Granting Accessible Tourism for Everyone – GATE

HANDBOOK

GATE Handbook for inclusive Tourism

Project Partners:

CAI Alpago | Municipality of Santorso | Dolomiti UNESCO Foundation| independent L. | Salzburg Research | University of Innsbruck

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1 GATE Project. Tourism for everyone

1.1 The context of the project

GATE (Granting Accessible Tourism for Everyone) is a cross-border project between Italian and Austrian partners aimed at promoting barrier-free tourist offers accessible to everyone in the Alps and Prealps. Through the development of inclusive tourism, the aim is to allow better accessibility to natural and cultural territories, thereby enhancing them within their regional development contexts. The Project focuses on the use of new technologies for achieving these objectives.

The GATE Project is promoted within the scope of the Interreg V-A Italy-Austria program. The Project's partners are the UNESCO Dolomites Foundation (Lead Partner), the independent L. social cooperative, the Municipality of Santorso, the CAI (Italian Alpine Club) of Alpago, the University of Innsbruck (Research Center on Tourism and Leisure Activities) and Salzburg Research.

1.2 Key points

Barrier-free outdoor experiences in the Alpine area

The fulcrum of the GATE Project translates into barrier-free tourist offers in the natural environment of the Alps and Prealps, an area that is of immense natural, landscape and geological value, a part of which has been listed as World Heritage, and that includes trails, parks and attractions that allow people with disabilities to enjoy landscapes and contact with nature as well.

Barrier-free tourist offers for everyone

Barrier-free tourist offers can be easily accessed and enjoyed by everyone. Based on an often quoted empirical rule, a barrier-free and accessible area is indispensable for 10% of the population, useful for 30% to 40% and convenient for 100% of the population (Neumann & Reuber 2004: 13). An example: barrier-free offers are useful not only to people with various disabilities but also to the elderly, to pregnant women, to families with infants or young children in push-chairs, to especially tall or especially short people and to people with injuries or wounds (UNWTO 2013: 4).

Inclusive tourism

GATE aims at creating an inclusive tourism project that includes, in addition to the elimination of architectural barriers obtained also by means of principles such as "Design for all", also the social and economic dimension of the inclusive tourist offer (Buhalis & Darcy 2010). The social dimension refers to participation, i.e. to the cooperation between the subjects involved and the regional entities as stakeholders, while the economic dimension refers to the acknowledgement that inclusive tourism is beneficial in terms of profitability, too, both for the regions and for the individual players involved.

Digital support

Nowadays, in the race to attract clientele, the use of digital media is a key aspect in tourism. Indeed, precise information about barrier-free tourist offers and about other features of the tourism destinations are an important factor for guests with disabilities when they are deciding pro or against choosing one or the other offer.

Precisely for this reason, the GATE Project also focuses on digital services, such as tourist portals, guide apps for mobile phones, information points in parks equipped with iBeacons, for example. When these iBeacons are approached, they activate functions on mobile devices, thereby allowing to view specific

information. These services support accessibility because the user is not forced to personally find and call up the various bits of information. In the case of trails and parks, however, physically present guide systems and poster information are still necessary on site because they are still the best solutions for informing and directing all types of visitors. The GATE Project instead does not consider, or considers only marginally, the barrier-free services and measures in the transport, accommodation and trade (sales, rentals) sectors.

2 The Handbook

The GATE Handbook contains certain results selected from the project's work packages:

Facts and numbers regarding competitive benefits: the excerpt of a study conducted by Salzburg Research provides facts and numbers that show that accessibility is an essential element in reinforcing the quality and attractiveness of tourism destinations and of service providers (Chapter 3).

Current state of research and practice: the SME and Tourism team of the University of Innsbruck has analysed the current state of scientific research and practice regarding inclusive tourism. A systematic analysis of the literature has revealed a relatively low level of research intensity. As regards practice, there are examples of good practices, but there still are notable gaps in terms of barrier-free service chains. From the interviews with Tyrolean stakeholders it clearly emerged that at regional level a vivacious exchange of ideas is under way, but that it is necessary to take further steps towards finding solutions applicable throughout the province, such as a standard information platform, for example. Chapter 4 briefly summarises these studies.

Barrier-free experience in nature: when choosing a destination, people with disabilities find that outdoor experiences, such as nature walks, are important but problematical. To answer this concern, Salzburg Research also verified whether it is possible to find adequate nature experiences on the information portals that offer tourist offers without architectural barriers; see Chapter 5.

GATE pilot regions: four project partners have developed new IT applications designed to provide tourists and local citizens, with and without disabilities, with better access to trails, parks and natural environments. Chapter 6 describes how these IT applications were created by CAI Alpago, by the Municipality of Santorso, by the UNESCO Dolomites Foundation together with independent L., and by Salzburg Research, as well as the knowledge acquired in the process.

GATE IT tools: Within the project, four IT tools were developed in order to provide information about locations and itineraries and about their accessibility by or under the guidance of independent L. These information tools regard the Points of Interest (POI) and their aim is to create a multimedia WebApp and a chatbot. Moreover, an IT solution allows to see, in an app already used for locating empty parking spaces, whether the parking spaces reserved for the disabled are free or occupied. Chapter 7 describes these tools and the example applications that have been created within the framework of the GATE Project.

Multisensory symbols and signs for accessibility: the results of the GATE studies conducted in this sector by the SME and Tourism team of the University of Innsbruck with the participation of Salzburg Research are summarised in Chapter 8 and illustrated by examples.

Guidelines for accessibility: the Handbook also offers a selection of useful guidelines regarding accessibility in the GATE-relevant sectors: tourism, Web content, excursions in nature, hiking trails, nature reserves, museums and exhibitions (Chapter 9).

3 Competitive benefits: facts and numbers

Accessibility is an essential element in improving the quality and attractiveness of a tourist destination and of the services it offers.

Not a niche market but offers for everyone

Up until 2000, the expression "Tourism for all" especially illustrated the measures adopted in favour of guests with disabilities, and the related offers were considered to be a small but cost-intensive niche market. The change in outlook was promoted by studies that showcased the great potential of "Tourism for all", primarily those conducted in Germany commissioned by the ministry (Neumann & Reuber 2004; Neumann et al. 2008; Lorenz et al. 2013) and the one funded by the EU regarding the economic potential of barrier-free tourism in Europe (GfK Belgium et al. 2014).

Barrier-free tourist offers are those services and spaces that anyone can easily access and use. It is not a niche market but rather a competitive benefit for the service providers and for the destinations that are based on accessibility. The local populations also benefit from the barrier-free development of a tourist-oriented region. In fact, barrier-free infrastructure and environments increase the quality of life and of stay in rural and alpine areas. Consequently, inclusive tourism generates benefits for both the travellers *and* the local populations.

Groups of people with special needs

The lack of barriers is something that interests everyone and must not be associated to one single group of people. In the surveys, however, the following groups of travellers with special needs were usually observed: the elderly (aged 65 and over), with limitations in performing activities regarding about 2/3 of the group; younger people (up to 64 years old) with various limitations regarding mobility, sight, hearing or even learning; people without specific impediments but who find it difficult to travel, especially families with small children. Other subjects have particular, albeit temporary, needs, such as pregnant women or persons with injuries or wounds, for example. Barrier-free offers, therefore, reach out to very large target groups because they are as interesting to the more or less disabled as they are to non-disabled people.

More travellers with age-related problems

Demographic growth plays in favour of accessible tourism services. According to Eurostat, in 2017, 47% of the elderly (aged over 65) travelled at least once. Of these 48 million tourists, 26.3% travelled only nationally, 14% both nationally and abroad and 7% only abroad (Eurostat 2019c). If one considers the demographic changes taking place, the 65+ group in the European Union is expected to grow. In the early 2018, approx. 20% - i.e. one person out of five – was more than 65 years old. Eurostat forecasts that this segment will rise to 24% by 2030 and to 27% - i.e. one person out of four - by 2040 (Eurostat 2019b). Consequently, the percentage of travellers with various age-related problems and needing accessible tourism services will also rise.

Escorts

Normally, people with disabilities and the elderly with age-related problems do not travel alone but with their partner, with family members or friends or even in groups. According to the online survey about tourism in the EU, an average of 1.9 escorts, and more precisely 1.6 persons, for elderly travellers and 2.2 persons for travellers with disabilities are envisaged (GfK Belgium et al. 2014: 421 and 437).

This points to the need for accessible tourism proposals capable of welcoming entire families or groups.

Potential regular clients

It is highly probable that travellers with special access needs become regular clients. In the previously mentioned online survey, over 80% of the people interviewed – travellers with disabilities, elderly (65+), travellers with children – confirmed their willingness to return to the same holiday location (GfK Belgium et al. 2014: 194-195). In an online survey conducted in Germany, in a sample of 1,361 people with disabilities or people who travelled with disabled persons, approx. 29% of the interviewees declared they had already stayed in the destination chosen for their latest holiday (IUBH International University of Applied Sciences 2019).

Low season

The elderly and other people with disabilities choose the low season for their holidays more frequently than other travellers, especially because in the low season the locations are less crowded and the prices are lower. Moreover, in this way they avoid the excessively hot summer periods. The elderly in general are more flexible when choosing their holiday period. In a comparison study conducted by Eurostat in 2014, if one considers the overnight stays of two age groups, one 15 to 64 and the other 65+, it emerges that the 65+ group travels more often in the months from March to June and from September to November. These months collect 58% of all overnight stays of the 65+ age group and 46% of the 15 to 64 age group, resulting in a 10% difference (Eurostat 2016; see also Eurostat 2019a).

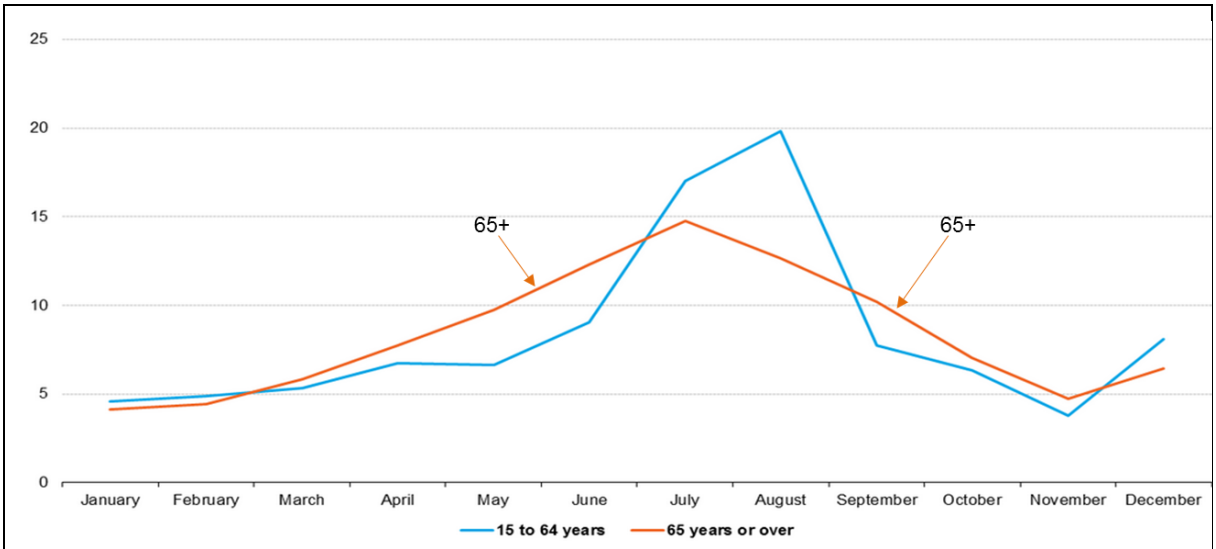


Figure: Distribution of overnight stays in 2014 for EU citizens in age groups 15 to 64 and over 65 (overnight stays in %). Source: Eurostat 2016.

