RADIO MAGICA'S COMMUNITY TALKING MAPS®: DIGITAL, LINGUISTIC AND COGNITIVE ACCESSIBILITY FOR CULTURAL HERITAGE

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Abstract – The Talking Maps® project aims at developing a "digital common good" based on multimodality to promote the dissemination of Italian Cultural Heritage through a narrative language, enjoyable and accessible by a wide range of users, including non-experts such as children, and individuals with cognitive disabilities or linguistic special needs. Maps are both digital and paper-based. Digital contents connected to each Talking Map® comprise multimodal stories and fun-facts developed by a multidisciplinary team of experts and artists, in line with the principles of universal design. Maps are conceived as community maps, since the production methodology involves citizens of all ages. Empirical investigation conducted between 2018 and 2023 made it possible to point out the strengths of the project and analyze its development on a longitudinal basis.

Keywords: Accessibility; Cultural Heritage; Universal Design for Learning; Community Maps; Information and Communication Technology.

"Inclusion is not bringing people into what already exists; it is making a new space, a better space for everyone".
(G. Dei, "Ontario's Equity and Inclusive Education Strategy", 2009).

1. A "magical" radio for promoting inclusion and accessibility to culture

Radio was born as a tool to bridge distances. For decades, radio waves have built invisible connections through which countless voices, music, and news travel every day, reaching people and communities spread across the planet. Since Marconi's time, radio has evolved: with the advent of the web, radio broadcasting has transformed, amplifying the opportunities to give voice to new broadcasters, even very tiny ones. This evolution has set the stage for podcasting, streaming and

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social media interaction, resulting in a multiplying diffusion effect of its contents and transforming it into web radio.

The richness of channels through which audio content is made accessible today constitutes another evolutionary leap: video can be associated with audio giving rise to visual radio. An audio channel augmented with a visual channel further enhances radio accessibility, as it opens up the way for the use of languages and non-verbal languages, such as sign language, thus expanding the boundaries of communication in favor of people who use these communicative resources in their daily lives. For instance, the American Council of the Blind (ACB) Radio offers a variety of audio programming tailored to the interests and needs of people who are blind or visually impaired. Their programming includes not only audio streams but also some content with visual elements accessible through their website. Similarly, the Accessible Media for Everyone program by National Public Radio (NPR) provides accessible content for individuals with disabilities. This includes transcripts, podcasts with detailed descriptions, and sign language videos for selected programs.

In the integration of audio and video lies the basis for the innovations pursued by Radio Magica and its projects the Talking Maps®, which are the subject of this chapter, included. Radio Magica[1] is an Italian foundation created in 2012 by a team of academicians and entrepreneurs advocating radio for educational purposes (radio education), particularly for children and young people. The adjective "Magica" takes its inspiration from a phrase coined by Roald Dahl – "those who don't believe in magic will never find it" – and qualifies its mission, which is to overcome barriers created by lack of knowledge, skepticism or prejudice and thus truly contribute to breaking down linguistic and cognitive barriers by promoting access to culture for all, especially for children and young people with disabilities. Radio Magica nowadays broadcasts multimodal contents for free: audio, video with subtitles, videos in Italian Sign Language (LIS), videos using symbols of Augmentative and Alternative Communication (AAC), videos with audio description, audio texts downloadable for free and available in high legibility fonts. Some contents are also available in English, German and Slovenian. The multimodal approach allows Radio Magica to create books in many formats, and disseminate the concept of "bibliovariety", to ensure everyone's right to stories (Corniglia 2023). Moreover, bibliovariety is a means of spreading a new culture of inclusion, making different languages of communication broadly known to all.[2]

The goal of this paper is to present a project developed by Radio Magica Foundation, with the support of a wide network of professionals, to create a

[1] Visit Radio Magica at www.radiomagica.org.

