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Heritage Enhancement through Digital Tools for Sustainable Fruition—A Conceptual Framework

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Abstract: Digital technologies are becoming increasingly relevant in the processes of documenting, surveying, enhancing, and preserving cultural heritage, including through applications that are becoming more and more optimized and oriented toward new data management and accessibility processes. This great potential can find significant levels of application in the tourism sector, seeking new strategies to access, discover, and understand cultural assets. In this direction, many digital applications have already found interesting outcomes in the tourism sector, but there is large room for improvement in the applications for "minor", small, or neglected cultural sites, not included in conventional tourism routes, which play a key role in social inclusion and territorial cohesion, as well as for the development of social, economic, and environmental sustainability. The paper presents a conceptual framework or possible outline to foster the use of digital technologies through a set of integrated bottom-up and top-down actions, to facilitate connections of minor sites into larger networks, contributing to the search for new forms of sustainable and active fruition and social participation.

Keywords: digital heritage; sustainable tourism development; minor heritage sites; heritage enhancement; digital tools; social inclusion

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1. Introduction

Digital technologies are becoming a more and more an effective tool to document cultural heritage and sites, and to integrate new information and knowledge into digital models. In addition to capturing shapes and metric data, digital survey techniques add different levels of knowledge to be connected to 3D metric–morphological models [1,2]. This is crucial added value in applying digitization as an extremely effective support for a wide range of analyses [3], as well as conservation and restoration purposes [4]. Moreover, current research directions toward the application of parametric modeling [5,6] and semantic enrichment of 3D models [7–9] are further expanding these applications.

This great potential can also be applied to sustainable tourism purposes [10], supporting visitors' deeper awareness of all possible dimensions of cultural heritage sites [11], contributing to the diversification of tourism toward lesser-known places, and enhancing digital applications to explore different contents.

The increasingly widespread application of 3D digital survey technologies is leading to an ever-growing number of digitized cultural heritage or landscape sites. However, this process needs further strengthening and a continued effort to digitize and digitally preserve cultural heritage assets, as indicated in the European Commission initiative called "European data space for cultural heritage" [12]. The state of the art is quite heterogeneous. Major or monumental sites often have the opportunity to be digitized thanks to the availability of economic resources; however, "minor" sites or widespread heritage, when digitized thanks to research projects or local initiatives, struggle to reach broader audiences outside of the specific initiative [13]. This can be a shortcoming in supporting heritage institutions to find effective tools for the public to access, discover, explore, and enjoy of cultural assets and to create innovative and creative services in the tourism sector.

Generally, there is a lack of digital applications to small or inappropriately so-called "minor" heritage sites, due to the reduced availability of economic resources or the absence of appropriate sustainable strategies toward a pipeline enabling the best possible use of digital opportunities.

The recent pandemic crisis and the resulting drop in tourist flows—albeit temporary—has generated strong economic and social repercussions [14] on geographical areas where tourism is the main source of economic activity and employment, as well as on small cultural institutions, deprived of their principal source of revenue ensuring their financial sustainability [15]. Lately, large museums and the most popular heritage sites have gradually recovered from the crisis. However, minor sites and other cultural institutions which are excluded from the main tourist flows have a much lower degree of business resilience or financial sustainability. These small cultural sites, not included in the mass tourism routes, play a key role in social inclusion and territorial cohesion, since a community's sense of belonging to a place is also based on cultural heritage, and because the way in which heritage is enhanced (or not) and managed is a function of a society's values and socioeconomic conditions. Opening up to new forms of valorization and fruition can impact on economic growth, create new forms of social inclusion for local population and trigger a virtuous circle to create new possibilities for heritage conservation and protection [16,17].

Digital technologies such as 3D, cloud computing, virtual reality (VR), and augmented reality (AR) are bringing extraordinary opportunities for digitization, online access, and digital preservation, opening up new ways of digitally engaging with cultural content [18]. When applied to cultural heritage, considering the uniqueness of heritage assets, these methodologies and applications need an integrated vision able to also address the needs of site managers, local cultural curators, and citizens.

Heritage fruition scenarios during and post pandemic have put a great emphasis on the use of digital technologies for heritage sites accessibility [19], giving new meaning to technologies for virtual tourism and remote fruition.

Under "ordinary" conditions, when the physical accessibility of heritage sites is not restricted, one of the focus points is the impact of mass tourism on renowned tourist destinations versus the lack of visitors of cultural sites off from the most popular routes. Before the pandemic crisis, urban studies already highlighted the need to solve the issue of mass tourism [20]. After the pandemic, the need to smooth and diversify tourist flows by moving them from large attractors in different urban contexts has become more and more evident [21,22], for social, economic and environmental reasons.

New economic strategies in tourism development and heritage enhancement and conservation are urgent requirements, especially for small, hidden, minor, unknown, or inaccessible heritage sites [23]. Without new forms of enhancement and accessibility, as well as economic resources, most of these sites are likely destined to disappear. In this direction, there is a huge potential for innovation and experimentation using digital technologies and fostering interdisciplinary collaboration.

"Digital resources are handled sustainably if their utility for society is maximized, so that digital needs of contemporary and future generations are equally met. Digital needs are optimally met if resources are accessible to the largest number and reusable with minimal restrictions" [24]. The aforementioned statement immediately highlights three major points: social utility of digital contents, accessibility, and reuse of digital data.

These points are at the forefront of recent initiatives by the European Commission [25,26] aimed at finding new ways of ensuring better access to, understanding of, and engagement with cultural heritage through digital technologies, with a particular focus on 3D models [27].

