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Cultural heritage and storytelling:
didactic applications in Trieste with ESRI Story Maps

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Abstract

New mapping technologies available in the cloud computing era are the current challenge for a narrative geography of cultural heritage. The concept of digital storytelling has become reality due to existing webGIS applications. Using available web templates (such as ESRI Story Maps), users can mix narrative text, multimedia content (photos, video, etc.) and interactive web maps without strong GIS or web development skills. Therefore, they are also powerful tools in teaching and learning geography. This paper presents the main results of a didactic experience at the Department of Humanities, University of Trieste (Italy). As a part of this activity, students were given a theoretical framework of the role played by geographical narration to promote cultural heritage. They also had practical experience on GIS and webGIS (namely on ESRI Story Map). Using these skills, students autonomously created different examples of territorial storytelling. For this paper, two storymaps were chosen: the first focuses on the geographical features, legendary and urban impacts of the Bora wind (storymap available at: https://arcg.is/14bDSz); the second is about the troubled history of a fascinating vehicle, the "Tram of Opicina" (storymap available at: https://arcg.is/0DHbje), a tramway line built at the beginning of the last century that connects the town of Trieste and the village of Opicina.

1. Introduction

In Italy, the need to collect and organize data on cultural heritage has been evident since the days of the "Editto Pacca" (1820) in the pre-unification period. This is still a priority today, as evidenced by the creation of the "DB unico" (a project about a unified database on this issue, started in the early 2010s), which is one of the main objectives of the current Ministry of Cultural Heritage and Activities and Tourism (Mangano, 2018). In fact, the cataloguing and mapping of cultural heritage are very complex activities that need a well-defined procedure to avoid becoming chaotic. For these reasons, geodatabases and Geographical Information Systems (GIS) applications could represent a procedure to classify, map and promote cultural

heritage (Favretto, 2007).

Since the latter part of the 20th century, GIS has deeply changed the methodological approach to the study of several geographical issues at a global scale (e.g. global warming and its consequences) or at a local scale (e.g. monitoring urban growth of a town). However, since the early 2000s the new challenges of GIS consist of managing complex spatial data with geodatabases and web mapping using webGIS applications. Nowadays, there is a great interest in these two GIS topics. PostGIS, PostgreSQL, SpatiaLite are some examples of free and open-source relational database management systems (RDBMS), supporting geographical objects (i.e. points, lines, polygons, etc.) in a geometric space. They are frequently embedded and employable in many GIS applications such as QGIS or ArcGIS. On the other side, ArcGIS Server, QGIS Server, Map Server, OpenLayers or Leaflet are some good examples of WebGIS software (or open-source libraries) for building web-mapping applications. Nowadays these applications are very common on the web as they are useful for several purposes such as providing information about local transport systems or publishing the results of a research project or promoting sustainable tourism in remote regions, etc.

Telling stories through maps is nothing new: as highlighted by Kersky (2015, p. 16), maps "provide a large amount of detail in a small amount of space" and their storytelling "began with describing explored lands in detail against *terra incognita*". However, current webGIS present somewhat of a revolution in cartography: through this tool we can include a lot of information on the map, so we can recover the plural meaning of the territory (Casti, 2018). Besides that, everyone can have access to georeferenced data using a smartphone or computer. In this sense, the webGIS of the cultural heritage risk in Italy[1] may be a good example for people working in this area of research. However, it is also important to

underline the limits of these systems, such as the positioning accuracy, the reference system and cartographic symbolism errors (Favretto, 2017).

In this context, the global market leader in GIS, namely the Environmental System Research Institute (ESRI), offers a good opportunity to introduce humanities students to this specific field of research. ESRI Story Maps is a specific product of web mapping applications working within the ArcGIS online platform. It combines different web templates with narrative text and multimedia content (photos, video, and audio capabilities), so that users can easily create interactive web maps without GIS or web development skills.

In this paper, we will briefly present the main results of a didactic experience at the Department of Humanities, University of Trieste (Italy). We have considered two icons of Trieste: the Bora wind and the Tram of Opicina. The Bora is a strong northeastern wind, blowing mainly in winter in the northeast of Italy. The wind originates from the peculiar geographic location of Trieste, which lies between the warmer Adriatic Sea and the continental region behind. The second icon is a tramway line connecting the town of Trieste and the karstic village of Opicina. For more than one hundred years, this important engineering masterpiece, dating back to the Habsburg era, has had a troubled history with several problems. This has increased local people's affection towards it. They consider it almost as a familiar element of their lived space. For these reasons, both the Bora and the Tram of Opicina could, on a basic level, be considered intangible and tangible examples of the cultural heritage of Trieste.

This paper is structured as follows: without being exhaustive, in Section 2 we present the theoretical framework about geographical education, storytelling and cultural heritage; Section 3 presents the educational context and the main didactic aims of this activity; Section 4 concerns the storymap of the Bora wind, whilst in Section 5 we map and describe the history of the tram of Opicina. Finally, Section 6 contains some final remarks about new opportunities of webGIS, such as ESRI Story Maps for the promotion of our cultural heritage.

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[1] This map is available at the following link: http://www.cartadelrischio.beniculturali.it/ (source: Istituto Centrale per il Restauro, Direzione Generale Sicurezza del Patrimonio Culturale).

2. The theoretical framework: a short overview

Narration is deeply rooted in the human experience and it is also able to promote our cultural sensitivity (Ragone, 2007). Storytelling is the oral art of "communicating through stories" (Fontana, 2013) in order to engage a live audience. However, it could even be considered as an active component of reality (Baricco, 2018) according to the *narrative linguistic turn* perspective. Nowadays, narratives of the development of territorial events, territorial disputes, identification, and analysis of spatial forms represent new interesting fields of geographical research (Maggioli, 2015).