[2] For further information, watch the Video Campaign on bibliovariety https://www.youtube.com/watch?v=u-Swsd735XI.

highly accessible tool to make the beauty and richness of Italy's Cultural Heritage known to all. Three dimensions of accessibility have been examined and developed in the project: digital, linguistic and cognitive. The following Sections present the project and its evolution from 2018 to 2024, pointing out benefits and implications.

2. The Talking Maps®

2.1. Multimodality for Cultural Heritage

Since its inception, Radio Magica has primarily focused on bibliovariety: in agreement with publishers, authors, and illustrators, the foundation regularly publishes on a section of its website – named "Libri per TUTTI/Books for ALL" – existing children's books, making them accessible in one or more formats, as described in Figure 1.

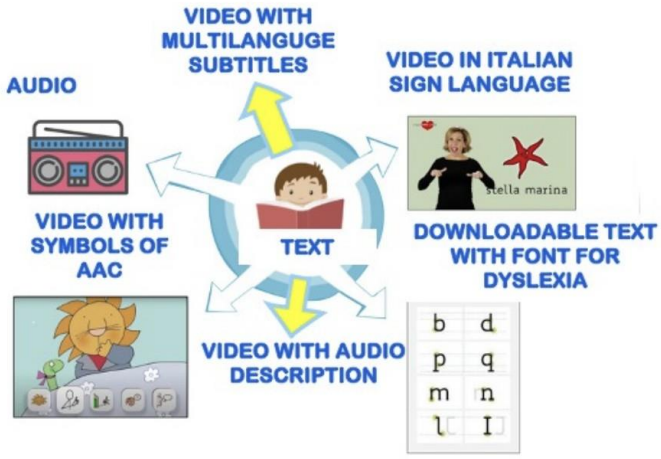

Figure 1
Bibliovariety: alternative formats to support accessibility.

The experience gained in the publishing sector constitutes the starting point of the Talking Maps®cultural project, devoted to the humanistic and scientific dissemination of Italian Cultural Heritage through accessible contents. The inspiration for this new project came from the widely known British radio program "A History of the World in 100 Objects", a unique and compelling radio program produced by BBC Radio 4 in collaboration with the British Museum. The series first aired in 2010 and was presented by Neil MacGregor, the Director of the British Museum at the time. It ambitiously explored the history of humanity through 100 artifacts carefully selected from the museum's vast collection. Later, in the preface to a volume, a spin-off from the radio

program, Neil MacGregor explains that he initially felt the endeavor was an "impossible mission" (2012), but BBC experts were very optimistic, "they knew that imagining something also means appropriating it in a unique way [...] by building a personal story of the world". The successful British radio program was replicated by many radios, demonstrating the successful association between radio and cultural heritage.

Radio Magica's Talking Maps® can also be considered as a special radio program on cultural heritage: its contents are broadcast on Radio Magica's web radio and, thanks to partnership agreements, on other FM radios as well (Rocco, Porzio 2022). However, Talking Maps® can be defined as more than a radio program: they are a multipurpose, multimodal tool for the accessible dissemination of Italian Cultural Heritage. They are multipurpose as their contents can be implied for educational, tourist and even marketing goals. For instance, stories narrated through Talking Maps® are suitable for children from the age of five, to learn about local art, traditions and history. The engaging narrative, enriched by drawings and videos, is useful both for tourists interested in knowing more about a territory, and for regional marketing strategies. Talking Maps® are also multimodal, following the bibliovariety approach described in Figure 1.

They are available through a dedicated digital platform, developed by the SASWeb Lab of the University of Udine (Italy), called #smARTradio® and freely available online www.radiomagica.org/smartradio. The platform represents an extension to the Radio Magica website whose function is to disseminate material and immaterial Italian Cultural Heritage in an "ART-istic" way, leveraging the potential of multimodal storytelling to ensure maximum accessibility to its contents. In a nutshell, the goal of the project is to combine beauty and accessibility, exploiting the talents of various artists. For this reason, each of the Talking Maps® involves a multidisciplinary team, made up of artists (writers, illustrators, videomakers, screenwriters, musicians, actors), heritage scholars (historians, researchers, archaeologists, museum curators, guides), computer scientists and experts in accessibility.

