POIs have I marked? how many photos have I uploaded?

Solution: visualisation of individual mappers' mapping activity

As a <mapper> I want to see the history of my mapping activity so I can see how well I have been doing.

Requirements: user dashboard

7.5 YIHAA

Persona category: power mapper

Issue: how does my mapping activity compare with the activity of other mappers (what is my impact?)

Solution: scores / tables with different figures about mappers' mapping activity

As a <mapper> I want to see how my mapping activity compares to others' so I can see how well I am doing (competitive aspect).

7.6 This is how big it is

Persona category: product owner/activists

Issue: showing the history of the worldwide activism

Solution: animation of the world with timeline

As a <product owner> I want to let people know where in the world engagement has taken place so everyone can see the impact he or she has with the product.

<http://vimeo.com/56374742>

<http://taginfo.openstreetmap.org/keys/?key=wheelchair#map>

7.7 Get me where I am needed

Persona category: activist/mapper

Issue: where is my help needed?

Solution: providing an info graphic that highlights no or low-targeted areas in a specific region

As a <mapper> I want to know which parts of my city have the most need for mapping/tagging so my contribution will be most effective

7.8 Ivor

Persona: policy maker

Issue: wants to demonstrate how wheelchair accessible Europe is according to Wheelmap.

Solution: providing a visual graphic of Europe with any POI related information

As a <policy maker> I want to show a map section of Europe displaying the green/yellow/red marked places of Wheelmap so I can raise the awareness of different stakeholders.

Requirements: European map section, number of marked places, e.g. three different graphics - one per each value (yes/no/limited), suitable for digital and printable formats.

7.9 Perception

Persona category: activist / urban designer

Issue: want to know what other people's perceptions are about the accessibility in my current location?

Solution: providing a spatial and temporal visualisation of public perceptions that highlights sentiments and changes over time onto community maps

As an <activist> I want to know what the general public thinks about accessibility in parts of my city and how these views have changed over time so I can see if specific events/interventions/campaigns have changed people's views

As an <urban designer> I want to know what the general public thinks about accessibility in a specific location before changes to the urban layout and after a redesign so I can see if my design has changed people's views

8 Methods and tools for awareness raising and collective action

8.1 Where am I needed?

Persona category: city planner/policy maker

Issue: where in my city does action need to be taken to improve accessibility? (ramps are needed, rebuilding, renovation of existing places)

Solution: providing information on specific places that are not yet accessible

As a <city planner> I want to know where in the city action needs to be taken so that accessibility will be improved.

8.2 That's what it looks like Atm

Persona category: activist

Issue: in my opinion my local authority does not do enough regarding accessibility and I want to give them a picture of the status quo of my city.

Solution: a tool displaying the status quo on accessibility.

As an <activist> I want my local authority know about accessibility in my city in order to sensitize them and make them more active.

Requirements: customizable, OSM-shape-based, info graphic, specific date or period of time, accessible via permanent link (see also 8.6).

8.3 Sensitize public transport provider

Persona category: wheelchair user

Issue: What can I do when I run into a problem during public transport?

Solution: a tool for reporting a problem to the transportation provider easily

As a <wheelchair user> I want to be able to report an accessibility problem to my public transportation provider so that the provider can make the necessary changes to improve the service.

8.4 Spread the word

Persona category: activist

Issue: How can I engage new people in the Wheelmap community?

Solution: providing instruments that appeal to new target groups

As an <activist> I want to have an appealing instrument which helps me to engage new target groups in collective mapping so that the Wheelmap becomes more widely known. (See also 8.1)

8.5 Compare region X with region Y

Persona category: journalist / activist

Issue: How do different cities compare with regard to the accessibility of their public places?

Solution: providing a visualisation of the status quo of different cities

As a <journalist> I want to have access to easy to convey information so that I can report on the accessibility of different cities and regions. (see also 8.6)

8.6 Learning from Best Practices

Persona category: policy maker

Issue: Where can I find examples of international best practices with regard to accessibility?

Solution: providing an instrument for sharing best practices internationally

As a <policy maker > I want to know about the experiences of other municipalities in other countries with regard to improving accessibility so that our city can learn from them.

Requirements: possibility of photos and videos, simple translation ability,

8.7 Best Practice awareness

Persona category: activist

Issue: Where can I find good ideas for improving accessibility so I can approach the responsible authorities in my hometown with concrete and workable suggestions?

Solution: providing an instrument for sharing best practices internationally

As an <activist> I want to have a list of ideas that have been proven to work so that I can show what is actually possible in improving accessibility.