Choice of tourism destinations

People with special access needs carefully choose their holiday destination so as to avoid encountering problems once they are there. In an online survey conducted in Germany, out of 1,361 people with disabilities or people who escorted people with disabilities, accessibility to the location was a key factor for 96% of the interviewees ("very important" for 81.7%) when choosing their holiday destination (IUBH International University of Applied Sciences, 2019). Easily accessible destinations are often recommended by friends or relatives: "*Positive experiences are transmitted on average to 5-6 people,*

while negative ones to about 10-11 people" (Stein 2008). By using online social media it is possible to reach a considerably larger number of people.

Trips discarded due to lack of accessible tourism services

Various surveys indicate that many people with disabilities eventually do not pick holiday destinations initially taken into consideration due to the lack of accessibility services. In a representative survey conducted in Germany, often quoted here, 37% of people with motor and functional deficiencies declared they had given up going a trip because of the lack of offers, structures or services that were barrier-free or providing accessibility for people with disabilities. On the other hand, 48% declared they would travel more often if a larger number of accessible tourism services were available (Neumann & Reuber 2004: 31). In another representative survey conducted in the United Kingdom, 13% of the interviewees stated they had not travelled in the last 12 months due to doubts they had about the availability of accessible tourist structures at the destination of choice (VisitEngland 2018). In an online survey conducted at European level, instead, in the last 12 months potential tourism destinations were not chosen by 9% of the interviewees falling in the 65+ age group, by 15% of young people with disabilities and by 26% of families with very young children due to the lack of accessible structures, insufficient information and similar reasons (GfK Belgium et al. 2014: 155-156).

4 Current state of research and practice

Thanks to the increasing awareness of the fact that approximately 16% of the world's population is affected by disabilities of various kinds (Eurostat 2015; WHO 2018), over the years there has been an increase in the research aimed at promoting inclusive tourism. The potential of accessible tourism in Europe is estimated to amount to 133 million tourists with disabilities and their escorts every year, a number that in turn corresponds to a purchasing power estimated to be over 80 billion euros (Buhalis et al. 2005).

Based on these concrete facts, the SME and Tourism team of the University of Innsbruck is conducting several studies regarding inclusive tourism within the framework of the research currently under way. Surveys have already been conducted in the following sectors, for example:

- In order to assess the evolution of the barrier-free service chains, in 2017 detailed analyses were conducted on already existing offers for people with disabilities. The results of these analyses showed that both the companies and the destinations, in part, already have made considerable efforts to include people with disabilities. However, further actions are required to complete the barrier-free service chains at the destination venues so as to allow people with disabilities to experience full inclusion during their holidays.
- Another study conducted in 2019, and based on a systematic analysis of the literature, examined the development of the focal points of research in the field of inclusive tourism. In this case, too, the aim was to identify any gaps present in the tourism service chain and the implications resulting from filling them in. Unlike the study described above, in this one the researchers based their work on the results of previous studies. Although research in inclusive tourism is causing growing interest, the results of this study show a relatively low research intensity level that suggests that, after all, the potential of inclusive tourism is still underestimated.
- Another study in 2019 assessed the current state of cooperation among the groups of stakeholders involved in the development of inclusive tourism. Thanks to various interviews, it was possible to gauge the prospects of people with disabilities, of service providers (tourism agencies, hotel managers, etc.), the representatives of the interests of people with disabilities and of the government bodies of Tyrol. While these interest groups enjoy a lively exchange at regional level, things are becoming increasingly confusing at national level. This is an especially marked phenomenon within the digitalisation context due to the existence of various information platforms regarding inclusive tourism that usually utilise different assessment criteria.
- Finally, in 2019 a study was conducted on the innovative projects launched in the field of inclusive tourism. Various examples of good practices were examined using a benchmarking approach that allowed to assess the ideas and examples of the progress made by various regions. The results of this study have allowed to gain knowledge about a highly important fact, i.e. that in the various segments of the service chain many ideas for better inclusion have already been put in place. Conversely, it became also quite clear that only rarely were the guests able to enjoy, on arrival, the inclusive offers made available (assistance from the region/from the hotel).

In order not to stray from the main purpose of this Handbook, an annex has been compiled providing a more detailed view of the procedures found and of the knowledge acquired through the studies described above (GATE 2020c). Please also see the contents of the questions regarding tourism created by the SME and Tourism team for the helpdesk of the GATE website.

5 Barrier-free experiences in nature

5.1 Nature walks – important but difficult

The GATE Project focuses on barrier-free tourist offers for open-air experiences, such as nature reserves and hiking trails in the Alps, for example. Movement and experiences in nature are very important because they can contribute significantly towards physical and mental well-being and in favouring social connection (Goldy & Piff 2019); Naturfreunde Internationale 2015; Ower et al. 2018; Zhang et al. (2017).

To this end, however, it must be possible to travel without barriers within the destinations going on tours in the environs and locally, such as in nature parks and along trails, for example. These are all activities considered important by people with disabilities seeking adequate offers, but at the same time they are seen as difficult to accomplish.

In an online survey conducted in Germany regarding disabled people's travel behaviour, in which more than 4,000 people took part, a distinction was made regarding the various criteria for the selection of a destination, between their degree of importance and the degree of difficulty due to the presence of barriers (Neumann & Reuber 2004). The results are summarised in the following table:

	Important in the choice of the travel destination		***Difficult due to the presence of barriers***	
1	Accommodation	82%	Cultural activities	67%
2	Locomotion on location	76%	Locomotion on location	65%
3	Journey to/from destination	74%	Tours	63%
4	Tours	71%	Sports	55%
5	Travel preparation	71%	Journey to/from destination	52%
6	Cultural activities	62%	Accommodation	47%
7	Arrival and orientation	61%	Arrival and orientation	44%
8	Service on location	58%	Shopping	42%
9	Health care on location	52%	Service on location	42%
10	Catering	51%	Travel preparation	40%
11	Shopping	37%	Health care on location	35%
12	Sports	19%	Catering	24%

Table: Important and difficult travel factors for impaired people. Source: Neumann & Reuber 2004: 33 (Data basis: 4.062 questionnaires). See also Rebstock (2017).

The comparison shows how the interviewees stated as especially important, and at the same time difficult, aspects such as locomotion on location (important: 76%, difficult: 65%) and tours in the environs (important: 71%, difficult: 63%), categories that should be seen as correlated seeing that transfers with public transport vehicles, on foot or by wheelchair are often used to carry out tours in the environs. Tours are important because disabled guests "strongly aspire to actively experience the region they have chosen for their holiday " (Neumann & Reuber 2004: 47).

When comparing the two tables, it should be noted that, although cultural activities rank, in terms of difficulty (67%), slightly above locomotion on location (65%) and tours (63%), they are deemed less important when choosing the destination (62% versus 76% and 71%, respectively). Especially interesting is the aspect regarding accessible accommodation that, although very important (82%), has been deemed as a source of minor difficulty (47%).

Barrier-free accommodation in any case remains very important, but the pertaining information is easier to obtain when compared to those regarding locomotion or tours on location without barriers that, after all, are also important when seeking to find the best experience and enjoy it to the utmost.

The difficulty of locomotion on location, especially in open-air environments, is confirmed by other surveys and studies. The following table shows the results of the Euan's Guide Access 2019 online survey conducted in the UK. A group of 1,027 participants, consisting of people with disabilities (81%) and their relatives or friends, were asked to give their opinion regarding the accessibility of various destinations, and outdoor locations ranked second last. Only events and festivals ranked as slightly less accessible.

	Typically good or excellent accessibility	***Typically poor or very poor accessibility***
Museums & Galleries	69%	10%
Cinemas & Theatres	54%	16%
Concert Halls & Music Venues	46%	22%
Leisure & Sports Centres	45%	22%
Visitor Attractions	45%	17%
Historic Attractions	29%	38%
Outdoor	24%	37%
Events & Festivals	24%	42%

Table: „How do different types of places compare?". Source*: Euan's Guide Access Survey 2019: 19* (results for selected activities).

There are many other confirmations regarding the fact that natural open-air environments are highly difficult to access by persons with disabilities. These locations are especially difficult for unescorted and blind people or people with severe sight-impairment (Bandukda et al. 2019; Bell 2019), as well as for people in wheelchairs or with severe walking disabilities (Corazon et al. 2019; Menzies et al. 2020). One must also consider families with very small children or with children in push-chairs and unescorted people with mental deficiencies or with 'learning disabilities' (regarding orientation along hiking trails, for example). Last but not least, further impediment to enjoying activities in the open can be represented by 'hidden disabilities' such as allergies or chronic disorders (cardiovascular diseases, for example).

5.2 Portals dedicated to barrier-free tourist offers

There are many portals that provide 'accessible' tourist offers, created by national organisms as well as by communities of people with disabilities. The former use formal evaluation criteria, while the latter, although simpler, provide useful assessment on the offers' suitability for people with disabilities. Salzburg Research has analysed these portals with the intent to discover how the offers 'assessed' in terms of outdoor experiences – hiking trails, adventure trails, gardens, nature reserves, zoos, etc. – are presented.

Both large and small portals were examined, such as, among those adopting more formal criteria, Reisen für Alle (Germany)[1], Alto Adige per Tutti (Italy)[2] and Holidays on Wheels (Austria)[3], and among those of the EC, Euan's Guide (UK)[4] and Disway (Czech Republic)[5]. Various aspects were examined, such as the operators, the rating systems, the types of disability taken into consideration and the search functions, and most importantly the percentage of experiences in nature out of the total offers assessed.

As regards the portals adopting formal criteria, the amount of offers regarding experiences in nature totals 8-10% (survey period: April-May 2020). In Reisen für Alle, for example, this was equivalent to 156 offers out of 1,946 (8%), in Holidays on Wheels to 54 offers out of 543 (9.9%) and in Alto Adige per Tutti to 64 out of 702 (9.1%).

When considering hiking trails only, the largest portal, Reisen für Alle, provided only 59 offers (3%); Holidays on Wheels provided 5% with 27 trails, 25 of which included in the private initiative Rollwandern in Österreich; in Alto Adige per Tutti, 61 of the 64 offers are taken from the Guida Escursionistica dell'Alto Adige[6] hiking guide.

The low number of trails assessed in Germany is due to the fact that the criteria for assessing the 700 trails deemed of high quality and of "Premium" quality do not include accessibility by people with disabilities. This also applies to the Austrian hiking quality brand (Österreichischer Wandergütesiegel) that lists only 58 hiking trails.

Among the Community portals, Euan's Guide, that totals 8,638 leisure time and tourist offers, is the largest and most carefully put together. In the 'Open air activities' sector there are 344 pertinent offers (4%), but only 120 of these (35%) give one review (68) or more (260 reviews in toto, an average of 2.18). The good reviews take into consideration various aspects, such as parking space, access, toilets, etc. evaluated with a star rating system (maximum 5 stars).