The narrative of local cultural heritage – as it is for the territory – means a significant revision of collective memory to reprocess the community identity in a new *sense of place* (Andreotti, 2014). Storytellers work on the imaginary, namely the shared stories of a people, to preserve and at the same time promote its cultural heritage (Ragone, 2007). Hagget (2004, p. 230) underlines how the "character of a region" can inspire an author in writing regional studies. This could lead to a greater public interest for this region, resulting in a renewed collective imagination about it. This may add new elements to the "character of the region", then becoming a cycle. Similarly, the relationship between imagination, collective memory, identity and cultural heritage also proceeds in a cyclical way with positive (or negative) feedback (Figure 1). Therefore, by working on the imaginary, storytelling could become a powerful tool to promote the knowledge of our cultural heritage.

New methods to create place narratives or to promote local bottom-up narratives, such as *Placetelling* (Pollice et al., 2020), have a strategic role in defining the identity of a region to drive its promotional processes in tourism. In this sense, *Information and Communications Technology* (ICT) also plays a key role: the development of a free App, for instance, supports a new form of tourism, namely *smart tourism*. The worldwide diffusion of ICT can result in a reduction of negative externalities of mass tourism, promoting sustainability and respect for places, local communities and their identity (Ronza and Scherbi, 2018).
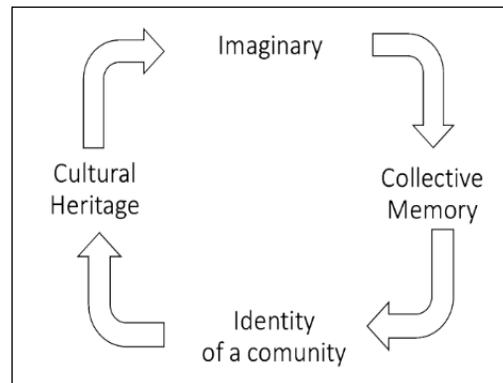

Figure 1. The circular relationship between some relevant subjects of the community territorialization process. Source: elaboration of Mauro.

Moreover, the current digital storytelling has become "a fashionable way to represent narratives through new media" (Kirkby et al., 2014). Implemented through ICT tools, it strengthens and transforms tourism communication management. Using the narrative attraction and the huge variety of codes and formats of new media such as detailed descriptions, old pictures, short videos, special noises, etc., we can use "the emotional customer involvement as the most truthful and credible testimonial" for tourism storytelling (Bassano et al., 2019, p. 18).

On the other hand, storytelling can also be considered as one of the oldest forms of education (Marta and Osso, 2015). Nowadays, webGIS can be considered as new tools which could facilitate geography learning; by using GIS, students are increasingly active and motivated in the study of spatial phenomena (De Vecchis et al., 2020). If the use of GIS applications is useful to provide practice for theory and to create a community of geographers who work using this technology (Pesaresi, 2019), web mapping related activities could also be considered as an effective teaching and learning tool. As highlighted by Strachan and Mitchell (2014, p. 214), they "have the potential to play a large role in encouraging spatial thinking skills and geographic knowledge". While learning geography, students sometimes prefer web-mapping applications, such as ESRI Story Maps, rather than traditional devices (traditional paper atlas, for instance) because they are high-quality digital products, user-friendly and strongly interactive (Berendsen et

al., 2018). However, there are also some crucial issues such as increased distraction (mainly due to the ability to zoom in anywhere in the world or near their "home") or students' uncertain responses about their perception of the storymaps and, overall, geographical issues. Despite this, due to the relevance of web mapping technology for society, there are several job opportunities for careers in the government, nonprofit organizations, academia, private industry, etc. (Kersky, 2013). As already pointed out, ESRI Story Maps is a fairly simple web-mapping platform to introduce students to these topics, so that several examples of Story Maps applications in geography teaching are already available (i.e. Marta and Osso, 2015; Zamperlin and Azzari, 2017).

3. Educational context

The two projects were carried out as a part of a teaching activity in the field of Geography for a Master's degree at the Department of Humanities (University of Trieste)[2]. The main aim of this class is to establish a connection between placetelling and cultural heritage, to recognize that cultural heritage can play an important role for the community identity and for the economic prosperity of a region, thanks to the tourism sector. Using these devices, students can truly understand that cultural goods – no matter if monumental, artistic, archeological or identity-related (Ruocco, 1979) – are not detached from the area where they are located. In fact, they can be considered as real evidence of the local community's background, which is often still able to evoke strong emotions. This is how, through narration, cultural heritage is recognized, firstly by the hosting community and successively by potential outsiders, such as tourists.

In order to achieve this goal and actively involve the (second-year master's) students, there were several classes covering theoretical topics. Successively, it was chosen to use the ESRI Story Map platform. Throughout the creation of a story, students would learn more about different territory-related aspects. This means, for example, an accurate analysis of the existing bibliography about a particular subject; using geographical tools (such as GIS, GPS and cartography) for detailed field-surveying; a better insight into placetelling. Students can also understand which innovative tools are now available to describe and promote a territory and its cultural heritage.

Therefore, from the very beginning of the teaching activity, a roadmap was defined with the students, who were expected to suggest their case studies. Since the students were fairly small in number[3], they could choose to work alone or in pairs. The theoretical topics included the geographical declination of storytelling and the structure of a story, referring to the classical narrative scheme[4]. Key elements of a story were examined to understand how to keep the reader's attention, e.g., starting with a bang, adding a hero, keeping the tension high, good pacing, a call for action etc. To convert the theory into real placetelling, students were also introduced to more practical topics. They learned how to make short videos for their stories and to create base cartography and thematic maps on GIS (reference software: QuantumGIS) and to use them on ESRI Story Maps platform. Students were supervised every step of the way and taught how to collect cartographical data from official sources (for example, Friuli Venezia Giulia regional webGIS) and open-access databases, such as OpenStreetMap. Using these sources as a starting point, they subsequently created the maps they needed to develop their own stories on GIS. Maps were imported and thematized in an ESRI Story Map cloud environment.