2.2. Digital, linguistic and cognitive accessibility

A wide literature presents the concept of accessibility, exploring different dimensions and specialized guidelines per specific disabilities (Dattolo *et al.* 2016; Dattolo, Luccio 2017). This section proposes the accessibility goals pursued by the project, followed by the illustration of the six-stage methodology underlying the production of each Talking Map®.

2.2.1. Digital Accessibility

Digital accessibility refers to the design and development of digital content, tools, and technologies in a way that ensures that they can be accessed and used byanybody, regardless of ability or disability. This encompasses websites, mobile applications, software, and electronic documents. Key components of digital accessibility include:

1. Web Content Accessibility Guidelines (WCAG): standards developed by the World Wide Web Consortium (W3C) to make web content more accessible. These guidelines focus on providing text alternatives for non-text content, creating content that can be presented in different ways, and ensuring that overall functionality is available from a keyboard.
2. User Interface (UI) Design: Creating interfaces that are easy to navigate and use, respectful of screen readers' needs, keyboard navigation, and other assistive technologies.
3. Responsive Design: Ensuring digital content is accessible on various devices, including desktops, tablets, and smartphones, with adjustments for different screen sizes and orientations.
4. Captioning and Transcripts: Providing captions for videos and transcripts for audio content to assist users with hearing impairments.

2.2.2. Linguistic Accessibility

Linguistic accessibility involves making content understandable and usable for people who speak different languages or who have varying levels of language proficiency. This can be achieved through:

1. Multilingual Content: Providing translations of content into multiple languages to cater for diverse audiences.
2. Plain Language: Writing content in clear and simple language to ensure it is easily understood by a wide audience, including those with limited literacy skills.
3. Language Support in Technology: Offering language options in software and applications, including support for different scripts, fonts, and linguistic conventions.
4. Cultural Relevance: Ensuring that translated content is culturally relevant and appropriate for the target audience, considering idiomatic expressions and local nuances.

2.2.3. Cognitive Accessibility

Cognitive accessibility focuses on making content and technology usable for people with cognitive disabilities, including learning disabilities, intellectual disabilities, and other neurodiverse conditions. Key aspects include:

1. Simple and Clear Layouts: Using straightforward and uncluttered designs to reduce cognitive load and help users focus on the content.
2. Consistent Navigation: Providing consistent and predictable navigation structures to help users understand and remember how to move through the content.
3. Multimodal Content Delivery: Using multiple methods to present information, such as text, images, audio, and video, to cater to different learning preferences and abilities.
4. Error Prevention and Correction: Designing forms and interactive elements to prevent errors and provide clear instructions and feedback for correcting mistakes.
5. Memory Aids: Including features like reminders, prompts, and visual aids to support users with memory difficulties.

Ensuring digital, linguistic, and cognitive accessibility involves a comprehensive approach to design and development that considers the diverse needs of all users. By implementing these accessibility practices, creators can make their content and technology more inclusive, benefiting a broader audience and fostering greater participation and engagement.

2.3. Talking Maps®' development methodology

Talking Maps® are both paper-based and digital, as shown in Figure 2.

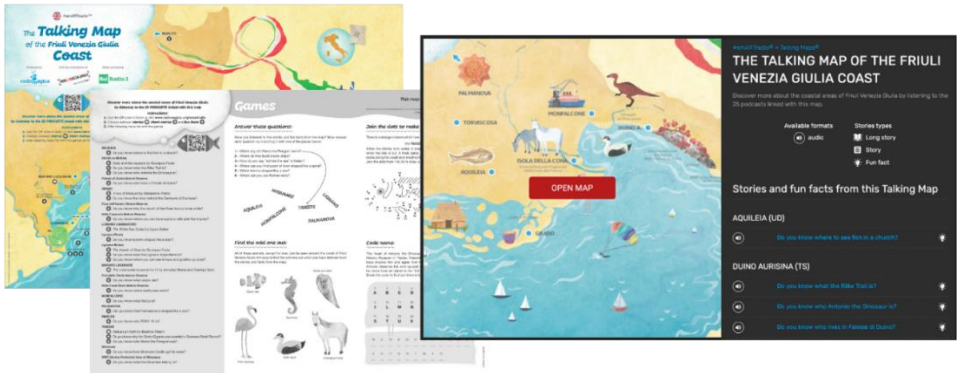

Figure 2
The front and the back of a paper-based Talking Maps® (left);
the same map in a digital format (right).