In summary, the percentage of offers assessed on the portals with regard to experiences in nature is relatively low when considering what a large country Germany is, especially in Reisen für Alle. As regards tours, the South Tyrol hiking guide, supervised by independent L., a GATE Project partner, can be considered exemplary. It should also be said that the portals are important but difficult to 'fill' with experiences in nature deemed free of architectural barriers.

[1] Reisen für Alle, https://www.reisen-fuer-alle.de

[2] Alto Adige per tutti, https://www.altoadigepertutti.it

[3] Holidays on Wheels, https://www.holidaysonwheels.at

[4] Euan's Guide, https://www.euansguide.com

[5] Disway, https://disway.org

[6] Guida escursionistica dell'Alto Adige, https://www.altoadigepertutti.it/it/vivi-la-natura-senza-barriere

6 IT Applications of the Pilot Sites – Implementation & Lessons Learned

The GATE project focuses on the use of information technologies that allow providing information about the accessibility of sites such as nature parks and hiking trails as well as engaging experiences when visiting the sites. As an important part of the project, partners developed IT applications to demonstrate these capabilities for four pilot areas and sites.[7]

6.1 Virtual Reality Experience Bletterbach Gorge

6.1.1 Background

GATE partner: Fondazione Dolomiti UNESCO, with support by independent L.

Region/country: Aldein/Aldino, South Tyrol, Italy.

Pilot site: GEOPARC Bletterbach area and visitor centre in Aldino, GEOMuseum in Redagno

Brief description of the site: The Bletterbach gorge and wider area is part of the UNESCO World Heritage of the Dolomites and presents itself as an open book in which it is possible to read over 40 million years of our planet's history. The area is particularly attractive for people with an interest in geology and nature, hikers, families and school classes.

Number of visitors: In the summer season the number of visitors of the GEOPARC Bletterbach can reach over 50.000.

Website: www.bletterbach.info

Contact e-mail: Guenther.Ennemoser@independent.it

6.1.2 Description of the IT application

Brief description

The Bletterbach Gorge Virtual Reality application is implemented at the GEOMuseum Redagno in a specially adapted barrier-free room. With the application, visitors of the Bletterbach area who cannot access the Bletterbach gorge due to mobility or other restrictions can still experience it in 3D. Actually, they can not only "fly" through the gorge but also perceive the whole area as the content includes film sequences captured from above with a drone. However, the application is of interest to everyone, for example when access to the gorge and other areas is not possible due to weather conditions.

Collaboration

The application was commissioned by the Foundation Dolomites UNESCO from the company Dimension (Trento), specialised in such products, and the implementation was coordinated by independent L. (Merano), who are experts in barrier-free physical and digital solutions. The development team consisted of representatives of the production company, an expert in didactic narrative forms, curators of the GEOPARC Bletterbach Visitor Centre and Museum of Nature South Tyrol (Bolzano) regarding the scientific content, and the work coordinator independent L.

[7] More detailed documentation is available in GATE (2020f).

Development of the VR application

The application is based on digital 360°VR video technology and is used with a VR headset. The video recordings of the Bletterbach gorge and environment have been carried out with a high-resolution 3D camera mounted on a drone. In addition, high quality audio recordings were made in the gorge for the background noise.

The narrative content of the VR application has been developed in a collaboration of the expert in didactic narrative forms and the scientific experts of the Museum of Nature South Tyrol and curators of the Geoparc Bletterbach visitor centre. For the content a storyboard and script had to be developed, taking care that the content is suitable for users of all ages. For the narration the figure Maya was invented that accompanies the user on the VR excursion into the Bletterbach gorge and tells him/her how geologists reconstructed the formation of this impressive site by examining the rocks.

The video recordings had to be edited and brought together with the narrative content for the VR experience in the different language versions, German, Italian and English, by a professional speaker. The recordings were edited into a long and a short version (12 and 5 minutes, respectively), and professionally set to music. Finally, subtitles in the three language versions for people with a hearing impairment were added.

Testing of the VR experience

Most of test users were enthusiastic and watched the virtual tour of the Bletterbach gorge until the end. Only few users have difficulties getting used to the digital 3D format feeling a discomfort in the first seconds. For particularly sensitive users, supervision by an accompanying person is advisable. The VR experience station in the GEOMuseum Redagno has been equipped with two stable viewer chairs with barrier-free armrests to make it easier for senior citizens and visitors with disabilities to sit down and get up.

The VR viewer Oculus Go is an independent system with headphones integrated in the device. The headset can be operated without assistance. The visitor puts on the headset, selects the preferred language, and the digital tour of the Bletterbach Gorge VR starts automatically. The virtual visitor experience lasts about 12 minutes. When not in use, the headset is returned to the charging station, and can then be used again at any time. If there is a large number of visitors, the museum can decide to show the shorter version of about 5 minutes.

Because of the current protective measures due to the COVID-19 crisis, disposable cardboard viewers for smartphones (Google Card DIY mobile phone VR 3D glasses) have been purchased, so that visitors can watch the VR without exposing their health to any risk.

Launch and promotion

The VR station has been installed on the 13th of October 2020 at the GEOMuseum Redagno in the barrier-free film room. A short video, currently in Italian and Italian sign language, introduces the visitors to the Bletterbach Gorge VR and the use of the technology.

To attract visitors, a teaser with versions in English, German, Italian and Italian sign language has been produced. The teaser is published on YouTube and is promoted on the GATE project and GEOPARC Bletterbach websites. Furthermore, the Bletterbach IT applications are networked with each other, so that the VR experience is also promoted in the Webapp GEOPARC Guide and the Bletterbach Chatbot to generate additional visitors for the GEOMuseum.

Following the planned new construction of the GEOPARC Bletterbach visitor centre, a VR station with the same equipment is planned also there.

6.2 Parco Rossi – INgame and Villa Rossi 3D

6.2.1 Background

GATE partner: Commune di Santorso

Region/country: Province of Vicenza, Italy

Pilot site: Parco Rossi in Santorso

Brief description of the site: Parco Rossi is a romantic garden of high landscape value. It is the cornerstone of a complex system located on the slopes of Mount Summano, which includes upstream the Villa Rossi and the park and downstream the model farm. Founded by Alessandro Rossi between 1865 and 1884, the Parco Rossi is among the outstanding examples of nineteenth century landscape parks of northern Italy. Here visitors can experience all the typical elements of such a park, including a lake, an impressive array of exotic and native plants, sinuous paths, rustic architecture, and other appealing elements. Parco Rossi is an inclusive heritage communication project with the aim to make the history, architecture and landscape of the park accessible to all visitors based on the principles of Design for All. A barrier-free visitor system and a multimedia guide with 19 stories in different languages (English, Italian and Italian sign language), triggered by iBeacons, already supported visitors to discover the park. In the framework of the GATE project new applications have been implemented.

Number of visitors: Summer season, around 3.000 visitors.

Website: www.parcorossi.it

Contact e-mail: antonio.demartin@comune.santorso.vi.it

6.2.2 INgame

Brief description

INgame has been developed as an inclusive IT application with the aim to allow visitors with disabilities (and others) an immersive experience of the park in an autonomous, comfortable and safe way. INgame is a reality game with a chatbot, an "intelligent" interactive chat system (ingame.parcorossi.it). Visitors do not have to download and install the game, but use a Web app with their smartphone or tablet. With the chatbot they can take three routes in the park and have a variety of options regarding language (Italian, Italian Sign Language, English, German) as well as interaction mode (e.g. visual with texts and images or audio-guide). The multimodal approach allows meeting the access needs of visitors with sight or hearing impairments and an engaging park experience for all.

Collaboration

For the development of INgame a multi-disciplinary team with synergies between the members' different expertise was necessary. The areas of development and leading team members were:

- *The narrative dimension:* Dramaturgy structure, storyboard, game design, animations and historical re-enactments, and production secretariat: La Piccionaia - Centro di Produzione Teatrale.
- *The digital dimension:* Software and Web development, following good practices of code versioning, automated testing, compliance with PHP standards (PHP-FIG / PSR) and privacy first design; video and augmented reality production, user-friendly chat interface and experience design: DonQ.

- *The Design for All dimension:* Elements necessary for the customization of the game for users with different disabilities, ensuring that texts and images for the chat interface are readable and comprehensible, translations from Italian to Italian sign language (LIS), English and German, tests with users, and overall accessibility management: Parco Rossi team with the accessibility expert Diana De Tomaso.

Implementation

The game dynamics are structured on missions to be carried out and explorers' site search – the visitor is the protagonist of a game of exploration. The player is guided on the selected game path by the little dragon ARAC as virtual assistant.

The most important aspect of INgame regarding inclusiveness is the possibility to personalise the game. The user can choose:

- One of the four languages available: Italian, Italian sign language, German and English;
- The preferred media mode: audio mode, designed for visually impaired people; text - images designed for people with a hearing impairment, or all modes for people without any particular difficulties;
- One of the three playing fields, which are the yellow, green and blue paths in the park, each with a different level of physical accessibility.

Augmented Reality elements

The Web app includes Augmented Reality (AR) features. AR means that in real-world scenes app users see through the camera of the smartphone or tablet inserted artificial elements such as historical persons or objects. In INgame these are animated graphics of ARAC who serves as a virtual guide, and historical re-enactments with Alessandro Rossi. The animated graphics and historical re-enactments come with special features for users with disabilities:

- The historical re-enactment videos are available in Italian, Italian sign language and English, with subtitles, for people with a hearing impairment;
- All videos have a dramaturgy and a voice over that supports the use of the game by blind people;
- The graphic animations of ARAC are accompanied by recorded speech and subtitles which makes them suitable for users with sight and hearing impairments.

Testing of the game

In the development of INgame principles of Design for All and user-centered design have been applied to ensure participation of users in the development – as consultants in the design phase and as on-site testers in the implementation phase (2 tests). Young and elderly people, with a sight or hearing disability, and wheelchair users have been involved. The consultants and testers have made important contributions to the development of INgame. They greatly appreciated the innovativeness of the project and their feedback has always been very positive and encouraging. Several improvements of the functionality and content could be made thanks to their suggestions.

6.2.3 Villa Rossi 3D

Brief description

In the GATE project also a panel with a 3D tactile and talking relief of the Villa Rossi has been created. The panel allows visitors with a visual impairment (and others) to learn about the Villa Rossi, its architecture and the history of the people who lived here. The relief of the model, graphical elements

and contrasts are tailored for visually impaired visitors, and the panel and its elements are also very well accessible for wheelchair users and children.

Basically the system consists of three elements:

- A tactile surface: designed and printed with contrasting colours for good readability and embossed text in Braille;
- 3D printed elements: representing the Villa's façade and details;
- A series of Capacitive sensors are triggered when touching model elements with the tips of the finger and activate audio descriptions and stories.

Implementation and testing

The Parco Rossi team collaborated with organisations with the required special expertise:

- Tooteko Srls (Venezia): designed the panel and managed the printing of the 3D tactile elements based on additive stereolithography techniques;
- Tactile Vision Onlus (Turin): supported the evaluation and selection of the graphics of the panel and the printing of the braille embossed signs;
- La Piccionaia - Centro di Produzione Teatrale (Padova): recorded the audio tracks with speakers in Italian and English.