Moreover, the applications of digital technologies for survey and documentation are currently also addressed toward the major issue of heritage at risk due to natural hazards, climate change effects [28], and several additional threats, including closed or destroyed sites, that could be renewed in terms of preservation strategies, accessibility, and tourism experiences thanks to technologies such as virtual, augmented, or mixed reality [29]. This

scenario indeed also includes inaccessible or abandoned heritage sites, many of which deserve to be put back into a circuit of knowledge, protection, and identity awareness.

The challenge is to improve the design of cultural experiences by enhancing new understanding and resilient strategies for heritage documentation, preservation, and sustainable fruition through digital means. This vision is consistent with the sustainable development goals (SDGs), focusing in particular on Goal 11 to "make cities and human settlements inclusive, safe, resilient, and sustainable", providing inclusiveness and accessibility to heritage spaces (subgoal 11.7), and supporting positive economic, social, and environmental links between urban and peri-urban areas (subgoal 11a). Digital technologies can also support the achievement of Goal 12 (12b: "develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products") [30].

The paper aims to propose a methodological approach and conceptual model aimed at facing the following main challenges:

- To open and diversify the tourist flows from the large attractors to culturally significant but little-known destinations, preventing over-tourism or reducing pressure in main renowned sites and giving new life to the minors;
- To contribute to the achievement of SDGs, making marginalized or minor sites accessible and opening to new forms of inclusiveness;
- To foster digitization and holistic documentation of heritage sites, at risk or marginalized;
- To facilitate connections of minor sites into larger networks, i.e., networks of large and well-known, along with small and unknown cultural poles, within a urban area or in geographically close areas (peri-urban areas, small satellite centers to large cities, etc.), proposing new approaches for handling visits in heritage sites and their surrounding area;
- To contribute to interlinking tangible resources and intangible memories through digital means, connecting stories and experiences to artifacts and sites, and improving deeper exploitation;
- To explore new economic opportunities in tourism development;
- To contribute to solve the current fragmentation in heritage sites and collections digitization, finding new ways to put together different sources, reusing already digitized datasets;
- To enrich personal fruition experiences, in the most possible inclusive way, fostering meaningful engagement of visitors and local people.

In order to create a workflow able to support the abovementioned actions, the involvement of cultural institutions, regional and local authorities, stakeholders, citizens, and creative industries is essential in order to redistribute and balance tourist flows and related resources from major or renowned sites to sites suffering from a lack of visitors and attentions, making the most of the currently available digital technologies.

The development model proposed is based on the concept that sustainable heritage fruition and participation, economic strategies, and digital technologies have to be integrated going together toward sustainable cultural heritage tourism [31]. The proposal includes different dimensions of sustainability: cultural and social sustainability, sustainable economic growth, and support of cultural diversity and traditions of local populations, according to the definition of sustainable tourism as "tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment, and host communities" [32].

Within this framework, digital technologies are assumed as an enabler to reveal unknown assets in the most possible inclusive way. Figure 1 illustrates in a diagram the methodological framework, including pilot sites (highlighting small sites or buildings to be reconnected into routs by leveraging on main "nodes" acting as drivers to address visits in surrounding sites), digital documentation devices, and sources to create digital content to be aggregated into modes and applications accessible by different users through different interfaces.