The front of the paper-based map represents the territory and its meaningful cultural objects through an artist's illustration. A QR code printed on the front, leads the user to a dedicated web page on the digital #smARTradio® platform containing the digital map and its multimodal contents. Each content corresponds to the cultural objects depicted in the illustration. On the back of the paper-based Talking Map® is a description of the project, its goals, partner institutions and sometimes children's puzzle games related to the cultural objects that trigger creativity and curiosity.

To apply the accessibility principles described above effectively, Radio Magica has developed a six-stage methodology, illustrated in Figure 3.

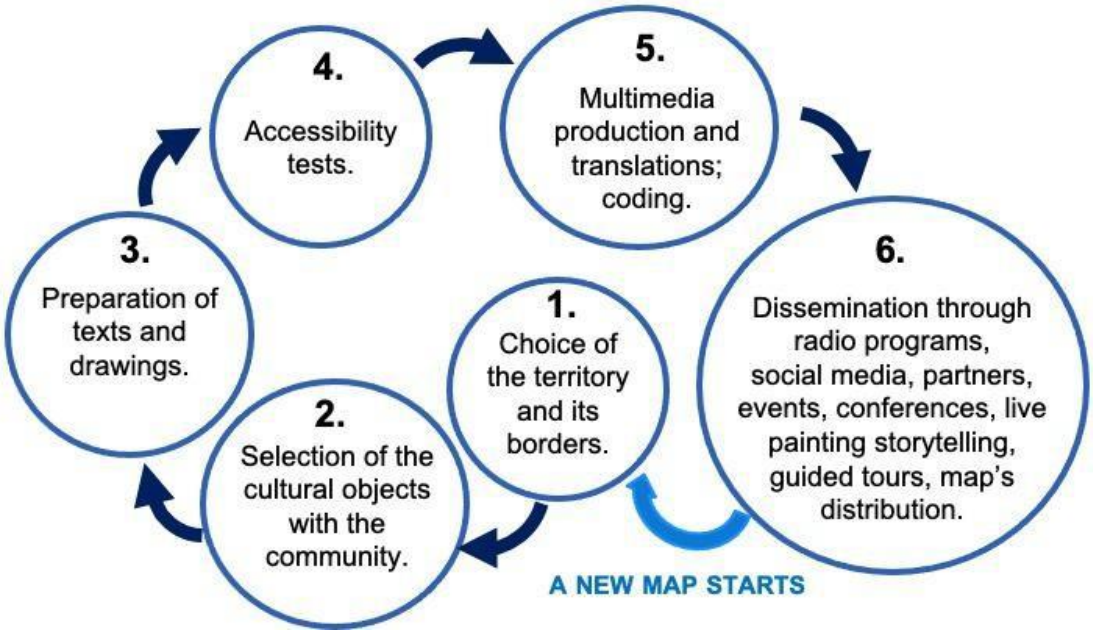

Figure 3
Talking Maps®' development methodology.

This methodology is carefully supervised by one of Radio Magica's scientific committees made up of three researchers, an editor and two to three experts of digital, linguistic and cognitive accessibility.

The first stage coincides with the selection of the territory and its borders. The territory can be a neighborhood or a town, a city or more extended regional area. Focusing on small territories allows Radio Magica to go deeper and tell the story of the objects in the area in greater detail.