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[2] Specifically, the course was taught for the graduate program in "Foreign Languages, Literatures, and Cultural Tourism".

[3] The small number of students is due to the fact that the course was an optional class in a recently created graduate program.
[4] As a classic narrative scheme we consider the tale's sequence: initial situation, problem, action, solution (Fontana, 2013).

After choosing the most suitable template[5] for their story, students managed all the textual and iconographical data they collected from the bibliography or other sources (such as visiting a museum or shooting photographs on site) to achieve the geographical narration of a previously chosen topic.

Students showed great interest in this concrete and rather innovative approach to cultural heritage and placetelling and they mostly worked autonomously. Remote learning did not seem to attract their interest: despite all the pandemic-related difficulties, this year's projects were excellent. In this paper, we present two stories as an example of the main results achieved by the students at the end of each course. They are cases in point as they tell the story of two symbols of the environmental and cultural heritage of Trieste: Bora wind and Opicina tramway. In the stories great attention is paid not only to the geographical and historical aspects, but also to local perception.

4. The Bora wind storymap

Trieste is a city in northeastern Italy, counting 205,000 inhabitants, on the homonymous Gulf. The city is surrounded by the Karst, a calcareous plateau located about 300 meters above sea level, on the border with Slovenia. Trieste is the main city of its region, Friuli Venezia Giulia.

Telling a story about this city without mentioning the Bora wind would be quite impossible: the relationship between the Bora and Trieste is indissoluble. Bora is a north eastern wind which originates from a high pressure divide between the continental area, lying behind Trieste, and the coast. This wind usually blows in winter, on the eastern Adriatic coast, especially in the North. Due to physical features (air is drier and denser than on the sea; Stravisi, 1977) and Trieste's orography, Bora is defined as "katabatic": this downslope wind which picks up speed while blowing from the upper Karst to Trieste. Therefore, in open spaces in the city (such as squares or piers), Bora's gusts usually blow for about a week at a speed above 100 Km/h (but they can exceed the speed of 180 Km/h as, for instance, in February 2012).

This North-Northeastern wind, "which rushes into the amphitheater on which Trieste rises from the icy and barren karst plateau, with sudden and violent gusts" (Berlam, 1947, p. 110), often adversely affects the inexperienced tourist, who is nevertheless expecting this pleasant encounter when he or she goes to Trieste. When the Bora blows in winter, the TV news always shows images of Trieste being swept by this wind, which makes the Bora particularly popular at a national level. People struggling to walk, broken umbrellas, garbage bins in the middle of the street are the ritual images of the effects of the Bora in the city. Some specific events have increased its popularity. In March 2011 a huge floating bridge called *Ursus* (an artifact of industrial archaeology) was pushed offshore by the Bora at over 170 km/h [6].

Moreover, several hints of this strong wind can be found wandering through the city, such as railings running along some uphill streets; streets and venues named after the Bora and typical windows (bulging or double-leaf windows, opening to the outside; Belci, 2003). In some very windy places, trees only have leaves on one side and in the local dialect the word "imboreza", literally "having Bora inside", means that someone is hot and bothered.

With mixed feelings, several writers and poets living in this city wrote about the Bora wind: while the French writer Stendhal or Ivo Andric hate this wind, Fulvio Tomizza or Paolo Rumiz love it (Nacci, 2019).

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[5] The cloud of ESRI Story Maps provides multiple templates (Story Map Tour, Story Map Journal, Story Map Cascade, etc.). For further details: "Moving on ArcGIS Story Map" (https://storymaps.arcgis.com/stories/472a6ddd582b40b58a5a6af2c30a4573).

[6] https://www.ansa.it/mare/notizie/rubriche/uominiemare/2011/03/03/visualizza_new.html_1560882561.html.

Figure 2. Interactive map of the Bora's journey. Readers can discover more about the Bora's four main jets (from north to south: Trieste, Senj, Sibenik and Makarska jet) between Trieste and the Dalmatian coast. The dimension of each jet is directly proportional to its power.
Source: elaboration of Soliani (https://arcg.is/14bDSz).
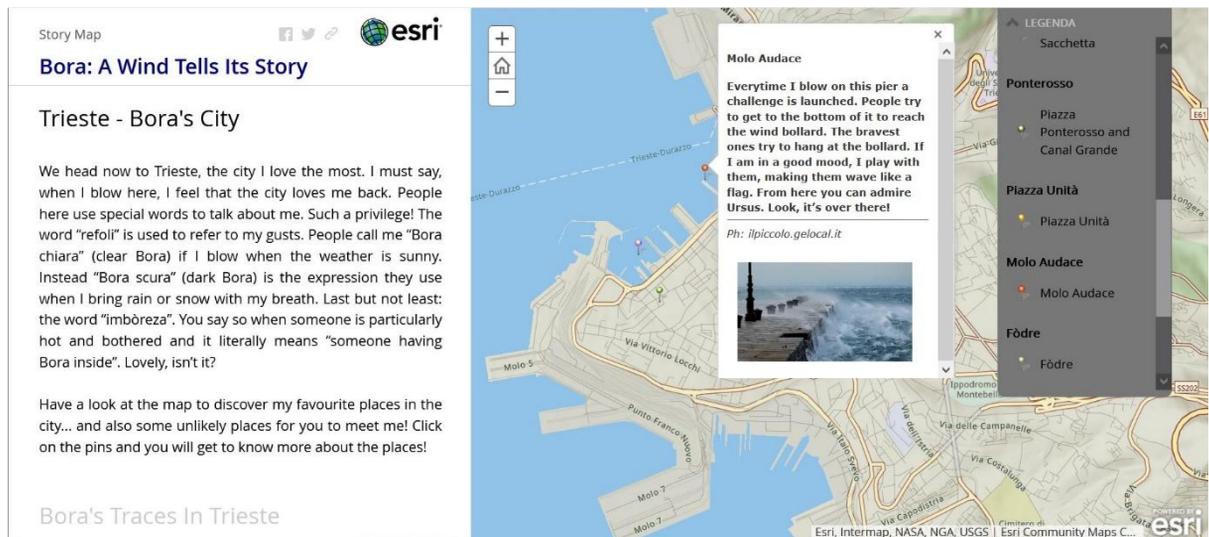
Figure 3. Interactive map of the places in Trieste where the Bora wind is particularly strong. Readers can have information about each. For example, about Molo Audace (a harbor pier in the city center, in front of Piazza Unità). Source: elaboration of Soliani (https://arcg.is/14bDSz).