The relief model and touch sensors follow a logical and tidy path, starting from a general exploration of the villa and then moving deeper to the details. The Capacitive touch sensors are embedded inside the panel and respond effectively to light touch of sensitive relief/model elements. The audio tracks are paired by Braille signs to support a full tactile exploration.

Tooteko experts in solutions for visually impaired people carried out a functional testing of the tactile elements and audio content. Finally, the panel was tested by end-users involving visually impaired persons and others, including children.

Launch and promotion

INgame and the Villa Rossi 3D model have been launched on the 27th of September 2020 in a public event in the Parco Rossi. Over 100 people attended the event to learn about the brand new applications.

As INgame is a Web application the access and usage can be monitored with Google Analytics. The analysis is based on aggregated anonymous data and various filters for dates, event types, interactions, etc. can be applied. Before and during the launch event and into October 2020 INgame has been used by 304 people. In September 2020, 211 users started INgame, 3.433 interactions took place (e.g. stations started, stations skipped, spools started, spools finished), and 56 users completed the whole game.

In the video interviews during the launch event to collect feedback on the new applications and experience of the park all interviewees reported the highest level of fun and satisfaction (collected with the use of emoticons). For the next year a promotion and communication campaign is planned that will particularly feature the new applications for inclusive access to the Parco Rossi.

6.3 CAI Alpago – Sentiero della Sensibilità

6.3.1 Background

GATE partner: CAI Alpago (Alpago section of the Club Alpino Italiano)

Region/country: Province of Belluno, Italy

Brief description of the site: The Alpago area is surrounded by mountains and has a good hiking network. With 25 CAI paths suitable for visitors from excursionists to expert equipped hikers, the Alpago offers a wide range of experiences in contact with nature. For the GATE pilot a 24 km route has been chosen which runs in part along the existing Alpago Nature Trail and in part along other paths in the municipalities of Alpago, Chies and Tambre. The route has been adapted by CAI volunteers as a hiking trail for people with disabilities; for example, the surface of some sections was adapted to make them suitable for wheelchair users and others cleaned to make the whole trail accessible to visually impaired people.

Number of visitors: The Alpago Tourist Office estimates that the area is being visited by about 12.000 hikers and other nature tourists annually. Most of the visitors are Italian day trippers, who can reach the area easily by car, from a driving distance of up to 1-1.5 hours. The area does not have many hotels and other facilities to stay overnight.

Website: www.caialpago.it

Contact e-mail: sezionecaialpago@gmail.com

6.3.2 Description of the IT application

Brief description

The Web App Sentiero della Sensibilità provides a guide for the hiking trail of 24 km, including multimedia information about the cultural landscape of the Alpago. There are several access points to the trail where panels give initial orientation and information in Italian, German and English, including in Braille. A system of panels developed for the trail informs about which stretches are suitable in case of a disability (mobility, sight), directions and distances, and resting places. For a number of special places along the trail the Web App provides rich multimedia contents. It can also be used as an audio-guide in Italian, English and German. The Web App is available for Android- and iOS-based devices. Via Bluetooth the app can communicate with 12 iBeacons that are placed along the route and alert users about available special content. In addition to the information about the cultural landscape, a musical path has been created that features the symphony par excellence dedicated to the mountains: The Alpine Symphony of Richard Strauss, composed between 1911 and 1915. The user can listen to short parts of the symphony that evoke landscapes, sounds and emotions that can be experienced in the mountains.

Collaboration

The Sentiero della Sensibilità goes through the areas of three municipalities and seven Regole, which are collective properties belonging to local families. This required agreements and cooperation with and among these public and private entities in order to share the definition of the trail and to decide on the most suitable access points. They supported making the trail barrier-free as well as the installation of iBeacons. Moreover, the municipalities will support also in future the trail maintenance for the stretches in their areas of competence. A close collaboration of CAI Alpago was also necessary with the Web App supplier to define all details of the Web App ensuring its easy use and attractiveness.

The professionality and high-quality orientation of the Web App supplier was a very important factor for the success of the project, including the adaptation of app standards to specific needs as in our case.

Implementation

The goal for the multimedia guide was that it should be as easy as possible to use. Web App technology was selected for the guide because of its high versatility in terms of both usability and flexibility regarding contents, e.g. the option to include additional content in future updates. The solution should also not take up too much data space of the mobile device of the user. The Web App structure was developed starting from the existing Sentieri Parlanti ("talking trails") of CAI Veneto, considering that the Veneto Region may intend bringing together different regional apps in a common platform. CAI Alpago volunteers helped with the production of the different content elements.

Testing of the Web App

In the development of the hiking trail and Web App, CAI Alpago volunteers met with people with disabilities to present the project and collect information about needs and suggestions regarding the implementation. GATE partner independent L. tested the developed app regarding the success criteria of the Web Content Accessibility Guidelines (WCAG 2.1) and usability.

The testing in the field was carried out along the first four kilometers of the Sentiero della Sensibilità. Ten people participated in the testing, three of which with impairments, two visually impaired and one wheelchair user. The group included also a family with a small child in a stroller. The app was downloaded on smartphones using the QR-code on the information panel at the trail access point Carota. The duration of the app testing was about three hours and included the working of the Internet connection, GPS location, interactivity of the iBeacons, and access to the Web contents. All contents were used, i.e. texts, images, audio supports as well as the music.

Feedback by all users was collected with questions during the hike and interviews with the participants with disabilities at the endpoint. Responses were collected on the overall accessibility of the trail according to one's disability, the degree of satisfaction with the Web App, and the experience of the visit compared to previous ones of mountainous environments.

Launch and promotion

The first version of the Sentiero della Sensibilità app has been made available on the 31th of October 2020 in the App stores for Android and iOS devices so that interested people can download it. Due to the restrictions imposed by the anti-Covid regulations, this was a "soft launch" with only limited promotion, mainly making selected people aware that the application is available to try and give feedback. Thus, so far, the CAI Alpago development team, disabled people involved in the testing, some members of CAI Alpago and GATE partners have been involved.

Before the end of the GATE project, information materials will be produced for distribution in 2021 at the places of greatest tourist influx and information points in the Alpago area. Thereby visitors will be made aware of the barrier-free hiking trail and that they can access the Web App via a QR-code before starting their hike. The broad outreach and promotion is planned for spring 2021 before the hiking season begins. This will of course include Web-based promotion on CAI websites and social media channels.

6.4 Kinderleicht Wandern im Pongau

6.4.1 Background

GATE partner: Salzburg Research

Region/country: Pongau, Country of Salzburg , Austria

Pilot site: Pongau region, over 80 easy hikes for families with small children

Brief description of the site: Many hiking trails, farmed alp lodges and other attractions make the Salzburger Pongau a true hiking paradise for visitors of all ages and capabilities. Some of the villages of the Pongau are located in the Hohe Tauern National Park, and in most holiday areas mountain lifts allow reaching the starting point for many hikes. Kinderleicht Wandern im Salzburger Pongau is a new offer for families with small children that look for suitable trails. The Web application presents over 80 easy hikes of which 35 are stroller-friendly.

Number of visitors: Pongau in the summer season May–October 2019: 866.348 guests staying overnight (all types of accommodation); overnight stays: 3.863.647 (average: 4.5); geographic origin of guests: domestic 27%, Germany 47%, other countries 26%.

Website: www.kinderleicht-wandern.net

Contact e-mail: guntram.geser@salzburgresearch.at

6.4.2 Description of the IT application

Brief description

The Web application is based on the Web-CMS WordPress and provides information about 82 easy hikes for families with small children in the Pongau region of Salzburg, 35 of the hiking paths can be used with a stroller. Also some other attractions such as children‘s zoos and playgrounds are included. The information about the hikes comprises place of start/end, duration, length, difference in altitude, restaurants (incl. contact information), and a downloadable map of the hike. To access and download information users need only a device (mobile, tablet, desktop) with a web-browser, no installation of an app is necessary.

Collaboration

Kinderleicht Wandern im Pongau has been developed by Salzburg Research, in cooperation with SalzburgerLand, the destination marketing organisation for the whole Country of Salzburg.

Implementation

The content of Kinderleicht Wandern has been extracted from a high-quality brochure that can be ordered freely from SalzburgerLand but is not made available for download as the high-resolution digital version has a quite large volume (about 100 Megabytes). As technical platform for the information the open source WordPress software is used and for the map-based access the Open Street Map.

The search functionalities of the website include full text search, keywords, and ratings with stars. The results are presented as a list with brief information and link to the full information. In addition, there is the map-based search functionality, where users can zoom into the map and call up the information on the tagged hikes and other attractions.

Users can download and print all information or only the maps of the hiking trails. They can also rate hikes and other attractions, give comments and share own images (max. 10). The application allows easy extension of the information by adding new hiking trails and more detailed trail description and media (e.g. brochures, images, videos).

Testing, launch and promotion

During the development of the website its functionality, display of content and other aspects were regularly tested and improved. On the 30th of June 2020 the website went online in a "soft launch" to allow selected organisations access, test and provide feedback on the website. The GATE partner independent L. tested the website regarding the success criteria of the Web Content Accessibility Guidelines (WCAG 2.1) and usability. Feedback from others was received in response to the promotion activities.

The promotion goal for 2020 was to make the website known to relevant organisations in the region. 22 tourist offices, 31 medium-large size family/children hotels, and 10 contacts of regional groups of nature/hiking organisations (Alpenverein, Naturfreunde) received e-mails with information about the website, website link, the digital version of a flyer attached, and the request to make the website known to families with small children. The tourist offices and hotels also received printed flyers for interested guests (in total 5.000 flyers).

Feedback and usage data

Some of the generally positive responses by the tourist offices and family/children hotels were helpful to improve the website content, for example to change or add information, including available brochures for hiking trails.

In the period August to October 2020 the Kinderleicht Wandern website had 524 interested visits in which in total 3.883 pages have been viewed (on average 7.4 pages per interested visit). Interested visits are those in which more than only the first page was accessed. Of these visits over 400 were very likely by guests in the Pongau region. In the period there were 310 downloads of maps of 63 hiking trails, including maps that present more than one trail. The functions to rate, comment on and upload images of hiking trails and other attractions have not been used in the period. In the future, this will require special promotion.

As Salzburg Research is a centre for technological research and development it cannot oblige to service developed solutions on a regular basis. Therefore, the intention is to hand over the website to SalzburgerLand Tourism or an organisation commissioned by them to maintain and extend it.

6.5 Lessons learned

This section summarises important lessons learned by the GATE pilot sites in the realisation of their new IT applications. The pilot sites developed applications of information technologies for different kinds of tourist offers, including the Bletterbach area and gorge (part of the World Heritage Dolomites), the nature park Parco Rossi, the Sentiero della Sensibilità of CAI Alpago, and the offer of hiking trails for families with small children in the Pongau region in the Country of Salzburg.

The main lessons learned relate to the topics of collaboration in multidisciplinary teams, narration and content, flexibility of IT applications, participation of users in the development, and of course the impact of the COVID-19 crisis.