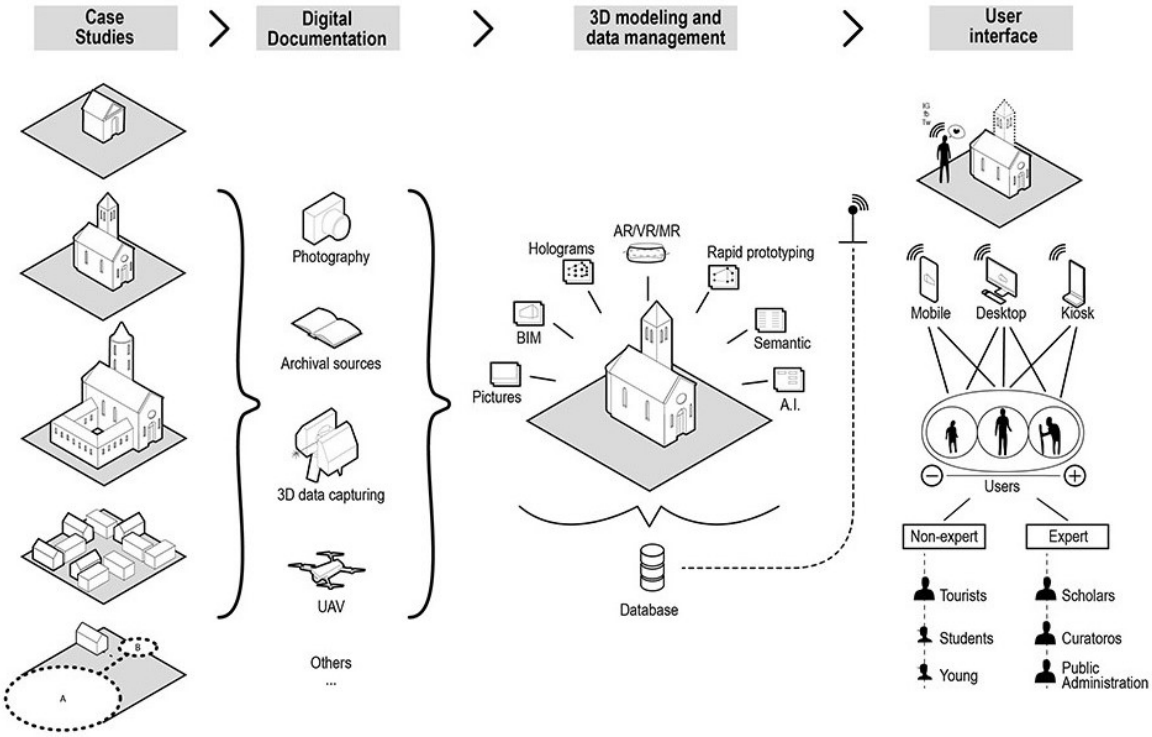

Figure 1. Overall framework of the possible "universe of knowledge" to define an outline integrating small heritage sites or sites not included in conventional tourism routes, documentation and data input via different acquisition devices, data aggregation and outputs for the active fruition of cultural heritage, and sites for the wide access of different users, expert and nonexpert. In the diagram on the left, A represents major heritage nodes, while B represents small sites or buildings in surrounding areas to be reconnected into routs.

In this direction, the focus is on "minor" or unknown heritage, seeking to solve the issue of unbalanced knowledge and cultural tourism between regions and sites, promoting unknown and unexplored heritage sites compared to high-demand areas being overexploited in an unsustainable manner.

The paper is consistent with the aim and scopes of the Sustainability journal and its Special Issue on "New Technologies for Sustainable Cultural Heritage Tourism" as it assumes digital technologies and applications derived from heritage digitization as crucial for culture and tourism, as well as for the sustainability of cultural institutions and sites from an economic, social, and environmental point of view.

2. Research Scenarios and Related Works

The state of the art in the field of digital technologies applied to cultural heritage tourism is wide and complex. The scientific literature shows relevant studies at an interdisciplinary level, covering social sciences, sustainability issues, tourism analysis and statistics, urban studies, economics, and remote sensing applications related to heritage digitization or cultural heritage digital documentation in the broadest sense.

In recent years, studies on the topic have increased in number as a consequence of the COVID-19 pandemic [33,34]. In general terms, the literature on sustainable tourism has exponentially grown in the last decades, being a central topic—linked to environmental, social, and economic impacts—while connections between sustainable tourism and digital tools are currently at the forefront of research in different scientific fields [35].

However, studies on the application of technologies such as VR or AR in the field of tourism fruition and enhancement are well established [36] and have been presenting results for 20 years.

Studies on developments in information and communication technologies (ICT) related to tourism and sustainability goals have highlighted the strengths and risks, as well as the need for more critical evaluations of the implications of the ICT economy [37,38].

Digital applications cross the issue of tourism-related sustainability at different levels, from the dematerialization of several practices (booking, information material, and maps) through the download of apps, almost always free of charge, contributing to reduce the environmental impact, to the deployment of immersive technologies.

The impact of VR and immersive applications in general can be considered twofold. On the one hand, these tools enable remote access to cultural sites and contents, potentially increasing accessibility by different user categories, reducing inequalities, and fostering inclusion in society (people with limited mobility, affected by social isolation, or unable to physically travel) [39]. On the other hand, the management of digital contents should be oriented toward encouraging physical access to heritage, and not vice versa [40].

As a matter of fact, digital technologies have significantly changed the global ecosystem of the tourism industry (products, services, business ecosystems, and destinations), starting from digital platforms with on-demand functionalities, creating new opportunities and challenges according to different markets, subsectors, and destinations, requiring new capacity building, regulations, and standards for digital services related to tourism. According to [41], while many basic technologies associated with e-business have been included in operator services, higher levels of digitization are not as common. For instance, storytelling through digital media is a powerful means for tourism and economic development, enabling strategic communication that supports sustainable competitive advantages [42].

Digital technologies, web-based platforms, and social media in the field of tourism can influence travel practices and tourists behavior [39], while the use of immersive technologies, such as VR and AR applications, on mobile devices has received increased attention in recent years [43], generating new creative innovative opportunities for tourism, such as virtual simulations in order to digitally interact with destinations before planning the onsite visit [44] or to enrich the on-site experience [45,46].

In recent years, immersive reality technologies such as AR, VR, augmented virtuality (AV), and mixed reality have become increasingly widespread for cultural knowledge dissemination, mainly for enriching personalized visiting experiences in museums, but also applied to historical buildings and heritage sites [47], or at a historical city level [48]. Recent studies foreshadowed for the near future very promising developments in the fields of tourism, education, and entertainment, enriching 3D scenarios with different types of content [49].

Projects and research aimed at documenting, storing, and disseminating the cultural heritage, starting from 3D data capture or digitization of documents to create digital models for augmented applications for mobile devices such as tablets and smartphones, also produced very relevant and promising results for future developments [50–52]. Recent expansion of artificial intelligence (AI) connected to AR is bringing a rapid development and advancement of applications, software, and devices to document, analyze, and communicate space and artifacts, i.e., tangible and intangible cultural heritage [53].

Despite research and development of applications that are achieving interesting advances in the field of digital documentation, as well as data management and representation, in the tourism industry, conceptual grounding which providers can leverage to create innovative immersive experiences is not fully mature [54].

The "Museum connections: between valleys and mountains, villages and cities" initiative, for instance, aims to create a real and virtual itinerary for the enhancement of places, cultural heritage, and natural contexts in the territory of Spoleto, Umbria (Italy), in order to increase the number of visitors in addition to museum experiences, creating new cultural tourism circuits [55]. The project developed an app for the enjoyment of tourist and environmental attractions, which activates in-depth information sheets on the various points of interest as the tourist progresses along the indicated itinerary, and which contains AR applications and a video game. Several well-known museums in the Spoleto area,

being a destination for large numbers of tourists, have taken the initiative to launch the app and itineraries on normally less visited cultural and natural sites. This project promotes sustainable tourism, offering tours on foot or by bicycle, through places of natural interest, as well as economically enhancing "minor" places of cultural value.