However, the poem about the Bora[7] by Umberto Saba, a famous poet born in Trieste, is probably the one which does complete justice to the controversial relationship between this wind and Trieste. In fact, as highlighted also by Rumiz[8], Saba hated the Bora when it was "clear" and blew in good weather and loved it when it was "dark", on rainy and stormy days.

In today's media culture, imagination is driven by the efficacy of sign systems and has become the central switch point for the construction of socially unifying images and collective stereotypes. The product of this process is called "cultural imaginary" and the organization of "imaginary energies" is possible thanks to a "collective imaginary" (Beller and Leerssen, 2007, p. 346). The Bora wind representations in the media and in literature fostered the creation of an imaginary around Trieste and how the local population can live with this wind on a daily basis. Our Bora storymap aims at answering these questions (at least partially) by telling some stories about this wind and by mapping some symbolic places into the town.

The first step towards our project was data collection: local newspapers, books about Trieste's history and geography, websites (such as meteorological and touristic websites[9]) were all crucial to get an idea of the imaginary around the relationship between Trieste and the Bora wind. Another valuable source was a museum in Trieste which focuses on this peculiar wind, called *Boramuseum,* a "laboratory museum", rich in interesting hints and stories related to the Bora (Lombardi, 2010).

Before configuring our webGIS, we created several maps using Quantum GIS software to implement maps in the story. As a cartographic reference we used online basemaps (OpenStreetMaps, ESRI, etc.) or different vector layers from technical regional digital maps (available on the Friuli Venezia Giulia regional website). We saved these maps in the shapefile format to import them in the ESRI Story Map platform.

In our storymap (available at: https://arcg.is/14bDSz), the fictional narrator is a "real insider" of this region. In other words, the protagonist of our story is the Bora wind itself. Therefore, we entitled our storymap "Bora: A Wind Tells its Story". Speaking in English for a wider audience, Bora addresses the readers – the "strangers" – throughout the several steps of the storymap with a very informal and friendly language[10]. Our protagonist suggests the "stranger" follow it in its journey or check out information about Trieste. To catch the attention of our readers, we start with a short video of Trieste's waterfront on a Bora day.

In the first section, we focus on the Bora's geographical nature: this is a katabatic wind which is characterized by a very irregular pattern, blowing in "gusts" ("refoli" in Italian; Stravisi, 1977). Thanks to several fast inputs combining photographs, videos, music, text, external links, and interactive webmaps it is possible to convey the sense of this feature of the Bora wind. For example, the first interactive webmap (Figure 2) shows the Bora's journey from the Dinaric Alps to the Adriatic Sea. Bora winds show a jet-like structure and jets follow the pattern of gaps and peaks shaping the Dinaric Alps, called "doors" (Hénin, 2015, p. 17). Bora suggests the reader to click on the map to have access to popup contents. The points indicate cities where the Bora blows, while the size of arrows roughly indicates different jet intensities.

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[7] We refer to the poem by Umberto Saba (in Italian): "Conosco la Bora,/chiara e scura,/la detesto quando scende fuori misura/con cielo sereno./Amo l'altra/che ha una buia violenza cattiva/Io devo recuperare la Bora/oppure qui affondare/nel mio paese natale/nella mia triste Trieste/nella mia Trieste triste/che amare è impossibile/e odiare anche".

[8] Rumiz, "Le mille leggende della Bora quel vento che ruba l'anima", 2002, https://ricerca.repubblica.it/repubblica/archivio/repubblica/2002/12/05/le-mille-leggende-della-Bora-quel-vento.html.

[9] All sources are available on the last page of the storymap, in the bibliography and web references section.

[10] We chose this style because the main target of our storymap are young tourists from all over the world, visiting the city of Trieste. This target is in line with the strategy chosen by regional authorities in organizing cultural events, which is based on the combination of internationalization and local traditions (RAFVG, 2020).

Suspense is a fundamental element of a story. Therefore, the strongest narrative moment is the following step of our storymap, a page telling the famous myth about the origin of the Bora as the daughter of Aeolus, the Greek god of the winds (MB, 2016-2018).

Repeating elements within a story can give a sense of rhythm: through two similar maps, the reader can find places or traces of the Bora in the city. On the first map, using MB (2016-2018) as our source, we map places where the wind is particularly strong or where it does not blow at all. By clicking on the different points of interest in the webmap, users can gather further information. In a popup content, they will be able to view textual metadata and related images (Figure 3). A map legend is available, preventing the reader from missing any point on the webmap. On the second map, scrolling down the text window, readers can find out information and images about several different places in Trieste where the Bora wind leaves its mark. For instance, the user can identify the typical architectural devices that ensure houses are better protected, trees having leaves only on one side, or railings running along some old uphill streets. Finally, after a short presentation of *Boramuseum*, the storymap ends with a traditional song from Trieste about this wind, which conveys the symbolic meaning of the Bora.