Collaboration

Projects aimed to make nature experiences accessible to all require the collaboration of a team with multi-disciplinary expertise.

independent L., who coordinated the development of the Bletterbach Gorge Virtual Reality Experience, observed, *"that the exchange of experience and the integration of subject-specific skills in a wide range of areas is of crucial importance for the success of the product and the subsequent user experience".*

The Parco Rossi project team emphasised, *"To develop a complex project of innovation, the winning strategy is the ability to work in a multidisciplinary team, where processes of knowledge sharing, collaboration and problem solving are activated. To realize an accessibility project you need to know how to be inclusive"*.

In the development of the Sentiero della Sensibilità of CAI Alpago also had to collaborate closely with public and private entities. The 24 km long route crosses through the areas of three municipalities and seven 'regole', which are collective properties belonging to local families. This required agreements and cooperation with and among these entities based on a common understanding and willingness to support in making the trail barrier-free as well as the installation of iBeacons.

In GATE, the opportunity the pilot sites had to discuss pilot ideas, the development and specific issues with other partners of the cross-border project also often helped to implement solutions according to best practice.

Required expertise

The expertise necessary for a successful IT application includes project management, user-centered design, content creation and integration, technical development, and ensuring access to and usability of the application for everyone.

Excellent project management enables all team members to play to their strengths, and together drive the project forward, against all odds (even the Coronavirus crisis). User-centered design requires involving end-users, particularly people with disabilities, early on in the project and up until the final testing and launch of the application.

The required specific expertise regarding content, technology, access and usability depends on the type of IT application to be developed. While some IT solutions are relatively easy to implement (e.g., a standard Web app or WordPress-based website), for others highly specialised skills regarding both content and technology are required.

Narration and content

Not every IT application has a narrative dimension, e.g. the main purpose of the Kinderleicht Wandern website is to provide information about the existence of easy hikes for families with small children. If the application is narrative, dedicated work is necessary for the storyboard, interaction design, and creation of the multimedia content, which may include texts, speech and sound recordings, images, videos, graphic animations, and even historical re-enactments as in Parco Rossi's INgame.

In the case of CAI Alpago's Web App Sentiero della Sensibilità, rich content for 12 points of interest (with iBeacons) has been created, and the musical path with parts of Richard Strauss' Alpine Symphony plays a great role in emotionally binding together the stories about the cultural landscape.

The more specialised the technology is, the more effort is necessary to create and particularly integrate the content for telling the story. This is the case with the Virtual Reality (VR) experience of the Bletterbach Gorge and the Augmented Reality (AR) in the INgame chatbot of Parco Rossi. It also applies

to the fine-tuned integration of physical elements (e.g. panel, relief, Braille), Capacitive touch sensors and recorded stories of the Villa Rossi 3D model.

Work by specialised providers was necessary for the VR, AR, 3D printing and touch sensor solutions, of course. The high standards of such providers regarding professionalism, technology and content greatly add to the successful realisation of a project.

Flexible applications

In the end, what counts most regarding the IT application, be it VR or AR, a chatbot, a multimedia guide or a WordPress-based website, is that it be as easy as possible to access and use by everyone. However, the application must also work for the operator as regards costs of maintenance and updates, for instance. In this regard, it is worth noting that the flexibility of a Web app makes it easy to keep information up-to-date and add new content, such as adding points of interest (with Beacons or QR-codes) on the Sentiero della Sensibilità or, thanks to the Web-CMS WordPress, new easy hikes to the Kinderleicht Wandern, for example.

More important for the inclusiveness of an IT application is choice regarding modes of use. The Sentiero della Sensibilità app and Parco Rossi's INgame have text and image or audio for visually impaired people as basic modes. Videos in INgame have a dramaturgy and a voice-over that supports this group of users. Historical re-enactment videos with speech come with Italian sign language or subtitles in the English version for users with a hearing impairment.

Participation of users

As mentioned above, people with disabilities should be involved in the development early on in the project and up until the final testing and launch of the IT application. However, the client and operator of the solution must be involved too, as they also have to support the goals of the heritage or tourism organisation.

The pilot sites used various methods to ensure that the final products would meet the requirements of the end-users as well as of the organisations. These include, among others: Workshops of the developers with staff of visitor centres, museum curators, and experts for digital accessibility. Meetings with people with disabilities to present the project and collect user needs and suggestions. Following the principles of Design for All and user-centered design, e.g. involving people with disabilities as consultants in the design phase. Testing of the functionality, Web Content Accessibility Guidelines compliance and usability of the IT application. Presentation of the beta version and collection of feedback at public events. Online feedback by tourist offices and hotels. Final testing in the field, e.g. in the park or on the hiking trail, including technical aspects (e.g. Internet connection, GPS location, interactivity of iBeacons), and interviews on user satisfaction.

The pilot sites received many helpful suggestions for the design and improvement of the developed IT applications. Regarding the involvement of the end-users in development, the CAI Alpago group notes, *"The opinion of end-users is more important in the development phase than in the test phase. In fact, if the involvement of end-users takes place only in the testing of the application, it will not be possible to change the general functioning of the tool, but only to modify the existing one."*

Impact of the COVID-19 crisis

The health protection measures against the Coronavirus obviously had a strong impact on the pilot sites. Some of the work was completed already in 2019, but starting from March 2020 the development of the IT applications at times was disrupted, particularly where face-to-face and on-site work was necessary. The Kinderleicht Wandern, which did not require on-site work, went online in July 2020,

but the other pilots could not roll out their applications in the summer season. Meanwhile all are tested, completed and available for the next season, and there are plans on how to proceed.

However, the impact of the COVID-19 crisis goes much deeper. On the one hand, there is an increased demand for being in natural environments, hiking and visiting nature parks, and it must be ensured that people with disabilities are not left behind. Organisations with a mandate and expertise for this should now boost their efforts, and may actually benefit from the heightened interest in nature tourism.

On the other hand, all operators of tourist facilities must come to terms with the requirements of health protection and the sensitivity of visitors regarding contact with other people and things. The need to keep a certain distance from others will require limiting the number of visitors at peak times as well as managing their flow through reception and exhibition spaces.

Moreover, the IT installations for visitors with controls to be touched, e.g. keyboards, touchscreens, headsets and others, will be affected. With the COVID-19 crisis, such installations have been closed down, and in the future many visitors will remain sensitive and not use them. Therefore, in the coming years touchless controls based on voice and gesture recognition will be an important topic concerning IT installations for the communication of cultural and natural heritage.

7 Accessibility Tools with Showcase Implementations

This chapter describes the developed GATE IT tools for accessible online content and the showcases for the tools.[8] The development of the tools was not aimed to create new tourist portals, but to provide existing websites with tools for data input, management, visualisation and access. The development builds on acknowledged good practices of "South Tyrol for all".

Designed to be barrier-free, the developed tools (software, modules or content templates) fulfil the requirements of digital accessibility for all (i.e. W3C Web Content Accessibility Guidelines) and provide the user with information on the accessibility of sites or points of interest.

7.1 Tool for accessible points of interest

Brief description

Independent L. has developed an IT tool for providing information on the accessibility of points of interest. The tool can be easily integrated as a module (plugin) into websites programmed with the most widely used Web-CMS WordPress. Particular attention has been paid to the digital/Web accessibility of the tool, which is tested thoroughly.

The tool allows operators of heritage, tourist or other facilities to display on their website on a map (e.g. Open Street Map) points of interest in the area and provide structured information for visitors on the accessibility of the POIs. The front-end of the plugin can be adapted graphically to the own website.

Features for users with impairments

Technically the tool supports accessible map-based or list view, navigation of pages with structured information, adjustable font size, capability for information in different languages, text-to-speech function. The structured information includes: name, photo and characteristics of the point of interest, accessibility description and rating with smileys, pictograms for different categories of impairment, information about available services, obstacles, orientation elements and comments.

Showcase implementation

A showcase of the tool is implemented on the website of the visitor centre of the GATE pilot site GEOPARC Bletterbach.[9]

Availability and potential for organisations

The GATE IT-tool is available free of charge to interested organisations in the Interreg programme area (and beyond). It can be requested from independent L. via the e-mail address info@suedtirolfueralle.it (subject: GATE IT-Tool). Provided are the program code for the module, a digital form for data collection, and a manual (in English, German and Italian) with instructions for programming and data entry.

Once implemented, entries with information about the accessibility of points of interest in the organisation's vicinity can be inserted in the tool, made available and updated at any time. In

[8] More detailed documentation is available in GATE (2020e).

[9] GEOPARC Bletterbach: Interaktive Karte, https://www.bletterbach.info/interaktive-karte/

cooperation with other local stakeholders also accessible places in an entire city, nature park or other area can be covered with the tool.

7.2 Webapp for multimedia contents

Brief description

The barrier-free Webapp for multimedia contents has been developed by the software company U-Hopper (Trento) on behalf of the Foundation Dolomites UNESCO, under the coordination of independent L. The Webapp enables organisations to support an inclusive nature experience for everyone.

Features for users with impairments

Barrier-free responsive Web design, easy to understand tutorial as an introduction to the app, barrier-free page navigation, adjustable font size, text-to-speech function, podcast audio content, capability to include content in different languages (including sign language) and in-depth content on topics. The application can also be easily activated via QR-codes.

Showcase implementation

A showcase implementation of the Webapp has been realised for the GATE pilot site GEOPARC Bletterbach. The GEOPARC Guide[10] explains the Bletterbach area and invites hikers on the Jochgrimm–Gurndinalm trail with a didactic theme path to experience the landscape and nature. The theme path includes at eight points of interest stations with QR-codes that allow calling up multimedia contents that promote such experiences.

Availability and potential for organisations

The developed content management system for the application is available for use by interested organisations, who can fill the programmed templates with digital content to create an audio guide for their own pilot site. Special attention has been paid to the replicability of the showcase at other sites in the Interreg programme area. It is particularly relevant for hiking trails that are among the most widely available nature experiences in the Alpine and pre-Alpine regions.

7.3 Chatbot for tourist site information

Brief description

The barrier-free chatbot for providing information about tourist sites has been developed by the software company U-Hopper (Trento), on behalf of the UNESCO Dolomites Foundation, under the coordination of independent L. The chatbot is based on the messenger service of Facebook. It provides an engaging automated conversation for everyone, with and without impairments. In the interaction the chatbot can automatically provide to the user prepared information texts, audio recordings or videos, and information from connected databases.

Features for users with impairments

Barrier-free access and navigation, user-friendly design of the pre-programmed chat flow, adjustable font size, text-to-speech function, capability to include content in different languages.

[10] GEOPARC Guide: https://guide.machineria.it/bletterbach/list

Showcase implementation

A showcase implementation of the chatbot has been realised for the website of the GATE pilot site GEOPARC Bletterbach.[11] It demonstrates the added value organisations can achieve by providing information about a tourist site and available services to interested visitors automatically.

Availability and potential for organisations

The developed chatbot module for the Facebook messenger service is available free of charge for interested organisations from independent L. (a tutorial is also available). A chatbot is an ideal tool for operators of natural or cultural heritage site (e.g. visitor centre) to provide information to interested visitors about the site and available services automatically (e.g. opening hours, bus connections, guided tours, etc.). The administrator of the chatbot can update and extend the contents at any time.