The second stage is devoted to the selection of the objects to be depicted and narrated in the Talking Map®. Each map is conceived of as a "community map" (Rambaldi *et al.* 2006). This explains why the second stage is particularly relevant in triggering community participation and eliciting the unique sentiment of appropriation toward the local heritage, in accordance with the

Faro Convention's principles. Radio Magica employs both face to face interviews and online questionnaires to invite both experts and citizens of all ages, including families and children, to pinpoint the relevant cultural objects that should be presented on the map. The community may select up to three objects such as specific artwork, parks, characters, cultural sites, monuments and legends. The scientific committee collects the community's preferences and selects the most voted and most relevant objects in the territory that will be described on the map.

Production starts in the third stage. The scientific committee entrusts a group of writers with the drafting of the texts. Texts can be short stories (about 2300 characters) or fun-facts (about 600 characters) and authors are given guidelines for linguistic accessibility (Rocco *et al.* 2018; De Appolonia *et al.* 2021). For each selected object, there is at least one story or fun-fact. Some objects in the territory, e.g. a museum or a cathedral, may also generate several stories and fun-facts. At the same time, a renowned illustrator or artist prepares the map's draft, following the scientific committee's instructions for optimizing cognitive and linguistic accessibility. The Talking Map® is evocative of the past and hence may represent symbolic or historically important objects that can no longer be seen in the territory. Similarly, historical or legendary characters may appear on the map and be described by a story or a fun-fact.

Once the texts and materials are ready, the committee begins the painstaking work of testing (Stage Four). The aim is to find a balance between a text's or an illustration's appeal and its accessibility to audiences with special needs. To optimize accessibility, artists and the committee work side by side, conducting tests on sample users and employing indices for measuring linguistic complexity, such as the Gulpease index (Benjamin 2012; Vajjala 2014; Venturis 2022). The latter allows the committee to rapidly identify complex sentences or words. The application of guidelines for linguistic accessibility (Rocco *et al.* 2018; De Appolonia *et al.* 2021) promotes a narrative faithful to the principles of universal design for learning, thus ensuring equal access to content. Even though Talking Maps® do not aspire to being a "comprehensive encyclopedia", heritage scholars ensure the texts' and drawings' correctness and scientific rigor. Talking Maps® utilizes multimodality for improving accessibility. According to the "dual coding" theory (Clark, Paivio 1991), verbal and visual messages are processed by the human brain in a distinct but mutually reinforcing manner, making it easier and faster to grasp a concept through both supports (visual and verbal). Hence, more complex texts are supported by videos based on a storyboard divided into scenes. Each scene supports the storytelling with drawings and subtitles.

The fifth stage is dedicated to the multimodal production and digital implementation of the map: audio and video makers, sound engineers,

musicians, illustrators, actors and actresses, sign language experts, web accessibility and software engineers collaborate with the scientific committee to produce and publish audio and video contents. All stories and fun-facts are available in audio and downloadable text printed in easy-to-read fonts. These formats support accessibility for users who cannot read (e.g. the visually impaired), or have reading difficulties (people with dyslexia or cognitive impairments). Based on budget constraints, contents are made available in video format as well. Artists study the storyboard and prepare drawings with different techniques (watercolor, black ink) working side by side with the videomakers. When videos include Italian Sign Language (LIS), the LIS expert becomes part of the video, and interacts with the animations. The goal is to create a product for deaf people and, at the same time, contribute to a culture of inclusion through videos appealing to everyone. Typically, videos using sign language are for deaf people and are thus produced with no audio as they generally circulate within the deaf community. Multimodality and simultaneous use of video, LIS and audio overcome useless barriers among different linguistic communities, promoting cohesion and identity building. This stage also includes a translation of some content into English, German, and Slovenian for tourists and international users.

Figure 4 depicts a second digital Talking Map®, while Figure 5 shows the graphical layout of a cultural object described in it (the legend of St. Martin's Cloak).

Figure 4
The Talking Map® of Saint Martin in Veneto (front page).

Figure 5:
Graphical layout with details of the digital Talking Map®.