Without being exhaustive, our Bora storymap could be considered as a taste of this topic, which can be developed in a multitude of ways. Trieste is a city full of literature and its stories were told by many eminent voices. The main objective of this storymap is to provide the reader with a new, less heard voice: the Bora's voice, through its gusts. Further work could be done in the context of this project about polyphony. The Bora's voice could be easily combined with other voices, e.g., citizens', travellers', or experts' voices. The hope is that readers will consider visiting this city after checking out this project, to transform their on-map experience into a real-life experience.

Carrying out this project was very enriching. It allowed the students to learn brand new skills and discover more about Trieste, where students have generally already lived for some time.

5. The "Tram of Opicina" storymap

The so-called "Tram di Opicina" connects the main city of Trieste with the uphill village of Opicina. Its creation was due to Trieste's urban expansion during the second half of the XIXth century. After the development of the historical quarters of the city, the urban area grew following the hilly physical morphology of the land around the city centre, as happened to many other High Adriatic cities (Battisti, 1993). The tramway system was crucial for many of the neighborhoods – such as Scorcola and Cologna, which, despite being very close to the city center, were much higher than the rest of the town. The tramway was also extremely useful to reach one of the farthest neighborhoods: Opicina, a somehow independent rural village. It is at the moment the most important town of the Karst area (ca 8,000 inhabitants), and it still maintains the typical structure of small Karst villages[11].

This cog railway – turned into a funicular system in 1928 – was inaugurated in 1902 and was cutting-edge technology in the Habsburg Era. It became the pride of Trieste, which at the time was one of the most important harbors of the whole Empire. After decades, the tramway is still a symbol of Trieste's cultural and technological history, and its panoramic journey, from sea-level downtown to the Karst plateau at 343 meters above sea level, is one of the main tourist attractions of the city (Rasman, 2002).

Stories need a protagonist. The tram itself, the steep uphill railway and its little stations, set in the scenic context of a beautiful Adriatic gulf, are the perfect subjects for an experimental storytelling project based on interactive maps. Place-based storytelling can be essential – among others – in maintaining the memory, enhancing confidence and sense of belonging, sharing specific goals, presenting a specific area to tourists and visitors, providing interpretative patterns to localized cultural and social factors

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[11] Karst villages are small settlements with a wide mesh building fabric (empty spaces prevail on the land built upon), even if apparently they look thick and compact. This feeling is due to the high traditional walls employed to enclose the large private gardens of the inhabitants (Facchini, 2012).

(Jeannotte, 2016; Bassano et al., 2019). Therefore, the "Tram of Opicina" storymap tries to address the geographical, historical, cultural and technological aspects of the tramway through a multi-layered approach. Thus, the project is structured on multiple levels, from the fairy-tale story, narrated by the tram itself, to reconstructions of the tramway route in its different aspects – geographical setting, stations, funicular peculiarities, ... A specific set of maps, videos and pictures, enhanced by a 3D reconstruction of the tramway funicular system, complete the work.

To turn this idea into reality, the first step was to gather bibliography and online material about the topic. Once the historic, technological and geographical backgrounds were provided, we focused our research on old newspapers, books, and interviews with local people. Their perspective contributed to completing the overview on the issue, and also proves the current importance the tramway still has for Trieste.

In our storymap, the tram is the fictional narrator of its short but troubled "lifetime". Its story is full of twists and turns, which are able to provide a regular pace to our narrative and to grab the reader's attention. The choice of a humorous and personalized style aims at attracting the attention of younger people and still captivates adults. However, we also paid attention to the precision and thoroughness of the pieces of information we gave, providing the reader with new and original insights.

The storymap (available at https://arcg.is/0DHbje) begins with a short presentation of the tramway in order to "create a little world"[12] and appeal to the readers' empathy (Figure 4). For this purpose, we presented the day of the inauguration, September 10th 1902, and the first ride of the tramway through two original pictures. Then, a short video illustrates the attractiveness of this railway's scenic route. From the town to the uphill village, the tram passes through urban and rural landscapes, terraced areas and the woods surrounding the city, while the traveler's gaze wanders to the omnipresent Adriatic Sea (Mauro, 2015). The narration continues by mentioning the tragic historical events of the two World Wars, which deeply affected these border territories. The Opicina Tramway was a witness to these events, but also a direct protagonist, as a vehicle of casualties, so notorious that it was sabotaged. Some poems and songs, written by local artists to honor the Tram (i.e. Rasman. 2002), enrich our story. The use of these popular cultural expressions is an acknowledgment of how much the tramway shaped local culture.

The mid-section of the storymap regards the geographical and technological aspects of the subject: we developed three different web maps. In this way, the reader can get detailed pieces of information about this region and this particular vehicle. The first map highlights the route sections of the tram and provides pieces of information on each one (Figure 5). The second map shows the geographical setting of the tram stations (Figure 6). They are both interactive and enriched with pictures and specific details (i.e. length, elevation gain, distance between the different stations, …). The last map highlights the two kinds of technology employed by the tramway. The steepest part is characterized by a funicular system (Figure 7), while the rest is a cogwheel electric railway.

Maps have proven to be extremely useful to explain the peculiarities of this unique tramway. Besides offering a visual support to the story, they allow the user to georeference the railway and its different characteristics in a comprehensive way. For example, we chose to use three different base maps, in order to better highlight the physical geography of this area. In fact, in less than five kilometers, the tram gains an altitude of over 300 metres, so it may be important for the reader to timely know some variables such as elevation, orography and topography, proximity with the sea and with the urban area.