7.4 Application for barrier-free mobility

Brief description

independent L. has developed a car park finder for people with disabilities as an application for barrier-free mobility in South Tyrol.[12] The application covers 1.300 reserved parking spaces in the municipalities of South Tyrol. For this IT application, a solution has been developed to display the occupancy status ("free/occupied") of the parking spaces in real time. The solution requires installation of "in ground" sensors which detect the presence or absence of a vehicle and transmit the data in real time via LoRaWAN to the parking spaces database. The "free/occupied" function for the car park finder app has been developed by the software company U-Hopper (Trento), the database and digital interfaces (web services) for the data transfer by independent L.

Features for users with impairments

The car park finder app for people with disabilities comes with a notification function, accessibility description, adjustable font size, and text-to-speech function. The function "free/occupied" enables the application now to display in real time also the occupancy status of reserved parking spaces.

Showcase implementation

Within the GATE project, the app for iOS- and Android-based devices has been extended by the new function "free/occupied". In the pilot measure, the web services for the application have been developed and 10 parking spaces in Bolzano equipped with an "in ground" sensor to test and validate the setup. Before the physical installation of sensors it is very important to test each position regarding the data transmission capability in order to prevent potential subsequent problems.

Availability and potential for organisations

For organisations interested to implement the solution in other regions information on the setup such as sensor, web services, etc. can be provided by independent L. In the expansion of Smart City technology solutions in South Tyrol's municipalities reserved parking spaces for people with disabilities (and others spaces) can now be equipped with sensors for the "free/occupied" function. Smart City initiatives in other regions for people with disabilities can benefit from the experiences in South Tyrol. The technology for the "free/occupied" function also can be applied to other innovative mobility services such as charging stations for e-cars, bike sharing, and others.

[11] Bletterbot (under "Send Message"), https://www.facebook.com/bletterbachvirtuell

[12] South Tyrol for all: Parking space finder, https://www.altoadigepertutti.it/de/parkplatzfinder

8 Multisensory signs

8.1 Introduction

GATE – "Granting Accessible Tourism for Everyone" or "Inclusive tourism is good for all". In the light of this principle, the purpose of the GATE project is to substantially contribute in the improvement of tourist offers for people with disabilities. This chapter provides an overview of the signs and symbols using which accessibility and multisensory signage for accessible tourism, subjected to examination in the various GATE-linked studies (see GATE 2020a/b), have been encoded. Multisensory signage refers to the whole sector of communication of information regarding tourism and leisure time, thereby increasing the safety of people with disabilities.

While precise guidelines have already been defined regarding the setting up of barrier-free hotel structures and have been confirmed by law, not much attention has been paid to making equally accessible the local tourist areas and destinations as well (Aigner et al., 2015; Lorenz & Melzer, 2013). Increasingly more often, it is the destinations that invest effort and money in making outdoor areas more accessible. As regards signage and multimedia support, reference is mainly made to local customary systems. Lack of information or the fact that information is represented or positioned inadequately is often the main reason which disabled persons do not feel at ease in nature, even in structures considered to be accessible.

8.2 Symbols for indicating accessibility

Back in the 1960's, attempts had been made to create symbols for accessibility. Due to the lack of precise agreements, however, the symbols used could be quite different from one another. Often, in order to illustrate accessibility, the promoters of tourism and leisure time offers would use the wheelchair symbol. In this manner, however, people with hearing or sight impairments could not be certain that the structure also met their specific accessibility requirements.

As seen by Domìnguez et al. (2013), there are no systematic collections of symbols representing accessibility. When creating symbols representing accessibility, it would be necessary anyhow to make sure people are represented in an as neutral way as possible, for example as regards gender and external features. Moreover, the symbols should have strong contrast. While, according to ÖNORM B1600:2017-04-01, § 8.2.1[13], white symbols on a black background, or black on yellow, or white on blue, or black on white should be considered, in the case of signs the red/green combination should be avoided.

The examples given below show symbols for each category involved, without any single one being considered more adequate than the others.

[13] The Austrian guidelines ÖNORM B1600:2017-04-01 can be downloaded for a fee at https://shop.austrian-standards.at/action/de/public/details/597955/OENORM_B_1600_2017_04_01

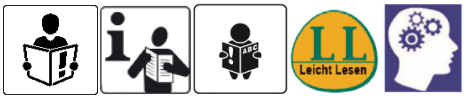
Limitation of mobility:	
Walking and hand disabilities:	 [14]
Autonomously practicable pathway:	 [15]
Practicable with assistance:	 [16]
Hard-of-hearing people:	 [17]
Assisted listening systems available:	 [18] [19]
Deaf people:	
Information in adequate formats:	 [20]
Information given via sign language:	 [21]
Sight-impaired people:	 [22]
Blind people:	 [23]
Persons with learning disabilities:	 [24]

Table 1: Symbols for indicating accessibility

[14] Sources: www.parcorossi.it; www.anatom5.de; www.bereit-fuer-barrierefreiheit.eu; ÖNORM A 3011-3.

[15] Sources: www.parcorossi.it; www.reisen-fuer-alle.de; www.anatom5.de; ÖNORM A 3011-3 Symbol; Domìnguez et al. 2013.

[16] Source: http://www.bereit-fuer-barrierefreiheit.eu

[17] Sources: www.reisen-fuer-alle.de; ÖNORM B 1600; Domìnguez et al., 2013; www.anatom5.de

[18] Sources: www.induktionsschleife.at; www.anatom5.de

[19] Source: ÖNORM B1600:2017-04-01

[20] Sources: www.parcorossi.it; www.anatom5.de; www.holidaysonwheels.at

[21] Sources: www.reisen-fuer-alle.de; www.bereit-fuer-barrierefreiheit.eu; www.oeglb.at; Domínguez et al. 2013.

[22] Sources: www.reisen-fuer-alle.de; www.bereit-fuer-barrierefreiheit.eu; www.anatom5.de

[23] Sources: www.reisen-fuer-alle.de; www.bereit-fuer-barrierefreiheit.eu; www.anatom5.de; www.holidaysonwheels.at; ÖNORM V 2106; Domìnguez et al. 2013.

[24] Sources: www.reisen-fuer-alle.de; www.bereit-fuer-barrierefreiheit.eu; www.euregio-barrierefrei.eu; www.capito.eu; Domìnguez et al. 2013.

8.3 Multisensory signs

Multisensory signs play a key role in setting up accessible structures. In order to develop them adequately for each category, when creating the signage and guide system one should consider the different needs of people with disabilities. The following table shows several examples of different needs for each form of limitation:

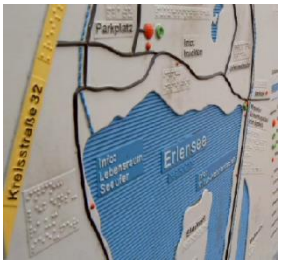
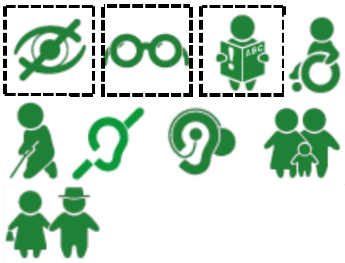
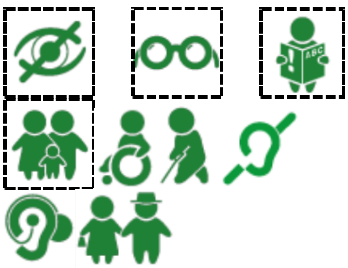
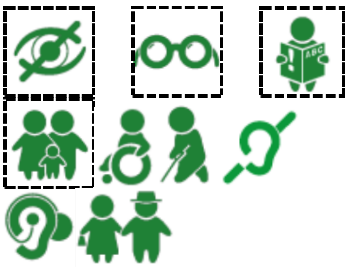
Limitation of mobility:		
Walking and hand disabilities:	- Gentle slopes - Handrails - Rest areas	- Low muscle engagement - Easy to use - Sitting available
Persons using wheelchairs	- Parking for the disabled - Stable flooring - Possible absence of steps	- Ramps - Accessible WCs - Adequate turning space
Hard-of-hearing people:	- Good acoustics - Low background noise	- Information with images and text - Assisted listening systems
Deaf people:	- Sign language - Visual information	- Good lighting - Visual contact (lips)
Sight-impaired people:	- Clear pathway indications - Handrail - Easy to read signs	- No obstacles - Good lighting - Audio information
Blind people:	- Tactile paths - Ground surface indicators	- Audio information - Tactile information
People with learning disabilities:	- Simple language - Guided trails (colours)	- Easily understandable signage - Absence of dangerous spots

Table 2: Needs of people with disabilities

Luckily, already many areas and providers of tourism services are strongly committed to setting up accessible natural sites using multisensory signage. Table 3 is based on the needs of people with disabilities as described above and offers 20 examples of such signals.

Divided into 14 ‘analogic’ multisensory signs and 6 ‘digital’ signs, it also shows symbols to be used for specific disabilities. The categories for which the solution is especially suited are highlighted (framed).

Analogic signage

Multisensory information boards	 [25]	
Tactile information boards in excursion areas and along trails	 [26]	
Touchable sculptures	 [27]	
Direction-indicating objects	 [28]	
Tactile paths and ground surface indicators	 [29]	
Tree trunks as path indicators	 [30]	

[25] Arnade & Heiden (2002).

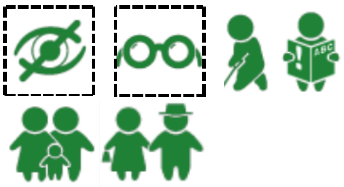
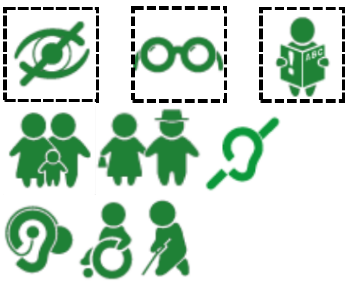
[26] Erlensee natural park (Arnade & Heiden 2002).

[27] Kaunergrat natural park „3000 m VERTICAL“ (https://www.kaunergrat.at/de/erlebnis/naturparkhaus/).

[28] Parco Rossi: ARAC kite as indicator, http://www.parcorossi.it

[29] Parco Rossi: Tactile paths and ground surface indicators, http://www.parcorossi.it

[30] Arnade & Heiden (2002).

Tactile elements on ground surfaces	 [31]	
Braille writing on handrails	 [32]	
Braille writing integrated in handrails	 [33]	
Braille writing on doors	 [34]	
Large and high-contrast writing	 [35]	
Road signs with incisions	 [36]	

[31] Patscherkofel: Das Kofel, indoors (picture: KMU & Tourismus, Universität Innsbruck).