The final stage is dissemination. Talking Maps® are multipurpose: they are designed to be used at home, at school, in museums, while preparing a trip with the family or after a visit, to learn more about a territory. According to the specific purpose, dissemination of each map leverages a combination of channels. Once printed and published on the digital platform, Talking Maps® are launched with a press conference and promoted through Radio Magica's social media (Facebook, Instagram, YouTube). Partners contribute to the dissemination online and offline. For instance, local radio stations broadcast the audio contents and regularly invite members of the scientific committee and authors to present the new maps or their upgrades when Talking Maps® are enriched with new content. Printed maps are sent to schools when teachers make a request, often before a visit. In some sites, like Aquileia, the success of a Talking Map® gave rise to guided tours for schools and families managed by Radio Magica. Also, tourist offices and museums support their dissemination, displaying the maps and showing their videos to visitors. International partners, such as the Dante Alighieri Society and the "Ente Friuli nel Mondo", have brought the project to a wider audience. Another important channel of dissemination is the performance called "live painting storytelling", organized in theaters and museums, as well as in local festivals. with a heritage scholar acting as an anchorman on stage, plus several artists: one or more actors, musicians and an illustrator. While the actors read a story or a fun fact accompanied by music, the illustrator sitting nearby quickly draws the objects and a projector displays it on a big screen. The anchorman

presents each story or fun-fact offering a brief explanation about the cultural objects that are the event's protagonists. On some occasions, the event involves on-stage students– for instance, as readers or musicians. They might even be the same students involved in the selection of the cultural objects (Stage two). The goal is to elicit community participation and turn young people into ambassadors for their cultural heritage.

In 2023, Radio Magica started to involve young adults with cognitive disabilities as on-stage readers. This step follows the guidelines settled by the Convention on the Rights of Persons with Disabilities (CRPD), adopted in 2006 by the United Nations. Among the key points that the United Nations have established regarding the involvement in culture of people with disabilities are: the need for accessible formats to allow persons with disabilities to take part on an equal footing with others in cultural life and opportunities for developing and utilizing creative, artistic, and intellectual potential. This means the right of individuals with disabilities to develop and utilize their creative, artistic, and intellectual potential, not only for their own benefit but also for the enrichment of society. By promoting the active involvement of those with disabilities in cultural life, the United Nations aims to foster an inclusive society that values and benefits from the diverse contributions of all its members.

Another valuable channel of dissemination for the Talking Maps® are the theatrical guided tours mentioned above, both for children or teenagers and adults. During the tour, an official guide presents the territory and its heritage. Along the path, one or multiple historical characters dressed in period clothes appear in sequence and engage visitors in storytelling experiences using and expanding the map's contents.

The sixth stage typically marks the beginning of a new Talking Map®, as a proof of the success of the participatory approach associated with the project's accessibility goals. The final result is a multisensory and multidimensional experience that involves listening, watching, touching, sometimes even smelling and tasting the cultural heritage, in the spirit of the principles of universal design for learning.

2.4. Talking Maps®: lessons learned

In recent years, there has been an exponential growth in on-demand audio content supporting the dissemination of cultural heritage. Besides radio programs, podcast platforms now offer a wide variety of narratives dedicated to art and museums. Storytelling is a great ally for cultural dissemination.

The challenge raised by the Talking Maps® relates to ensuring that this cultural dissemination is comprehensible and engaging for everyone. It is a

very ambitious goal because the barriers involved are numerous and subtle: they can be related to age (children and the elderly are users usually in need of accompaniment), to physical or cognitive disabilities or both, to the lack of a cultural background that is vital for the narration to arouse interest. Lack of background may arise with users characterized by weak cultural preparation or foreigners coming from other cultures; for the latter, accessible storytelling must consider the need to create forms of mediation, where no historical or cultural reference is taken for granted.

A valuable support, in this respect, comes from the language of tourism. The discipline works on tourist discourse from the perspective of translation. However, the heuristics for successful transcultural communication can also be applied to intra-cultural communication. This happens especially when the recipient requires mediation (s/he is a child or s/he has a low scholastic level, or s/he has physical or cognitive impairments). In these situations, the language of tourism has become an ally for accessible writing in that it sheds light on the invisible barriers of communication (Calvi 2000; Agorni 2016).