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[12] Caroll A., *Nine steps to great storytelling,* 2020. https://storymaps.arcgis.com/stories/429bc4eed5f145109e603c9711a33407.

Figure 4. Short presentation of the Tram of Opicina.
Source: elaboration of Battaini and Segantin (https://arcg.is/0DHbje).

Figure 5. Interactive map of the tram sections. In detail, the user can have information about number, length, average altitude, and technology. Source: elaboration of Battaini and Segantin (https://arcg.is/0DHbje).

Figure 6. Interactive map of the tram stations. In detail, the user can have information about the name, the number, the distance and the altitude of the station.
Source: elaboration of Battaini and Segantin (https://arcg.is/0DHbje).
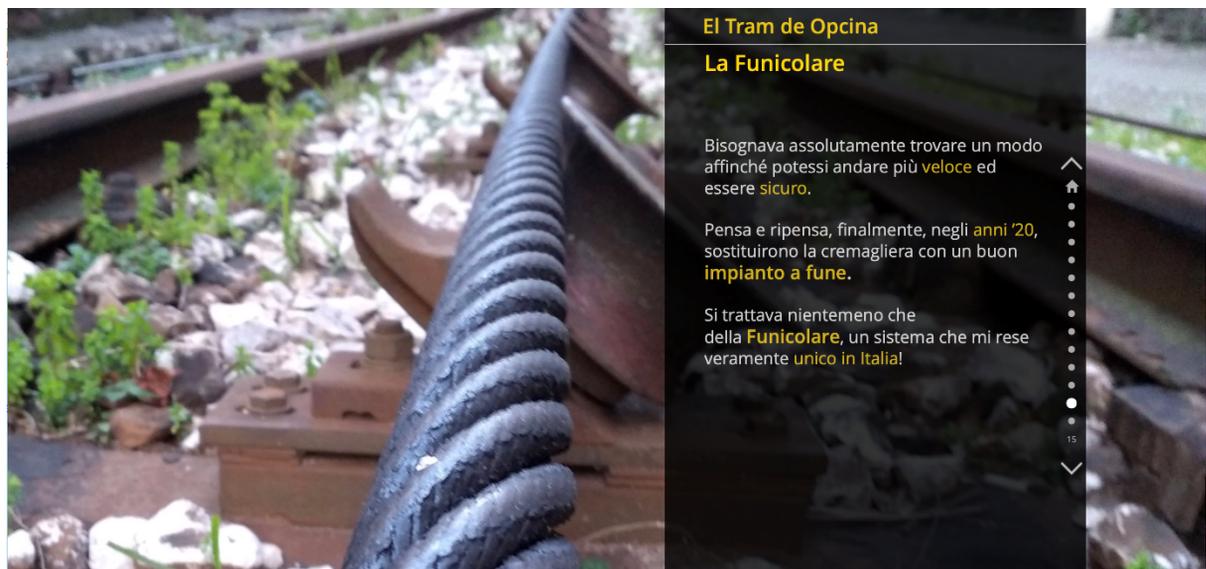
Figure 7. The funicular system. Source: elaboration of Battaini and Segantin (https://arcg.is/0DHbje).

Looking at this region at different scales or discovering new details by clicking on the desired icon are just some of the possibilities offered by interactive maps. This proves how "the interactive nature of storymaps moves significantly beyond other presentation software" and "allows one to display and interrogate a wide range of geographical information very easily" (Walshe, 2016).

As mentioned above, the short history of the Opicina Tramway has been quite turbulent: no later than one month after its inauguration there was the first accident. This was just the first in a long line of incidents. At the time, this event was also celebrated by a dialect song (still locally famous), making the tramway particularly popular in and around the city. Engineering problems were partially solved almost thirty years later by replacing a cog railway with a funicular. To explain the technological complexity of the tramway funicular section, we used a 3D reconstruction video which simulates the functioning of the tramway in all its components. This video facilitates the understanding of the connected written sections, clarifying the functioning of such a complex system. In addition, the video reproduces some of the sounds of the Opicina Tramway, making the simulation even more realistic.

In the last section of the storymap, we present some considerations on the current situation of the tramway. Unfortunately, the Tram of Opicina was closed in 2016, after an accident[13], and is still waiting to run again. The long debate on the reopening of the tramway is well testified by the chronicle of the local newspapers (of which an extract is reported in the storymap). In our storymap, this is dramatized by our fictional narrator. The tram explains the sense of abandonment felt by himself but, above all, by the people who care for their cultural and technological heritage. It is a sort of "call to action" with which the storymap ends, inspiring the audience to do something for a fast reopening of this symbol of Trieste.

Despite there being all the elements to build a story in the case of the Tramway of Opicina (the "hero", the history, the suspense, the rhythm, the "call to action"), it is not easy to put a story together. To make a good story you have to face several challenges: creating (or choosing) appropriate videos; collecting GPS traces in the field surveys; shooting effective photos; connecting geographical and technological elements through a flowing narration; creating exhilarating atmospheres and characters; making interesting interactive maps. Although it is a demanding task, it can also be considered as a moment of growth for us as students. WebGIS as well as digital storytelling can help to engage a local (or international) audience, but a deep understanding of geography, culture and history remains necessary to convey the *sense of place*.