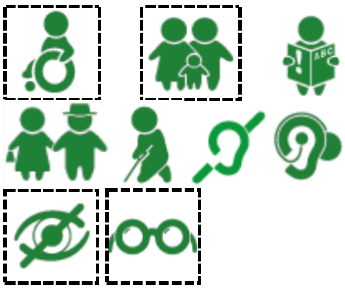
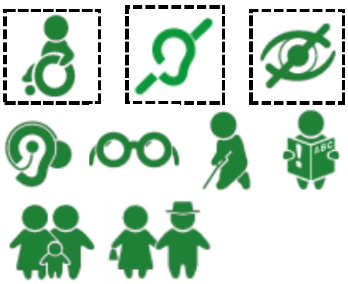
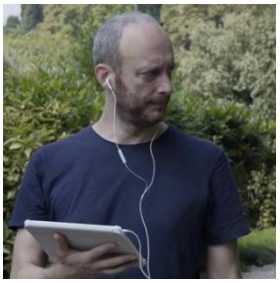
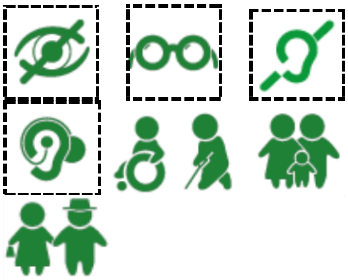
[32] Virgen: Trail of perceptions, https://www.meinbezirk.at/osttirol/c-lokales/der-weg-der-sinne_a3264687

[33] ÖZIV Bundesverband, https://www.oeziv.org/access/wissenswertes-ueber-umfassende-barrierefreiheit/

[34] Patscherkofel: Das Kofel, indoors (picture: KMU & Tourismus, Universität Innsbruck).

[35] Patscherkofel: Downhill station area (picture: KMU & Tourismus, Universität Innsbruck).

[36] Hainich national park, https://www.nationalpark-hainich.de/de.html

Mid-height information boards	 37	
Barriers at entrance to areas	 38	
Digital Signage		
Digital information boards	 39	
Client-facing screen on cash registers	 40	
Multimedia guides	 41	

[37] Dachstein: Panoramic panel, https://dachstein-salzkammergut.com/de/sommer/oberirdisch/welterbeblick/

[38] Patscherkofel: Entrance valley station (Bild: KMU & Tourismus, Universität Innsbruck).

[39] 4xperts: Projects & Examples, https://www.4xperts.de/projekte-beispiele

[40] SDS cash register systems, https://www.sds-kassensysteme.de/touchscreen/

[41] Parco Rossi, http://www.parcorossi.it

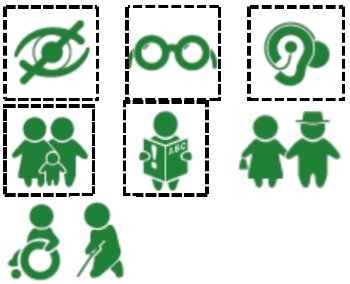
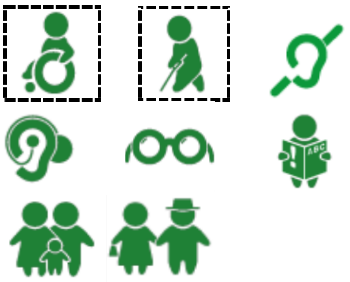
iBeacons	 42	
App Talking Trails	 43	
Virtual reality	 44	

Table 3: Set of multisensory signs

8.4 Summary

This part of the study refers to signs (symbols and pictograms) used for signalling offers intended for people with various kinds of limitations. Using multisensory signs, it is also possible to organize areas, analogic signage and information boards, as well as multimedia devices (screens, audio- and video-guides) in such a way as to adapt them to the needs of all of the various groups of interest.

[42] Parco Rossi, http://www.parcorossi.it

[43] CAI Alpago (picture: information materials by GATE partners).

[44] Visore VR (picture: KMU & Tourismus, University of Innsbruck).

9 Guidelines for accessibility

A selection of useful guidelines for accessibility:

Barrier-free Web contents

Netzwerk Barrierefrei (2016). Barrierefreiheit von Websites und Dokumenten Technisches Informationsblatt, April 2016, https://www.wko.at/branchen/tourismus-freizeitwirtschaft/Barrierefreiheit-Websites-und-Dokumente.pdf

European Blind Union (o.J.). Informationen für alle zugänglich machen, http://www.euroblind.org/publications-and-resources/informationen-fur-alle-zuganglich-machen

W3C (2018): Web Content Accessibility Guidelines (WCAG) 2.1. W3C Recommendation, 5 June 2018, https://www.w3.org/TR/WCAG21/

Web Accessibility Certificate Austria (WACA), Abwicklung durch Hilfsgemeinschaft der Blinden und Sehschwachen Österreichs, Zertifizierung durch TÜV Austria, https://waca.at

Barrier-free tourism

ADAC - Allgemeiner Deutscher Automobil Club (2003). BarrierefreierTourismus für Alle. Eine Planungshilfe für Tourismus-Praktiker zur erfolgreichen Entwicklung barrierefreier Angebote. München: ADAC, https://hdb-sn.de/wp-content/uploads/2016/09/planungshilfe_barrierefreier_tourismus_komplett.pdf

Ambrose I., Garcia A., Papamichail K. & Veitch C. (2017). Accessible Tourism Destination Handbook. European Network for Accessible Tourism (ENAT). Lisbon: Turismo de Portugal, http://business.turismodeportugal.pt/SiteCollectionDocuments/all-for-all/acessible-tourism-destination-management-handbook-enat.pdf

Grundner M.R. & Schmied-Länger B. (2014). Barrierefreiheit im Tourismus – Aspekte der rechtlichen und baulichen Grundlagen. Hrsg. von BMWFW, Wirtschaftskammer Österreich & Austrian Standards, Wien, Oktober 2014, https://www.wko.at/branchen/tourismus-freizeitwirtschaft/Barrierefreiheit-im-Tourismus.pdf

Istituto Italiano per il Turismo per Tutti (ed.) (2010). Viaggiare senza limiti: il turismo per tutti in Europa / Travel without limits: Tourism for All in Europe. Venaria, Italy: Luca Ricci, October 2010, http://www.turismabile.it/attachments/article/142/viaggiare_senza_limiti_web.pdf

Lorenz, A., Melzer, H., & Schieferer, J. (2013). Tourismusperspektiven in ländlichen Räumen: Kurzreport Barrierefreiheit. Berlin: Bundesministerium für Wirtschaft und Technologie (BMWi), https://www.bmwi.de/Redaktion/DE/Publikationen/Tourismus/tourismusperspektiven-in-laendlichen-raeumen-barrierefreiheit.html

Rheinland-Pfalz Tourismus (2018). Nachhaltige Wertschöpfung durch barrierefreie Reiseangebote. Praktikerleitfaden für Betriebe, Orte und Regionen in Rheinland-Pfalz. Koblenz, https://rlp.tourismusnetzwerk.info/download/Leitfaden_Barrierefrei_Screenreader.pdf

RKW Kompetenzzentrum & EDAD (Hrsg.) (2011). Gesund und sicher unterwegs. Konzepte und Marktchancen für kleine und mittlere Unternehmen im Tourismus. RKW Kompetenzzentrum & Europäisches Institut Design für Alle in Deutschland, https://www.design-fuer-alle.de/wp-content/uploads/EDAD_RKW_Gesund_und_sicher_unterwegs_2011.pdf

UNWTO - World Tourism Organization (2016). Manuals on Accessible Tourism for All – Definition and context; Accessibility chain and recommendations, Principal intervention areas, Indicators for assessing accessibility in tourism, Good practices of accessible tourism for all; https://www.unwto.org/accessibility

VisitScotland (2016). Easy does it. Simple, low-cost changes to benefit you and your visitors. Edinburgh, June 2016, https://www.visitscotland.org/binaries/content/assets/dot-org/pdf/marketing-materials/easy-does-it.pdf

Wirtschaftskammer Österreich – Barrierefreiheit in der Tourismus-, Freizeit-, Kultur- und Gesundheitswirtschaft. Publikationen, Rechtsinformationen und Links, https://www.wko.at/branchen/tourismus-freizeitwirtschaft/barrierefreiheit1.html

Nature experiences

BMWFW - Bundesministerium für Wissenschaft, Forschung und Wirtschaft & WKO - Bundessparte Tourismus und Freizeitwirtschaft (Hrsg.) (2015). Tourismus für Alle. Eine Orientierungshilfe für barrierefreie Naturangebote. 2. Auflage. Wien: BMWFW - Tourismus-Servicestelle, https://www.wko.at/branchen/tourismus-freizeitwirtschaft/hotellerie/Tourismus-Barrierefreiheit-barrierefreie-Naturangebote.pdf

Bundesamt für Naturschutz (2017). Naturschutz: einladend - sozial - integrativ. Angebote für Menschen mit Einschränkungen. A. Biendarra, G. Hein, T. Hövelman et al., Bonn, BfN -Skripten 474 [siehe besonders die Beiträge von H.-G. Heiden, T. Schäfer, Thomas & Wosnitza], https://www.bfn.de/fileadmin/BfN/service/Dokumente/skripten/Skript474.pdf

Naturfreunde Internationale (2014). Naturerleben für Alle. Ein Leitfaden zur Gestaltung barrierefreier Naturerlebnisangebote. Naturfreunde & Österreichische Bundesforste, Wien, Oktober 2014, https://www.nf-int.org/sites/default/files/infomaterial/downloads/2018-03/Handlungsleitfaden%20Naturerleben%20fuer%20Alle_web.pdf

Regione del Veneto (2003). Il verde è di tutti. Schede tecniche per la progettazione e la realizzazione di aree verdi accessibili e fruibili. A cura di Lucia Lancerin. Venezia, http://repository.regione.veneto.it/public/b008608f269614ae4d2ced2b0effe584.php?lang=it&dl=true

Hiking trails

Gather M., Friedrich J., Sommer S. & Zeigerer A. (2005). Planungsleitfaden für die barrierefreie Gestaltung von Wanderwegen. Institut Verkehr und Raum an der Fachhochschule Erfurt. Hrsg. Thüringer Ministerium für Soziales, Familie und Gesundheit, Erfurt, https://www.thueringen.de/imperia/md/content/tmsfg/bb/publikation/thm_freiraumus2.pdf

Greenways4ALL (2017). How to Make Accessible Greenways, https://www.aevv-egwa.org/download/greenways4all/gw4all-publications/GW4ALL-leaflet-AccesibleGreenways-EN-fin.pdf

Lebenshilfe Wittmund & Regionales Umweltzentrum Schortens (2002). Natur für alle. Planungshilfen zur Barrierefreiheit, Planungshilfe 4 – Weggestaltung, https://ruz-schortens.de/natur-fuer-alle.html

Rheinland-Pfalz Tourismus (2018). Wanderwege-Leitfaden Rheinland-Pfalz: Ergänzungsband barrierefreie Wanderwege. Koblenz, https://rlp.tourismusnetzwerk.info/wp-content/uploads/2018/04/Wanderwege-Leitfaden-Rheinland-Pfalz-Erg%C3%A4nzungsband_-Barrierefreie-Wanderwege.pdf

Nature parks

EUROPARC Deutschland (2017). Barrierefreies Naturerleben planen. Berlin, http://www.europarc-deutschland.de/wp-content/uploads/2017/03/Barrierefeies-Naturerleben-planen.pdf --

Ministero dell'Ambiente e della Tutela del Territorio (2003). Parchi per tutti: Linee guida per gli enti di gestione dei parchi nazionali italiani. Associazione ACLI Anni Verdi, Roma, http://www.parchipertutti.it/?LevelID=59

Verband Deutscher Naturparke & EUROPARC Deutschland (2016): Faszination Natur erlebbar machen. Wegweiser für die Konzeption und Umsetzung von Naturerlebnisangeboten in den Nationalen Naturlandschaften. Bonn: Bundesamt für Naturschutz, http://www.europarc-deutschland.de/wp-content/uploads/2015/10/Wegweiser-f%C3%BCr-die-Konzeption-und-Umsetzung-von-Naturerlebnisangeboten_barrierefrei.pdf