Over five years (2018-2023), the project has allowed us to experiment with various solutions for accessibility and learn lessons from the field. First of all, it is important to employ different strategies to conduct accessibility tests (Stage 4, Figure 3). Linguistic studies offer readability indices of the text that allow its linguistic complexity to be measured. The Gulpease index, for example, is calibrated to the Italian language and allows relating a text to the user's educational level (elementary, middle, or high school). It considers two linguistic variables: the length of the word and the length of the sentence in relation to the number of letters. Tools like these have undeniable value in identifying critical elements and consequently favoring accessibility, but they are not sufficient. Experience with Talking Maps® has demonstrated the importance of submitting text that is read out to people with disabilities or difficulties and, through their feedback, introducing adjustments that, while maintaining the charm of the story, make the content presentation simpler. The two stages must be applied both to text and drawings (cover image of the story, storyboard drawings that will later be animated in videos) to meet the needs of people with vision difficulties, low vision, or blindness.

As the "dual coding" theory cited earlier also highlights, using multimodality enhances understanding where it is entrusted to multiple channels, both auditory and visual, because the human brain creates relationships between channels that make learning more intuitive. Moreover, multimodality raises end users' interests and curiosity.

The second lesson learned during this project concerns the dissemination strategies of the Talking Map® as a product. End users, especially very vulnerable ones, must be involved in the dissemination process to leverage their emotional experience and enforce their inclusion. Indeed, a well-written

narrative is no guarantee of accessibility and inclusion. The narrative must be accompanied by cultural mediation, which can take different forms; the theatrical guided tours, conducted both online (during the Covid-19 pandemic) and in person, organized for three age groups (children, teenagers, and adults) have so far been one of the most appreciated dissemination strategies. Each theatrical visit involves groups that are accompanied to discover a territory with the cultural mediation of a tour guide and one or more actors or actresses playing the characters presented in the Talking Map®. The dialogic game between the guide and the actor extends to the spectators, even those who visibly show reticence, to make the visiting experience pleasant, engaging and accessible for everyone.

Similar success is shown by storytelling performances in theaters or museums, with live painting, during which the Talking Map® is presented and the stories are read by professional actors accompanied by live illustrations and music (Stage 6, Figure 3). One strength of these performances is bringing children, teenagers, and people with disabilities on stage as readers. Users who usually belong to these fragile categories assume a new role and become ambassadors for their territory's cultural heritage. The benefits are manifold, both in terms of the appropriation process, because fragile users are upon called to engage in a learning process with an active role in a significant project, and in terms of inclusion. Placing the fragile user center-stage (literally as well as metaphorically) while reducing the distance between them and cultural heritage also changes and reduces the distances between people, between strong and weak users: people typically classified as "fragile" are entrusted with the task of narrating for a "strong" audience. Cultural heritage thus becomes a source of cultural renewal that eliminates barriers and prejudices and gives everyone the right to take part in the "community of heritage" envisaged by the much-cited Faro International Convention (Council of Europe 2005). The utopia of creating storytelling truly for all, capable of activating a participatory and inclusive enhancement process, becomes a possibility with the Talking Maps®.

3. Conclusions

This paper attempts to broaden the discussion on accessibility to cultural heritage by experimenting with Talking Maps®' inclusive storytelling. There is a dual goal: increasing accessibility to content and inviting more fragile people as the ambassadors for their territories. Involvement starts from the beginning, as Talking Maps® are conceived as a community map with a

bottom-up participatory approach, in keeping with the principles of the Faro Convention.

The mission of Radio Magica Foundation is to take concrete steps to ensure inclusive and equitable quality education and to promote lifelong learning opportunities for all. In this respect, the Talking Maps® project leverages traditional storytelling and digital technologies to establish new frontiers in the promotion of cultural heritage.

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