To increase citizens' awareness about cultural offerings and create a more effective public engagement with culture, the European co-funded project "Tag Cloud" [56] focused on unexplored heritage by general public. According to the state of the art analyzed within this project, few cultural institutions have incorporated innovative personalized digital approaches as part of their solutions, and few have taken into account cultural trends to engage visitors. The project was aimed at creating cultural engagements using cloud-based solutions that support adaptive and personalized experiences according to individuals' interests, leveraging the increase in the available information about cultural heritage on digital media as a means to promote new ways to participate in culture. In this way, the institutions can launch cultural "themes" and invite the public to contribute, acting as attractors for visits, while geolocation technology allows recommendations of points of interest, expanding the routes to additional sites.

The project "Pluggy" [57], likewise, developed a social network dedicated to cultural heritage through open-source solutions that developers can use to create a range of social applications for promoting local traditions, customs, and history to a wider European—or even global—audience. This platform addresses society to be actively involved in heritage activities, while providing digital content that can encourage to visit places not on conventional tourist circuits.

On the basis of slightly different assumptions, the project "The Impossible Exhibitions" [58] presents, in a single exhibition space, in the form of digital reproductions in full size and very high definition, the complete oeuvre of great painters, displayed not only in museums but also in castles, villas, and historical palaces in large cities and small towns. In this case, digital content is used "physically" in places that, thanks to exhibitions, can attract new tourist flows.

A possible direction to make the most from the current state of the art is to go toward integrated systems able to combining the informative value of digital models (3D) with the intangible values that can be conveyed for tourism fruition at different levels. Starting from local administrations, cultural institutions, or heritage site managers, a possible vision is to create new attractions or to add new dimensions to the visit experience, promoting the extension of the visit with "unconventional" routes to discover neighboring sites.

3. Materials and Methods

The conceptual framework here discussed is based on an analysis of the state of the art and an overview of the current scenario, and it is based on experiences and considerations resulting from the author's participation in the ongoing EU projects in the field of heritage digitization, such as "4CH—Competence Center for the Conservation of Cultural Heritage" [59] and "5Dculture—Deploying and Demonstrating a 3D Cultural Heritage Space", aimed at enriching the offer of European 3D digital cultural heritage assets, and fostering their reuse in domains such as education, tourism, and the wider cultural and creative sectors toward socially and economically sustainable outcomes.

To develop the framework, moreover, a preliminary analysis of possible application cases was performed considering different Italian regions, in order to identify minor but highly valuable cultural sites that, through the use of digital technologies, could be enhanced and promoted by the most popular tourist destinations located in the surroundings through websites or digital applications to be designed as an additional information set. In the case of the city of Ferrara (Emilia-Romagna, Italy), for instance, the preliminary investigations identified a possible network of small cultural sites located in the province, leveraging both the most visited UNESCO heritage sites of the city and the cycle tourism routes.

The main concept is based on a possible approach—economically and environmentally sustainable—grounded on guidelines and indications set in a "model" to be provided to municipalities, local administrations, cultural institutes, or any local or territorial body or institution that needs to create new virtuous circuits in terms of sustainable tourist flows. Alternatively, it can be provided to those sites that need an incentive to digitize contents that cannot be physically accessed (archival documentation, parts of the site not accessible to the public, and intangible heritage) to enrich both the visit path and the remote use.

Starting from major or renowned heritage sites, the model is conceptualized to create connections and network routes, as outlined in Figure 2, where the main "node" (major heritage building) can act as a driver to suggest additional visits to minor cultural destinations in surrounding sites.

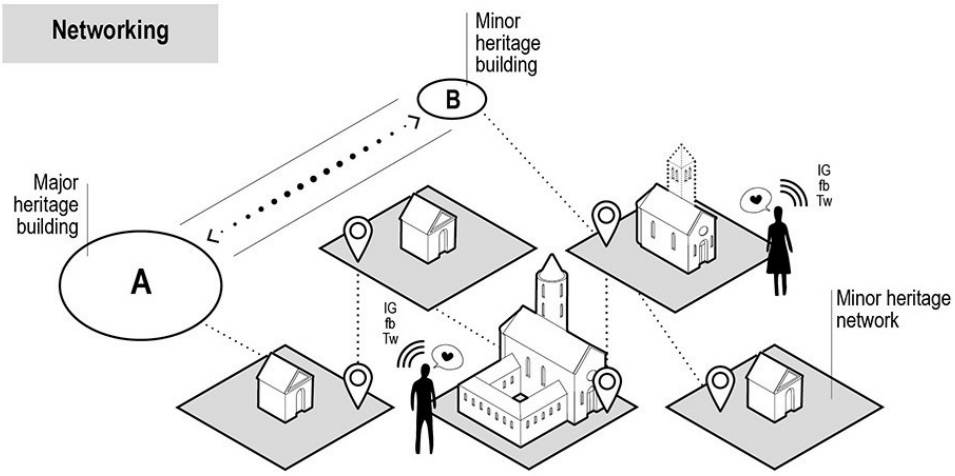

Figure 2. Concept of site networking. The renowned location can be the driver to create new and unconventional visits facilitating connections from minor sites into larger networks, proposing new approaches for handling visits in heritage sites and their surrounding areas.

The concept is based on two levels: that of digital documentation and that of promotion and public engagement, in a two-way process. A scalable model depending on site features, needs, and requirements, and on available resources (economic, human, and technological), based on top-down and bottom-up actions that can be activated simultaneously or asynchronously considering different time spans according to different resources available, until converging.