6. Conclusions

Geography and narrative have always been connected (i.e. Maggioli and Morri, 2009) and in the last years the focus on this relationship has been renewed. Geographical storytelling, land-telling, place-telling are all fairly close declinations of a basic concept. Today, as, even more than in the past, geography can also be seen as the narrative of a place and its cultural heritage. However, new tools are now available: web mapping rapid development enables users to create, share and use georeferenced information through innovative applications, such as webGIS software (Haklay et al., 2008; Favretto, 2016). Therefore, even non-expert users can create web applications: the ESRI Story Map is a good example of this technology. It gives a new educational opportunity to geography students and it represents a real activity for training a new professional role of experts in cultural heritage and systems (Carbone, 2020).

The main results of this activity, carried out by a group of Master's students at the University of Trieste, showed the educational potential of this device. Students mostly appreciated the innovative approach to geographical narration for promoting the cultural heritage. The possibility to have free access to the ESRI Story

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[13] Barbacini C., "Panico sul Tram di Opicina", *Il Piccolo*, 17 agosto 2016, https://ilpiccolo.gelocal.it/trieste/cronaca/2016/08/17/news/panico-sul-tram-di-opicina-9-feriti-nello-scontro-frontale-1.13972540.

Maps base functionalities[14] is surely an important opportunity for both professors and students. Professors can prepare an effective course and students can try out new ways of communication, based on textual or visual data and interactive digital cartography. In particular, professors can show their students what is meant by territorial storytelling in promoting cultural heritage, both in theoretical and practical terms. The quality of the storymaps created by the students is generally high and represents a meaningful assessment of the proposed educational activity.

The next challenge, which goes far beyond the initial targets, is to spread and promote these projects. For this reason, it is important to take the opportunity given by ESRI Story Maps to have access to the products on different devices (PC, tablet, smartphone, etc.). Interesting strategies to ensure further visibility to the stories could be: translating the stories in several languages, linking the project to the reference institution (i.e. University of Trieste), gathering the main results, launching effective partnerships with local institutions (tourist offices, museums, etc.), promoting related activities of scientific communication.

The two case studies analyzed – Bora and the Opicina tram line – are cases in point of geographical storytelling. In these two storymaps, it is possible to find all the typical elements of a story: a protagonist, several situations with suspense, a call for action, and so on. In both cases, our protagonists (the Bora and the Opicina tram line) are the fictional narrators: in this imaginary way, we would like to introduce the readers to our "little world", using two well-known land marks (or "iconems"; Turri, 1998) of Trieste and its surrounds. In particular, in the Bora storymap we mainly emphasize geographical issues, while for the Opicina tram line we focus on the historical and technological issues. For students, this means a new way of learning geography by detailed geographic research, field surveys, gathering photos or videos, bibliographic research, etc. As a result, our students often improve their geographic knowledge about their case studies.

In addition to these interesting educational potentials, these new technologies allow maps to regain their "dual relationship with cultural heritage" (Scanu and Podda, 2016, p. 182). The first one is to geo-reference the object of study on the map to ensure its use not only by the local community, but also by tourists. The second is to describe a landscape in a captivating way in order to improve its attractiveness for outsiders and to underline the identity role of cultural heritage for insiders.

Acknowledgements

References

1. Andreotti G., "Rivelare il *GeniusLoci*", *Bollettino della Società Geografica Italiana*, XIII, VII, 2014, pp. 533-558.
2. Baricco A., *The game*, Turin, Giulio Einaudi Editore, 2018.
3. Bassano C., Barile S., Piciocchi P., Spohrer J.C., Iandolo F. and Fisk R., "Storytelling about places: Tourism marketing in the digital age", *Cities*, 87, 2019, pp. 10-20.
4. Battisti G., "Trieste e il suo porto. I modelli di riferimento di un'evoluzione urbana", in Cammarata M. (Ed.), *Panorama di Trieste attraverso vedute e piante della collezione Davia*, Trieste, La Mongolfiera, 1993, pp. 86-117.
5. Belci C., *Il libro della Bora*, Trieste, Lint Editoriale, 2003.
6. Beller M. and Leerssen J., *Imagology. The cultural construction and literary represent-tation of national characters*, Amsterdam, Editions Rodopi, 2007.

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[14] ESRI Story Maps license is free for non-commercial and non-governmental users. There are however multiple limitations in the free version of this software, for example in the use of some templates and of personalized base maps, and in the creation of tridimensional maps (https://doc.arcgis.com/it/arcgis-storymaps/reference/licensing.htm).

7. Berendsen M.E., Hamerlinck J.D. and Webster G.R., "Digital story mapping to advance educational atlas design and enable student engagement", *ISPRS International Journal of Geo-Information*, 7, 125, 2018.

8. Berlam A., "Il sapore di Trieste", *La Porta Orientale, Rivista Giuliana di Storia Politica e Arte*, 7-8-9, XVII, 1947, pp. 107-113.

9. Carbone L., "Il Digital Storytelling per la formazione di esperti di Beni e Sistemi Culturali", in Arcangioli C. and Sarto M.S. (Eds.), *Proceedings of I Convegno annuale*, (Rome, 30 settembre 2019), Rome, L'Erma di Bretschneider, 2020.

10. Casti E., *Cartografia Critica, dal Topos alla Chora*, Milan, Guerini e Associati, 2018.

11. De Vecchis G., Pasquinelli d'Allegra D. and Pesaresi C., *Didattica della Geografia*, Milan, UTET, 2020.

12. Facchini M., "Architetture di pietra nell'Altipiano carsico. Forme insediative e tecniche costruttive nell'edilizia storica", Ph.D. Thesis, Università degli Studi di Bologna, Bologna, 2012.

13. Favretto A., "Database relazionali e GIS per la gestione dei beni culturali ed ambientali", in Mautone M. and Ronza M. (Eds.), *Patrimonio culturale e paesaggio, Un approccio di filiera per la progettualità territoriale*, CNR – Dipartimento Patrimonio Culturale, Naples, Gangemi Editore, 2007, pp. 77-82.