Requirements: possibility of photos and videos, simple translation ability

8.8 Fix that barrier

Persona category: wheelchair user / activist

Issue: I frequently encounter obstacles to accessibility in my daily life of which I think the responsible authorities should be made aware.

Solution: provide an instrument for reporting problems with accessibility to a responsible authority within the municipality.

As a <wheelchair user> I want to be able to report obstacles to accessibility in my city so that local policy makers are aware of the problems that need to be addressed.

8.9 Don't call it taxi

Persona category: wheelchair user / activist

Issue: I frequently encounter problems with taxis where they turn up and the ramps don't work, they make me wait because it's an account job or they are rude and unhelpful which I think the taxi companies and public should be made aware of

Solution: provide an instrument for reporting problems with accessibility to a taxi firm and regulatory bodies

As a <wheelchair user> I want to be able to report problems with inaccessible taxis in my city so that companies, regulators and local policy makers are aware of the problems that need to be addressed.

8.10 How to mapping

Persona category: activist

Issue: I want to know what to consider for planning a good mapping event

Solution: providing online and/or offline information / checklists

As an <activist> I want to have detailed and useful information on how to plan a mapping activity so that the outcome will be as effective as possible

8.11 Group building

Persona category: mapper

Issue: I want to map in a specific region but would prefer to do so in a group

Solution: Event builder to let people know about activities

As a <mapper> I want to let people know about my desire to get engaged and to have the opportunity to invite more people to a mapping event, so I can map within a group rather than being alone.

8.12 Next level scaling

Persona category: mapper / wheelchair user

Issue: I want to map and/or find places according to their accessibility on other platforms and maps which I already use for other purposes

Solution: provide an API, set new and uniform rating standards and convince companies such as Foursquare and their communities to become engaged in accessibility mapping

As a <mapper> I want to be able to mark accessibility barriers on Foursquare so that I don't have to switch between apps for different purposes

As a <wheelchair user> I want to be able to find information on accessibility on any map so that I don't have to use different maps for different purposes.

9 Personas

9.1 Hanna

Persona categories:

- Mapper
- Tool user
- Wheelchair user
- Tourist

Facts:

- 30 years old
- single
- lives in Berlin
- freelance designer
- uses a motorized wheelchair
- paralyzed from the waist down
- has a small circle of friends and acquaintances with and without disabilities

Behaviours:

- is very cautious about venturing forth on her own
- is a very capable internet and smartphone user
- is an active member of the OSM and Wheelmap communities
- is a daily social media contributor
- travels infrequently
- lives independently

Needs and goals:

- needs to know what to expect when she goes to a new place, does not like to be surprised
- wants to get out of her home more often
- needs to be able to get to work using public transportation
- wants to be able to travel more easily
- wants to play a role in improving wheelchair accessibility

9.2 Jason

Persona categories:

- Activist
- Mapper
- Manual wheelchair user

Facts:

- 42 years old
- single
- lives in South London
- uses a manually propelled wheelchair
- can transfer himself unaided from the wheelchair to other seating

- freelance consultant, personal assistant and volunteer

Behaviours:

- is a very capable internet user and uses smartphones to a lesser extent
- travels around the city daily
- has an active life and is involved in various groups and activities for disabled people
- lives independently
- is outspoken on issues of disability rights

Needs and goals:

- wants to be able to carry out his social and professional life easily
- needs to be able to get to work on time using public transportation
- wants to be able to travel easily without being treated unfairly
- wants to play a role in changing the attitudes of public transport users and providers towards wheelchair users

9.3 Dieter

Persona categories:

- Mobility impaired senior citizen
- Tourist

Facts:

- 82 years old
- widower
- lives in Leverkusen
- uses a wheeled walker
- has great difficulty walking due to rheumatism
- retired manager
- has 5 children and 6 grandchildren, all internet-savvy

Behaviours:

- uses a cell phone especially designed for senior citizens
- does not use the internet except with the help of others
- lives independently
- uses public transportation regularly
- is frequently visited by his children and grandchildren
- his children frequently take him places by car

- uses a manual wheelchair for longer excursions
- travels with a specialized travel agency within Germany twice a year

Needs and goals:

- needs to be able to run daily errands independently
- wants to be able to plan and take part in cultural activities regularly
- needs to be able to use public transportation easily several times a week
- would like to travel more independently and more extensively
- wants to be able to check wheelchair accessible routes in advance

9.4 Antonia

Persona category:

- Policy maker

Facts:

- 52 years old
- married
- one daughter
- trained as an architect
- lives in Valencia
- bureaucrat in the city's department of urban planning / development

Behaviours:

- has limited access to facts about accessibility
- uses the internet on a daily basis
- uses a state-of-the art smartphone
- has very little contact to people with mobility impairments
- thinks progressively and is open for change