The model can be conceived of as a set of strategies and guidelines—as a first level—and a set of digital tools as a framework of indications as a more mature or structured level of action, most likely for the main site to be considered as the "promoter" of a network of other touristic destinations.

As a bottom-up strategy, several forms of storytelling can be activated, encouraging local populations and tourists to share their visits and experiences via social media and other platforms. In this direction, storytelling [60] can be considered a way to communicate tourists' impressions, stories, and views through digital media, as well as to enhance citizens or local population to share traditions, local customs, and culture to enhance the visibility of the community [61].

In order to emphasize the opportunities offered by digital technologies for heritage enhancement and fruition, the concept is structured considering all possible digital media, starting from basic tools (a more effective use of information from cultural site websites and the upload of digital content in possible mobile applications, totems, and QR codes), going toward the creation of a 3D digital model of the heritage site, to be used for deeper digital experiences and as the basis for several applications for VR and AR. The heritage site manager or the cultural institution can create storytelling (from the supply side) through digital tools to create additional narratives.

Figure 3 graphically outlines the main concepts. At the center is the process of digital documentation, which is necessary not only to document heritage sites, but also to have digital data available for the creation of digital applications, in order to make visit experiences more attractive. Major sites can lead tourists to other nearby (smaller or lesser known) sites through the communication of visit networks (via online information material). Visitors can trigger bottom-up storytelling processes, sharing their experience through social channels. Municipalities, curators, or site managers can gradually manage different online applications, from the simplest to the development of more advanced tools, such as specific apps for augmented experiences. One of the main issues in this direction is economic; very often, small cultural sites hardly have the economic resources to set up digital survey, modeling, and data management processes to produce digital models. The idea of creating a framework of bottom-up actions—thanks to the network generated by the attractor site—is aimed at gradually increasing the income of the small or lesser known site, which can be reinvested in further actions for enhancement.

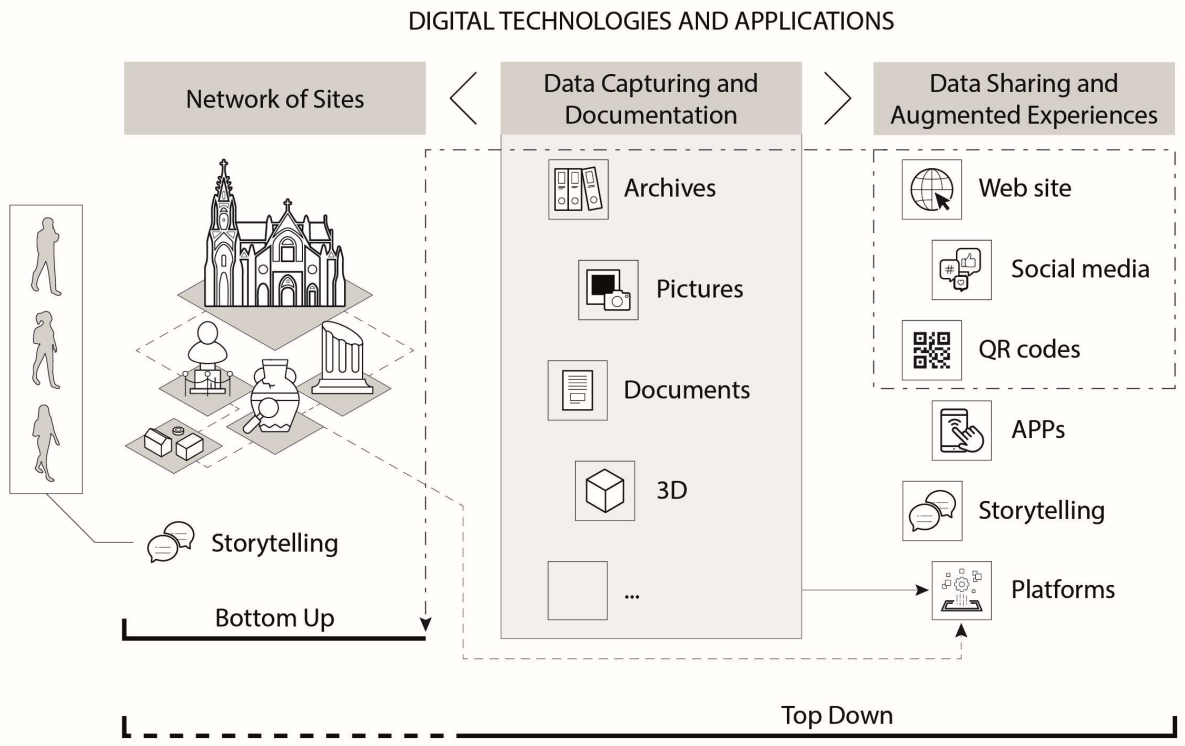

Figure 3. Overall vision of the conceptual model, grounded on an efficient use of digital technologies, to be provided to heritage site managers, municipalities, local administrations, or cultural institutes needing to increase sustainable tourist flows, set by integrating bottom-up and top-down actions and tools, and fostering social participation.

The model can be considered scalable and exportable, and organized as a kind of protocol of actions of different complexity. Priority or entry-level actions are related to the assessment phase, including the following:

- Identification of heritage site needs in terms of implementation of digital tools to improve forms of sustainable tourism and enhancement;
- Assessment of the potential network of neighboring sites or cultural destinations;
- Cataloging and mapping of heritage buildings inaccessible not only to visitors but also unknown to local communities;
- Assessment of the level of development of available digital tools (website, social media connections, totems, apps, etc.);
- Assessment of digital resources available (digitized documents, 3D models, digitized iconographic sources, etc.);

- Assessment of potential financing funds or calls for tenders.