14. Favretto A., *Cartografia nelle nuvole*, Bologna, Patron Editore, 2016.

15. Favretto A., "Tecnologia Webmapping per la diffusione della cartografia: alcune riflessioni", *Semestrale di Studi e Ricerche di Geografia*, XXIX, 1, 2017, pp. 77-85.

16. Fontana A., *Manuale di Storytelling: Raccontare con efficacia prodotti, marchi e identità d'impresa*, Segrate, Rizzoli Etas, 2013.

17. Hagget P., *Geografia umana. Una scienza di sintesi*, Bologna, Zanichelli, 2004

18. Haklay M., Singleton A. and Parker C., "Web Mapping 2.0: the Neogeography of the GeoWeb", *Geography Compass*, 2/6, 2008, pp. 2011-2039.

19. Hénin R., "Dynamics of Bora wind over the Adriatic Sea: atmospheric water balance and role of air-sea fluxes and orography", Master Thesis, Università di Bologna, 2015.

20. Jeannotte M.S., "Story-telling about place: Engaging citizens in cultural mapping", *City, Culture and Society*, 7, 1, 2016, pp. 35-41.

21. Kerski J.J., "Understanding our changing world through web-mapping based investigations", *J-READING (Journal of Research and Didactics in Geography)*, 2, 2, 2013, pp. 11-26.

22. Kerski J.J., "Geo-awareness, geo-enablement, geotechnologies, citizen science, and story-telling: Geographyon the world stage", *Geography Compass*, 9, 1, 2015, pp. 14-26.

23. Kirby J., Faulkner J. and Perrin J., "'Once there was a…': Reclaiming storytelling in the middle years", *Literacy Learning: The Middle Years*, 22, 2, 2014, pp. i-x.

24. Lombardi R., *LaBORAtorio.Alla scoperta del vento di Trieste*, Trieste, Editoriale Scienza, 2010.

25. Maggioli M., "Dentro lo *Spatial Turn*: luogo e località, spazio e territorio", *Semestrale di Studi e Ricerche di Geografia*, XXVII, 2, 2015, pp. 51-66.

26. Maggioli M. and Morri R., "Tra geografia e letteratura: realtà, finzione, territorio", *Quaderni del '900*, IX, 2009, pp. 53-70.

27. Mangano S., *I territori culturali in Italia: geografia e valorizzazione turistica*, Rome, Carrocci, 2018.

28. Marta M. and Osso P., "Story Maps at school: teaching and learning stories with maps", *J-READING (Journal of Research and Didactics in Geography)*, 2, 4, 2015, pp. 61-68.

29. Mauro G., "Paesaggi terrazzati in Costiera triestina tra problematiche di abbandono ed ipotesi di rivalutazione turistica", *Documenti Geografici*, 2, 2015, pp. 67-89.

30. Museo della Bora (MB), *I luoghi della Bora: una piccola guida per vivere l'unicità di Trieste e conoscerla attraverso il suo vento*, Trieste, Consorzio PromoTrieste (Discover Trieste, progetto Bora museum), 2016-2018.

31. Nacci L., *Trieste selvatica*, Bari, Edizioni Laterza, 2019.

32. Pesaresi C., "From Education to Job Opportunities. Defining Professional Profiles for Geographers with High Competences in GIS Environment", in Tambassi T. (Ed.), *The Philosophy of GIS. Springer Geography*, Cham, Springer, 2019, pp. 253-264.

33. Pollice F., Rinella A., Epifani F. and Miggiano P., "Placetelling® as a strategic tool for promoting niche tourism to islands: the case of Cape Verde", *Sustainability*, 12, 10, 4333, 2020.

34. Ragone G., "Storytelling, Immaginari, Heritage", Calabrese S. and Ragone G. (Eds.), *Transluoghi. Storytelling, beni culturali, turismo esperienziale*, Naples, Liguori Editore, 2007, pp. 41-60.

35. Rasman S., *Cent'Anni col Tram*, Trieste, MGS Press, 2002, pp. 30-58.

36. Regione Autonoma Friuli Venezia Giulia (RAFVG), *Le proposte culturali in Friuli-Venezia Giulia tra grandi eventi e tradizioni locali*, Trieste, 2020, https://www.regione.fvg.it/rafvg/cms/RAFVG/GEN/statistica/FOGLIA59/.

37. Ronza M. and Scherbi M., "Turismo smart e patrimonio culturale: un App per il centro storico di Gaeta", *Annali del Turismo*, VII, 2018, pp. 105-124.

38. Ruocco D., "Beni culturali e Geografia", *Studi e Ricerche di Geografia*, II, 1, 1979, pp. 1-16.

39. Scanu G. and Podda C., "Cartografia e turismo in aree rurali", *Bollettino dell'Associazione Italiana di Cartografia*, 158, 2016, pp. 167-182.

40. Strachan C. and Mitchell J., "Teachers' Perceptions of Esri Story Maps as Effective Teaching Tools", *Review of International Geographical Education Online (RIGEO)*, 4, 3, 2014, pp. 195-220.

41. Stravisi F., "Il regime dei venti a Trieste (1951-1975)", *Bollettino Società Adriatica di Scienze*, 61, 1977, pp. 87-104.

42. Turri E., *Il paesaggio come teatro. Dal territorio vissuto al territorio rappresentato*, Venice, Marsilio Editore, 1998.

43. Walshe N., "Using ArcGIS Online story maps". *Teaching Geography*, 41, 3. 2016, pp. 115-117.

44. Zamperlin P. and Azzari M., "The Smart City I Would Like. Maps and Storytelling in Teaching Geography", *J-READING (Journal of Research and Didactics in Geography)*, 1, 6, 2017, pp. 17-28.