Needs and goals:

- is eager to improve the accessibility of Valencia
- wants to work together with civil society organisations and with other municipalities
- needs easy to understand information on accessibility with which to convince her superiors and her political adversaries

9.5 Thomas

Persona categories:

- Caretaker
- Activist
- Mapper

Facts:

- 38 years old
- divorced
- lives in Vienna
- teacher at a school for physically and intellectually disabled children
- has a broad international network
- does not have a disability himself

Behaviours:

- internet savvy smartphone user
- does not regularly use social media
- frequently uses public transportation with his students
- has a great deal of knowledge on disability issues
- is a very vocal and at times controversial advocate for disability issues

Needs and goals:

- is eager to improve the situation of disabled people
- wants to work internationally on disability issues
- expects accessibility to be interpreted in very broad terms
- needs tools to make his daily work with disabled students easier

9.6 Victor

Persona category

- Journalist

Facts:

- 45 years old
- married
- journalist for a regional newspaper
- reports on a variety of social issues
- lives in Heidelberg

- does not have a disability himself

Behaviours:

- internet savvy
- avid iPad user
- is interested in new ways to call attention to social issues
- writes with a broad audience of readers in mind
- has recognized inclusion to be an important issue

Needs and goals:

- needs access to information on accessibility issues that is easy to convey to his readers
- wants to learn more about disability issues
- wants his writing to have a social impact

9.7 Caroline

Persona category

- Parent (who uses a stroller for her children)

Facts:

- 32 years old
- married
- mother of 1 year old twins and a 3 year old
- managing director of small consultancy
- lives in East London

Behaviours:

- is an active parent who likes to takes her kids to various activities (such as mothers and toddlers mornings)
- internet savvy and uses her smartphone constantly
- has a wide variety of apps installed on her smartphone
- prefers apps that are creative, informative, fun, attractively designed
- uses the internet frequently for information about children, booking holidays, planning outings and for work
- travels to work with the kids occasionally for team meetings

Needs and goals:

- wants accessibility information on public places

- wants to get out and about with her children and needs to know how to get to different places whilst avoiding stairs and other such obstacles
- needs to know what she will encounter on route to different places
- wants to travel to work and meetings when necessary and ensure she has step free access on the journey
- wants to travel abroad yearly with her kids

9.8 Patrick

Persona category

- Citizen (not mobility impaired)
- Mapper

Facts:

- 43 years old
- in a relationship
- works for a tech company
- lives in Bonn
- has several friends who use wheelchairs
- has an aunt (70 years old) who uses a wheelchair

Behaviours:

- is a socialite who enjoys going out with friends
- is internet savvy and uses his smartphone constantly
- is someone who cares about the environment and social justice
- frequent participant on online activism platforms (Avaaz, Campact, Change.org)
- plays a lot of games on his phone, on games consoles and loves gadgets
- loves playing games for social/environmental good
- frequent contributor to various VGI platforms, such as OSM; especially those with environmental and social purposes
- frequently travels for work and pleasure
- enjoys mapping new places that he visits using OSM and developing his own OSM derived web maps

Needs and goals:

- wants to share his personal views about accessibility when out and about, especially in locations new to him
- wants to see the perceptions of others about specific locations

- wants to raise awareness for accessibility issues in his community, with policy makers and stakeholders
- wants to convince his older relatives of the benefits of online interaction

9.9 Cindy

Persona category:

- Tool user
- Caretaker / parent

Facts:

- 35 years old
- married
- stay-at-home mom
- lives in London
- mother of a child who uses a wheelchair (aged 10) and a daughter aged 14

Behaviours:

- is a very capable internet and smartphone user
- is a daily social media contributor
- uses a car when travelling with children and wheelchair
- has a busy social life

Needs and goals:

- wants to be able to find accessible activities for her child & teenager easily
- wants to be able to find parking information for activities and venues
- wants to be able to park easily near to activities and venues
- wants to play a role in improving the information available on wheelchair accessibility for parents and children

9.10 Tolgay

Persona categories:

- Tourist

Facts:

- 48 years old
- married

- lives in Stockholm
- author
- travels a lot for getting new impressions for his writings
- has a lot of friends around the world

Behaviours:

- loves planning
- is a internet and smartphone user, but is rather beginner and has small experience
- is afraid of becoming member and avoids sign-ins in internet projects
- is very aware of his environment
- travels frequently
- lives in the same house with his wife and a dog for 16 years

Needs and goals:

- wants to be 10 minutes early to appointments, does not want to be late
- wants to write a book any 2 years
- wants to do more sports in order to keep himself healthy