Depending on the different contexts, the relationship or agreements with governmental institutions and heritage management bodies will be crucial in determining the next steps of the top-down approach to channel resources for the upgrading of digital tools and skills.

The following additional considerations can be pointed out:

- Despite the need for specialized personnel capable of producing digital models with high-quality content, and the need for hardware and software infrastructure, 3D data capturing and digital documentations are possible today by exploiting low-cost technologies, such as structure from motion or photomodeling starting from photographic survey;
- The spread of open-source software to manage digital data can help starting different kinds of data processing to create digital contents to be shared;
- The current direction at a European level to accelerate digital transformation is creating unprecedented opportunities to use different funding to boost digitization and capacities in the cultural heritage sector. Several initiatives and calls for tenders or calls for proposals are moving in this direction, creating relevant funding opportunities (program such as Digital Europe, Horizon Europe, the Cohesion Policy Funds, REACT-EU, the Technical Support Instrument, and the Recovery Resilience Facility). Moreover, the already mentioned initiative for a "Common European data space for cultural heritage" is aimed at not only accelerating the digitization of all cultural heritage monuments and sites, but also boosting their reuse in domains such as education, sustainable tourism, and cultural creative sectors. The commission encourages member states to digitize by 2030 all monuments and sites that are at risk of degradation and half of those highly frequented by tourists.
- At the national level, actions toward the enhancement of heritage fruition have been promoted by the European Commission, e.g., the Italian National Recovery and Resilience Plan [62], including a focus on tourism and culture, highlighting the need to improve culture and tourist accessibility through digital investments, promoting participation in culture, and enhancing sustainable tourism. Investments to achieve these goals include the "digital strategy" and platforms for cultural heritage and regeneration of small cultural sites, to foster the development of new tourism/cultural experiences and balance tourist flows in a sustainable way [63]. Under this umbrella, the Digital Library of the Italian Ministry of Culture has the mission to accompany cultural institutions and sites in implementing their digital transformation, to redesign the way they interact with cultural heritage, and to develop new models in an ecosystem approach.
- A very relevant point is indeed the reuse of digital content already available. The widespread heritage 3D digital documentation is a process started a long time ago—currently being even faster and more widespread—producing several databases and 3D models that can be shared, explored, and reused. There are several major sites (potential attractors to promote surrounding visits) and small sites, already digitized, that can be collected and enriched.
- A two-way strategy for heritage content storytelling can be activated, bottom-up and top-down, the latter conceived of as an advanced exploitation of digital contents by the cultural institution or the site manager. The bottom-up strategy can trigger possible participation to make people create and interact with digital contents.
- The topic of aggregator platforms to collect and make heritage digital contents available and accessible is also topical. The already mentioned "Data space for cultural heritage" initiative promoted by the European Commission to support the digital transformation of the cultural sector, allowing cultural heritage institutions across Europe to share digitized content promoting the reuse and creating value for the economy and society, will draw the direction; meanwhile, several platforms and digital infrastructures are available to share 2D and 3D heritage contents to collect and share digital models.

Figure 4 shows possible fallouts from the proposed model. As the digital data are collected and structured and the models enriched, they can flow into different repositories, following the concept of using and reusing 3D models and digital contents for different purposes. On the one hand, the models can be a pool of knowledge to activate sustainable monitoring and conservation practices; on the other hand, they can flow into platform for knowledge sharing, and be the basis for the creation of popular and touristic apps. This outline is aimed at defining a framework for possible approaches to the inclusion and fruition of minor, hidden, or inaccessible heritage, or spaces at the limits of the conventional tourist routes, to be recovered and reconnected. The way in which latest technologies are applied to digitally document tangible and intangible heritage needs to be oriented, including different dimensional scales (sites, buildings, artworks, etc.) by enhancing engaging narrations, storytelling, and linking physically separated objects and sites.