Verband Deutscher Naturparke (Hrsg.) (2016). Barrierefreies Naturerleben Gestalten! Ein Leitfaden für die Praxis. In Zusammenarbeit mit dem Bundeskompetenzzentrum Barrierefreiheit. Bonn: VDN, https://www.naturparke.de/service/infothek/d/fd/leitfaden-finalpdf-1946/download.html

Museums and exhibitions

Bundesministerium für Wissenschaft, Forschung und Wirtschaft & Wirtschaftskammer Österreich (2015): Tourismus für Alle - Barrierefreie Kunst- und Kulturangebote - inklusiv und innovativ. 2.Auflage, https://www.wko.at/branchen/tourismus-freizeitwirtschaft/Tourismus-Barrierefreie-Kunst-und-Kulturangebote.pdf

COME-IN! - Cooperating for Open Access to Museums (2017). Publications – Guidelines / Linee guida / Richtlinien, http://www.central2020.eu/Content.Node/COME-IN.html

Deutscher Museumsbund (2013): Das inklusive Museum. Ein Leitfaden zu Barrierefreiheit und Inklusion. Berlin: DMB, https://www.museumsbund.de/wp-content/uploads/2017/03/dmb-barrierefreiheit-digital-160728.pdf

Ministero per i beni e le attività culturali e per il turismo (2008). Linee guida per il superamento delle barriere architettoniche nei luoghi di interesse culturale. Decreto ministeriale 28 marzo 2008, https://www.beniculturali.it/mibac/multimedia/MiBAC/documents/1311244354128_plugin-LINEE_GUIDA_PER_IL_SUPERAMENTO_DELLE_BARRIERE_ARCHITETTONICHE.pdf

Verband der Museen der Schweiz (2016). Barrierefreie Museen / Musei senza barriere, https://www.museums.ch/publikationen/standards/barrierefreiheit.html

Zuccalà, Amir (ed.) (2018). Andiamo al museo. Esperienze, proposte e buone prassi per un patrimonio culturale accessibile alle persone sorde. Ente Nazionale per la protezione e l'assistenza dei Sordi - Onlus, Roma, https://www.accessibitaly.it/wp-content/uploads/2019/07/PUB-Andiamo-al-Museo.pdf

10 Bibliography

Aigner, M., Gigler, H., Heitzenberger, S., Krauland, K., et al. (2015). Tourismus für Alle: Eine Orientierungshilfe für barrierefreie Naturangebote. Online unter https://www.wko.at/branchen/tourismus-freizeitwirtschaft/hotellerie/Tourismus-Barrierefreiheit-barrierefreie-Naturangebote.pdf

Arnade, S., & Heiden H. G. (2002). Natur für alle. Planungshilfen zur Barrierefreiheit, Planungshilfe 4 – Weggestaltung. Lebenshilfe Wittmund & Regionales Umweltzentrum Schortens. Online unter: https://ruz-schortens.de/natur-fuer-alle.html?file=files/ruz_schortens/pdf/natur_fuer_alle/PH4_Wegegestaltung.pdf

Bandukda, M., Singh, A., Bianchi-Berthouze, N., & Holloway, C. (2019). Understanding experiences of blind individuals in outdoor nature. In: CHI'19 Extended Abstracts, 4-9 May 2019, Glasgow, Scotland, UK; https://www.researchgate.net/publication/331959311

Bell, S.L. (2019). Experiencing nature with sight impairment. Seeking freedom from ableism. In: Environment and Planning E: Nature & Space, 2(2): 304-322; preprint, https://ore.exeter.ac.uk/repository/handle/10871/36091

Buhalis, D., & Darcy, S. (eds.) (2010). Accessible Tourism: Concepts and Issues. Bristol: Channel View Publications.

Buhalis, D., Darcy, S., & Ambrose, I. (eds.) (2012). Best Practice in Accessible Tourism: Inclusion, Disability, Ageing Population and Tourism. Bristol: Channel View Publications.

Buhalis, D., Eichhorn, V., Michopoulou, E., & Miller, G. (2005). Accessibility market and stakeholder analysis. One Stop Shop for Accessible Tourism in Europe (OSSATE), University of Surrey, UK, https://www.accessibletourism.org/resources/ossate_market_analysis_public_final.pdf

Corazon, S.S., Gramkow, M.C., Poulsen, D.V., et al. (2019). I would really like to visit the forest, but it is just too difficult: A qualitative study on mobility disability and green spaces. In: Scandinavian Journal of Disability Research, 21(1): 1-13, https://doi.org/10.16993/sjdr.50

Domínguez, T., Alén, E., & Fraiz, J. (2013). International accessibility: a proposal for a system of symbols for people with disabilities. International Journal on Disability and Human Development, 12(3), 235–243.

Euan's Guide Access Survey 2019. Euan's Guide, Edinburgh, Scotland, UK, https://www.euansguide.com/access-survey

Eurostat (2015). Disability statistics introduced. Retrieved from https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Disability_statistics_introduced#Disability_models

Eurostat (2016). Tourism trends and ageing (Nov. 2016), https://ec.europa.eu/eurostat/statistics-explained/index.php/Tourism_trends_and_ageing#Seasonal_patterns

Eurostat (2019a). Seasonality in tourism demand (May 2019), https://ec.europa.eu/eurostat/statistics-explained/index.php/Seasonality_in_tourism_demand

Eurostat (2019b). Population structure and ageing (July 2019), https://ec.europa.eu/eurostat/statistics-explained/index.php/Population_structure_and_ageing

Eurostat (2019c). Tourism statistics - participation in tourism (September 2019), https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Tourism_statistics_-_participation_in_tourism

GATE (2020a). Universität Innsbruck & Salzburg Research: Multisensorische Zeichen für Barrierefreiheit und Sicherheit von Freizeit- und Tourismusangeboten. Report, September 2020.

GATE (2020b). Universität Innsbruck & Salzburg Research: Multisensorisches Zeichenset für inklusive Freizeit- und Tourismusangebote. Report, September 2020.

GATE (2020c). Studien aus der laufenden Forschungsarbeit zum inklusiven Tourismus, Universität Innsbruck, Institut für strategisches Management, Marketing und Tourismus - KMU und Tourismus, September 2020.

GATE (2020d). Leitlinien – Inklusiver Tourismus. Erstellt von Guntram Geser, Salzburg Research, 16. September 2020.

GATE (2020e). Report on the Accessibility Tools with Showcase Implementations. Edited by Guntram Geser, Salzburg Research, 27 November 2020.

GATE (2020f). Report on the IT Applications of the Pilot Sites. Monitoring & Lessons Learned. Edited by Guntram Geser, Salzburg Research, 3 December 2020.

GfK Belgium et al. (2014). Economic Impact and Travel Patterns of Accessible Tourism in Europe. Final Report. Study for the European Commission, DG Enterprise and Industry prepared by GfK Belgium, University of Surrey, Neumann Consult & ProASolutions, http://ec.europa.eu/DocsRoom/documents/7221/attachments/1/translations/en/renditions/native

Goldy, S.P., & Piff, P.K: (2019). Toward a social ecology of prosociality: why, when, and where nature enhances social connection. In: Current Opinion in Psychology, 32: 27-31, http://doi.org/10.1016/j.copsyc.2019.06.016

IUBH Internationale Hochschule (2019). IUBH Touristik-Radar 2019. Barrierefreier Tourismus für Alle, https://www.iubh.de/wp-content/uploads/1903_Themenmappe-Tourismus-mit-Behinderung_fin_web.pdf

Lorenz, A., Melzer, H., & Schieferer, J. (2013). Tourismusperspektiven in ländlichen Räumen: Kurzreport Barrierefreiheit. Berlin: Bundesministerium für Wirtschaft und Technologie (BMWi), https://www.bmwi.de/Redaktion/DE/Publikationen/Tourismus/tourismusperspektiven-in-laendlichen-raeumen-barrierefreiheit.html

Menzies, A., Mazan, C., Borisoff, J.F., Mattie, J.L., & Mortenson, W.B (2020). Outdoor recreation among wheeled mobility users: perceived barriers and facilitators. In: Disability and Rehabilitation: Assistive Technology, 15: 1-7. http://doi.org/10.1080/17483107.2019.1710772

Naturfreunde Internationale (Hrsg., 2015). Naturerleben und Gesundheit. Eine Studie im Rahmen des Projekts Wasser:Wege von Naturfreunden und Österreichischen Bundesforsten. Wien, Mai 2015, https://www.nf-int.org/sites/default/files/thema/downloads/2018-06/Naturerleben%20und%20Gesundheit.pdf

Neumann, P., & Reuber, P. (2004). Ökonomische Impulse eines barrierefreien Tourismus für Alle. Langfassung einer Studie im Auftrag des Bundesministeriums für Wirtschaft und Arbeit. Münstersche Geographische Arbeiten 47, https://www.uni-muenster.de/imperia/md/content/geographiea/publikationen/mga/mga47.pdf

Neumann, P., Pagenkopf, K., Schieferer, J., & Lorenz, A. (2008). Barrierefreier Tourismus für Alle in Deutschland: Erfolgsfaktoren und Maßnahmen zur Qualitätssteigerung. Herausgegeben vom Bundesministerium für Wirtschaft und Technologie (BMWi), http://www.holicap.de/cms/upload/dokumente/BMWi-Studie_Barrierefreier_Tourismus.pdf

Ower, C., Kemmler, G., Vill, T., Martini, C., et al. (2018). The effect of physical activity in an alpine environment on quality of life is mediated by resilience in patients with psychosomatic disorders and healthy controls. In: European Archives of Psychiatry and Clinical Neuroscience, 269: 543-553, https://doi.org/10.1007/s00406-018-0930-2

Rebstock, Markus (2017). Economic Benefits of Improved Accessibility to Transport Systems and the Role of Transport in Fostering Tourism for All. International Transport Forum, Discussion Paper No. 2017-04, February 2017, https://www.itf-oecd.org/sites/default/files/docs/improved-accessibility-fostering-tourism-for-all.pdf

RKW Kompetenzzentrum (Hrsg.) (2011). Wirtschaftsfaktor Alter: Körperliche Veränderungen verstehen - Angebote anpassen. Eschborn, http://handwerk-owl.de/media/1394004591_wirtschaftsfaktor_alter.pdf

Stein, Signe (2008). Barrierefreier Tourismus. In: Nullbarriere.de, https://nullbarriere.de/barrierefreiheit-tourismus.htm

UNWTO - World Tourism Organization (2013). Recommendations on accessible tourism for all. Madrid: UNWTO, https://www.e-unwto.org/doi/pdf/10.18111/9789284415984

VisitEngland (2018). Accessibility - Non Participation. May 2018, https://www.visitbritain.org/sites/default/files/vb-corporate/business-hub/resources/latent_demand_accessibility_research.pdf

WHO (2018). Disability and health. Retrieved from https://www.who.int/en/news-room/fact-sheets/detail/disability-and-health

Zhang, G., Poulsen, D.V., Lygum, V.L., Corazon, S.S., et al. (2017). Health-Promoting Nature Access for People with Mobility Impairments: A Systematic Review. In: International Journal of Environmental Research and Public Health, 14(7), 703, https://doi.org/10.3390/ijerph14070703