

# Making web-based maps accessible for elderly people: Development of an improved information source for recreational visits in natural areas

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Current demographic changes which are characterized by a steadily increasing number of elderly people call for changes in natural areas visitor management. Due to specific age-related physical deficits and changes such as visual impairment or walking disabilities these visitors demand for specific infrastructure. However, the availability of these elements must be communicated to the elderly. This asks for particular designed information media. Here web maps runnable on desktop and mobile devices can be the tools of choice. Based on research conducted within the project *AccessibleMap* this paper aims to offer suggestions for accessible web maps, providing elderly people with relevant information when visiting natural areas.

## Introduction

Several studies conducted over the past few years show that visitor management in natural areas is confronted by increasing numbers of elderly visitors, who can be divided into different subgroups such as the “new” elderly (best ager; aged 55-65) and the older people (seniors; aged 65plus) (Trachsel & Backhaus, 2011). Due to better health conditions and fitness, the elderly are more active than a decade before. Nevertheless, because of age-related deficits and changes this visitor group not only asks for particular infrastructure, services and facilities (Pfeifer et al. 2009), but also requires information about the availability of these elements.

Today, dynamic and interactive web maps (e.g. GoogleMaps), runnable on desktop and mobile devices play a significant role in getting information. To a growing extent, natural areas use these tools to inform and guide their visitors. Advantages of using web maps for visitor information are numerous: timeliness of information, well-known benefits of cartographic communication, relevance for navigation, etc. (Jekel & Jekel, 2010). Accordingly, web maps can be seen as a relevant information source for the elderly as well. However, there still exists a gap on the specific requirements of this visitor group with regard to appropriate web maps:

- Which content is asked for by this visitor group to support, i.e. encourage natural area visitation?
- How to design web maps (i.e. map layout) appropriate for elderly people (e.g. paying attention to age-related visual impairment)?

The main objective of the *AccessibleMap* project (funded by the Austrian Federal Ministry of Transport, Innovation & Technology/ Benefit program; [www.accessiblemap.at](http://www.accessiblemap.at)) is to develop and improve usage of web maps according to the requirements of the elderly and particularly visually im-

paired people. It aims at designing and implementing an accessible map application (prototype development). The *AccessibleMap* project is based on the research results of the *AmauroMap* project (Wasserburger & Neuschmid, 2010). Specific research findings of the *AccessibleMap* project can thus be used to implement accessible web maps, proving elderly people with relevant information when visiting natural areas.

## Methods

In order to specify user requirements of the elderly within the *AccessibleMap* project (focusing on users with visual impairment) a user survey was conducted in 2011. This questionnaire was developed using the internet survey tool SurveyMonkey and consists of 55 questions referring to:

- Demographic issues
- Characterization of internet and web map use behavior
- User needs on map content
- User preferences on user interface design and map design.

The questionnaire was spread across Austria and Germany by Email, telephone and face-to-face propaganda. The data collected by the survey resulted in 158 valid responses. After pre-processing results, they were statistically analyzed, interpreted and enriched with findings of a comprehensive literature review.

## Recreational visits in natural areas: How to make web maps accessible?

Generally, web maps being accessible and usable for the elderly have to be designed as simple as possible. This encompasses the visual design as well number and structuring of implemented functionalities. Only the most important and basic map operations such as zoom, pan, search, and identify features (incl. popup windows offering supplementary information) should be provided. With regard to these demands a number of common standards as well as Web-Accessibility standards and guidelines can be used. Standards (e.g. WCAG 2.0, ATAG 2.0, UAAG 2.0, ISO 28803, EN ISO 9241) can therefore support the design of an accessible web map application.

User interfaces of accessible applications should address the different human senses such as tactile, hearing and sight. This enables users to access and use information according to their personal preferences and capabilities. Thus an accessible web map should be designed as a multimodal interface and implemented as graphical, audio, and textual interface. To enable elderly to use computer applications

Table 1. Examples of map content items for elderly visitors

Category/ type	Characteristics/ aspects important to elderly visitors
<b>POIs (Points of Interest) such as picnic areas, nature attractions, viewpoints, wildlife observations points, parkings etc.</b>	<ul style="list-style-type: none"> <li>➤ Barrier-free access and usage</li> <li>➤ Provision of benches, resting places</li> <li>➤ Accessibility to transportation means (e.g. nearby)</li> <li>➤ Existence of guidance systems (e.g. signs, tactical signs)</li> <li>➤ Availability of toilets and/ or other services (restaurants)</li> </ul>
<b>Trails</b>	<ul style="list-style-type: none"> <li>➤ Length, height difference, inclination, material,</li> <li>➤ Provision of benches, resting places</li> <li>➤ Existence of barriers (e.g. steps)</li> <li>➤ Existence of guidance systems</li> <li>➤ Accessibility to transportation means (e.g. nearby)</li> <li>➤ Availability of toilets and/ or other services (restaurants)</li> </ul>
<b>Visitor centers</b>	<ul style="list-style-type: none"> <li>➤ Personal attendance</li> <li>➤ Barrier-free access/ entrance</li> <li>➤ Barrier-free design of presentation/ use</li> </ul>

and web map applications, assistive technology and visual aids (e.g. magnification software, Optical Character Recognition, Screen Reader, Voice Output) and textual, i.e. readable descriptions (with regard to the user interface and the map content) must be provided (Neuschmid et al., 2012).

In terms of an optimized map design for the elderly, particular attention should be paid to an optimized visual map design (referring principally to age-related visual deficits). This depends on the suitable configuration and combination of visual variables for presenting point, line and polygon features. User survey results point out that color contrast, color design, feature size, and feature labeling (font size) are of particular relevance to optimize web map design. Due to the wide range of personal preferences, provision of functionalities which allow user adjustment on contrast, symbol size, line width, color combination etc. can therefore be considered essential (Neuschmid et al., 2012).

Regarding the map content, information demand of the elderly is characterized by their particular recreational behavior, which in turn is depending on physical age-related

deficits and changes. Information is required on existing infrastructural supply, services and facilities, which is accessible and barrier-free. Table 1 shows a selection of specific information demanded by the elderly.

## Conclusion

The current process of demographic change asks for new and smart solutions even within the domain of recreation. One of the challenges is to provide suitable information material to the elderly communicating recreational infrastructure which meets their demands in terms of age-related physical deficits and changes. Here accessible web maps (specific map content, optimized map layout) are one essential information source. Implementing accessible web maps for natural areas contributes therefore towards delivering individual natural areas information for a wide range of users, including the elderly.

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