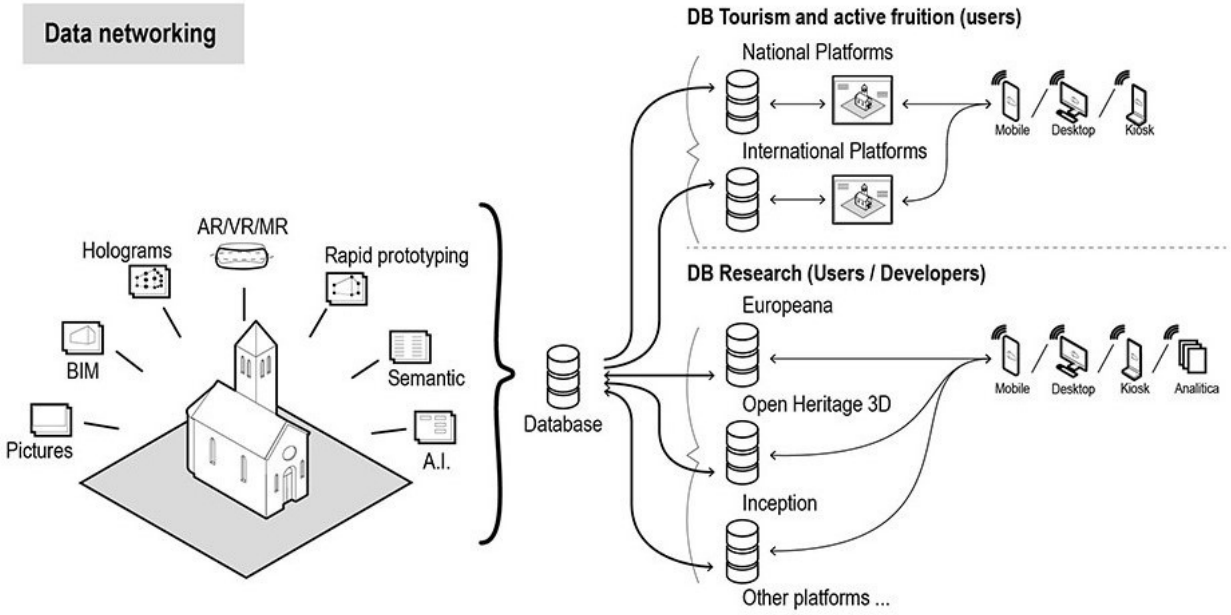

Figure 4. Possible fallout in terms of sharing data and document sources through existing platforms to disseminate digital contents. Europeana, Open Heritage, Open Heritage Labs, Open Heritage 3D, and Inception are some examples of digital data collectors and aggregators on which additional applications are grounded.

Catalysts are needed for the renewal of the cultural identities of otherwise neglected places that, if enhanced, can renovate interest in the populations and foster social and economic positive impacts.

The proposed network between major and minor sites could help address issues that digitization efforts by minor sites cannot fully resolve on their own by creating "circuits" of valorization via the integration of measures from different sectors, including tourism, culture, commerce, artistic craftsmanship, agriculture, business, active employment policies, digital networks, and building conservation in historic centers. In this direction, an indicative initiative is that developed by the Italian region Marche, focused on the enhancement of historic village. The initiative was launched as a legislative proposal "Support for integrated initiatives for the redevelopment and enhancement of villages and historic centers in the Marche region and the promotion and development of the *Albergo diffuso* network" [64], which was approved. The project acts on neglected heritage by also including strategies for digitization, which can attract young people.

4. Possible Impacts

The overall workflow outlined in the present paper can be a strategy proposal to foster procedures of sustainable touristic development through digital tools.

Although current efforts in terms of digitization are geared toward sites with higher tourist numbers and toward heritage at risk [65], the proposed strategy focuses on minor and diffuse heritage buildings and sites as a possible driver for new approaches to sustainable tourism.

This historic moment foreshadows great accelerations in terms of development and technological applications, especially related to the digital domain, but the issues at the level of local management of small sites or those outside the major economic circuits is vital. The gap between small heritage assets to be safeguarded and technological advancement is not so unbridgeable, but a comprehensive strategy is needed.

The proposal can foster interdisciplinary collaborations, including social science and public engagement, to activate pilot experimentations of bottom-up and top-down strategies toward the increasing adoption of digital tools, considering the high potential of making accessible, interlinking, disseminating, and preserving sites and collections. Nevertheless, there is a need to set up a systematization of documentation procedures and a careful and critical selection and verification of information to be included in the additional layers of knowledge that digital systems allow. While, in this sense, there are several best practices and guidelines [66,67], copyright-related issues when digitizing and sharing cultural heritage are still a shortcoming to be faced.

From a social point of view, the rediscovery and promotion by digital media of sites only marginally known but expressive of a cultural reality worthy of attention, can arise a social awareness and sense of belonging by local communities. The outlined conceptual framework is indeed focused on giving access to cultural contents and resources to as many people as possible, by using functionalities and applications (websites, databases, digital libraries, virtual applications, etc.), and overcoming cultural, environmental, and management barriers, while promoting easier and widespread fruitions.

From an economic point of view, cultural tourism represents up to 40% of all tourism in Europe [68], and cultural heritage is an essential part of cultural tourism. Digitization of cultural heritage assets and the reuse of such content can generate new jobs, as well as be a driver for cultural initiatives and a channel to find new economic resources bringing in new tourist flows. As far as current funding opportunities are concerned, the point is to draw up procedures for accessing funding that are sufficiently simplified to be managed even by small institutions.

The setting up of the conceptual framework can flow into good practices, both at a managerial and at a technological level, proposing innovative communication strategies enabling a cultural appropriation through easy-to-understand systems.

Stakeholders and target groups to whom this framework is geared are manifold. Professionals, scholars, and researchers can be involved toward the effective application of documentation through digital resources for analysis, conservation actions, and knowledge enhancement. Local communities, citizens, and tourists can benefit from new form of access, fostering the rediscover of local heritage, and encouraging new visit routs. Curators, asset managers, and public administrations can find new forms of enhancement, exploitation, and business models. Online access [69] to documented digital replicas (including storytelling) of artifacts, augmented visits to sites and monuments, and new accesses to archive documents may increase the appeal and promotion of a place, a building, a site, a museum, or a city, promoting new tourism and increasing the local economy. Young people and students can be involved in training and education activities [70,71], as well as participation actions. The participatory, educational, and training fallout is central within the concept of sustainable tourism, and it is aimed at both local communities and citizens (through storytelling tools), as well as at curators, experts, professionals, and stakeholders involved in heritage preservation (through applications for advanced uses of digital models for conservation actions).

Digital technologies can be the catalysts for the renewal of the cultural identity of a place and the strengthening of social involvement through new approaches for handling visits in heritage sites and their surrounding areas according to the concept of network of sites, finding unconventional paths of knowledge in which the real and the virtual are able to dialogue.

The proposed framework is aligned with the sustainable development goals (SDGs) in promoting sustainable tourism that creates jobs and promotes local culture and products (Goal 8.9), and in applying information and communication technologies (ICT) to reach the sustainability goals in different areas. ICTs are mentioned in different parts of the of the 2030 Agenda, highlighting the role of digital technologies and online platforms to facilitate access to information, knowledge, and experience. "The spread of information and communications technology and global interconnectedness has great potential to accelerate human progress, to bridge the digital divide, and to develop knowledge societies."

5. Discussion

The workflow proposal is based on the setting up a "model"—flexible and scalable—grounded on an efficient use of digital technologies, to be provided to heritage site managers, municipalities, local administrations, or cultural institutes that need to create new approaches to knowledge and to the increasing of sustainable tourist flows, focusing on small or minor sites out from conventional routes.

The development of a set of integrated bottom-up and top-down actions and tools can enable the exploitation of virtual applications, experimenting digital opportunities on real contexts, merging missing memories with tangible legacy, and fostering social participation.

Digital technologies allow adding several levels of knowledge to a site, including intangible values, "traces", and remains, not only physical but also documentary and immaterial assets, contained in physical places that narrate heritage spaces and sites. Single "objects" can be potentially organized in rout networks, where tangible and intangible memories can be related, in order to enhance hidden but valuable places.

The brief discussion here proposed, theoretically embedded, does not resolve the entire structure of an approach that presents different levels of complexity and different variable parameters, depending on the specific context. Nevertheless, a comprehensive view of the current scenario and the focus on the potential of digital applications for "minor" assets can be the starting point for the definition of possible strategies to outline a cross-approach pipeline for small, unknown, or nonenhanced heritage sites.

The proposed methodological approach can be considered as a first step in further developing a "model" that could help small cultural institutions to find their way to manage all the opportunities that digital technologies offer, toward cultural and social sustainability.

While the issue of "quality" of digital data produced [72] should be discussed deeply, the quantity of digital contents is growing exponentially; this large amount of data presents an increasing challenge of management to curators and public administrations toward an adaptation of the current fruition of heritage toward a sustainable and inclusive access [73].

An additional crucial point is to strengthen the concept and meanings of accessibility, through the creation of networks, creating connections among places and individuals, shifting attention to the great added value that digital technology can bring in merging the social dimension of inclusiveness and active fruition into a process usually fragmented and expert-oriented, increasing heritage awareness by addressing knowledge methodologies and governance rather than mere technological tools, by bringing methodological innovation, and by mapping relationships and practices, rather than technologies.

Another major challenge is related to the digital skills gap [74] in the sector. Cultural heritage institutions need to be able to exploit the opportunities offered by advanced digital technologies, and to be aware of possible tools to be easily exploited. For instance, several existing platforms can be an entry level to disseminate digital contents (Europeana, Open Heritage, Open Heritage Labs, Open Heritage 3D, Inception, etc.), while other specific platforms to upload digital models and applications should be carefully analyzed,

setting specific tools for web navigation and virtual tours, reconstructions, immersive features, etc. The potential applicability of tailored digital contents in local digital networks and international platforms [75] is high and offers different opportunities.

Additional chances to access different kind of services as a support in fostering digitization capabilities are related to the connection with ongoing project; for example, the already mentioned 4CH project is working in the direction of setting up the methodological, procedural, and organizational framework of a competence center able to work with a network of national, regional, and local cultural institutions, providing them with advice, support, and services focused on the preservation and conservation of historical monuments and sites, and giving access to training services, repositories of data, metadata, standards, and guidelines.

Although the proposed model is currently being developed as a theoretical and methodological approach, potential constrains or shortcomings within the research can be pointed out. The already mentioned digital skills gap in the cultural and tourist sector could slow the development of even the simplest tools (website implementation and QR code creation), required at the first level of the bottom-up strategy.

An additional possible limitation can be the potential resistance of major cultural sites to promote neighboring sites for fear of losing tourists or triggering a decrease in the flow of visits over time, even though the model is designed to make sites, which already have many tourists, the promoters of smaller sites, also solving problems of overcrowding.

The major constraints may lie in the lack of sensitivity by cultural institutions or site managers toward the updating of digital tools or in the lack of personnel to deal with digital promotion. In this framework, the possible lack of economic resources, even minimal, can be a very common condition in smaller cultural sites, making even the activation of basic strategies very difficult.

The model was conceptualized considering the above-mentioned possible limitations, and it is structured in such a way that the first level (guidelines for digital promotion and bottom-up strategies such as the storytelling through social networks) can create a "cascade effect" in channeling new tourist flows and, thus, the income of new resources that can also be reinvested over time in more sophisticated digital applications to offer the access to additional "augmented" contents.

6. Conclusions

Cultural heritage is a shared resource to raise awareness and reinforce a sense of common identity, which acts a transformative force for community regeneration, strengthening links among culture and education, social aspects, urban policies, research, and innovation, as stated in "A New European Agenda for Culture" by the European Commission [76].

A central point concerns the opportunity to bring citizens closer to the cultural institutions of their territory through a more open and inclusive governance model, promoting a real opening of the institutions that incorporate the use of information and communication technologies [77,78] in terms of transparency and dialogue with the citizens.

Human–technology interaction is becoming increasingly disruptive (not only among young people, who need to find alternative uses of digital devices), and this is producing several cross-cutting social impacts. Interacting with digital heritage contents in a meaningful and effective way is a goal to be reached, considering that, even if we are living in a digital world, tourism and cultural routes are still grounded mainly on traditional practices. Nevertheless, touristic development models to approach sustainability in a new and broad way are needed, as well as technologies addressed to tourists for helping them understand cultural heritage sites in all possible dimensions.

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