MAKING AN ANIMATION AS A MEANS FOR DISSEMINATION AND A TOOL FOR RESEARCH ABOUT HISTORICAL SITES: THE CASE STUDY OF SAN JULIÁN DE SAMOS

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INTRODUCTION

Digital visualizations help us to represent and study the processes in which isolated historical buildings or complex built environments were preserved, altered, destroyed or imagined over time. Each of them is a vast archive with multiple layers that cross centuries and thus a huge challenge to be understood in spatial and temporal terms. In this sense, a spatiotemporal approach is crucial not only to further our knowledge, as scholars, of a site's or building's significance, but it is also needed to guarantee its future conservation through an effective communication of gained understanding by the public at large, as ICOMOS charters highlights.[1]

For this purpose, today there are a number of digital technologies used to research and disseminate knowledge about historical built environments.[2] In the field of architectural history, the evolving nature of heritage sites has been longer represented through phased plans that show fixed moments of centuries-old processes of changing. The use of 3D reconstructions provide scholars with the possibility to analyse the historical space from multiple points of view, as well as the exploration of issues of human experience that are otherwise impossible due to the alteration or disappearance of sites.[3] The latter has been enhanced by the development of Virtual Reality (VR), which offers the potential to interact with historical artefacts in a more real and appealing way,[4] or Augmented Reality (AR), which adds the superimposition of the virtual heritage in the present world.[5] All these tools and their diverse range of digital outputs have contributed to meaningful research outcomes while they make also possible new kinds of scholarly production in and outside academia.[6]

In particular, the combination of digital products possesses qualities that makes them relevant to build integrated diachronic narratives for cultural heritage sites that are based on

multi-disciplinary sources. In the last decades, there have been a number of initiatives trying to address and display the past of heritage sites through case studies that prove the potential of applying different digital methods for research, while they promote understanding of the cultural heritage among the public and reach awareness of the importance to preserve and protect historical architecture and its context.[7] These initiatives have been accompanied by a more recent debate about the legitimacy of multimedia outputs as a new way of scholarly production to be recognized and accepted as serious as written traditional means of publication.[8] In this debate, it is argued that making a digital product, whether if it is a 2D map, a 3D model, an animation or a virtual ecosystem must be considered a new form of knowledge production equivalent to traditional written analysis if scholars treat them with the same rigour as they face textual research. This legitimacy depends on the assumption of common principles, rules, practices, and evaluative criteria within the community.[9]

The animation 'Creating the Monastic Site: from the origins to the 19th century' was developed to show how the monastic site of San Julián de Samos was formed and re-formed over the course of centuries through an attractive but accurate way of public dissemination. In addition, we tried to test a new path within the open-ended Digital Samos project that aims to enhance the work done in previous stages about this heritage site.[10]

The core of this complex built environment is one of the most ancient and largest monasteries in Spain.[11] In our project, we approach this building along with its immediate sacred precinct, the nearby village and the surrounding rural landscape.[12] Founded back in the second half of the 6th century, the monastery was continuously run by Benedictine monks until the secularization in the early 19th century. The religious community was the owner of a large territory around the monastery and, as a result, it played a key role in the evolution of this monastic landscape.

However, despite the importance of San Julián de Samos in Spanish monastic architecture, the understanding of the historical process that defined the present physical realm is largely unknown. This is probably due to the centuries-old site's biography, the difficulties to study layered complex built environments, and the challenges that dissemination for broader

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audiences involves. By creating the animation, our first goal was to develop a visual output that offers a simple, but rigorous explanation of the continuous architectural process of changes over time in Samos for all-age audiences.

In this article, we show that the process of making an animation is a new form of knowledge production in which the accurate assessment of multiple sources and the integration of a variety of visualization techniques lead to a better academic understanding. In addition, the perspective of making an animation for spatiotemporal study, demands to answer questions that existing sources and the use of individual tools leave open with implications for enhancing public dissemination and a distinctive contribution to art-historical method. We argue that this case study also supports the larger debate in favour to the recognition of digital products as new types of interdisciplinary scholarship that aims to overcome the boundaries of textual-focused academic production.

THE CASE-STUDY INTO CONTEXT

The animation for our project was began after our participation in the Getty Summer Institute 'Advanced Topics in Digital Art History: 3D (Geo)Spatial Networks'.[13] It was organized by the Wired! Lab (Duke University), the Università degli Studi di Padova and the Università Iuav di Venezia in June 2018. The instructors belong to an international team of scholars that lead a Digital Humanities Initiative called 'Visualizing Venice'.[14] They are mainly focused on studying and modeling change over time in urban environments through digital technologies in order to face new art and architectural historical questions. After years of collaborative work, they have become a major contributor and an essential reference to dialogues in digital humanities, cultural heritage, art and architectural history.

The institute brochure proposed a two-week workshop in June 2018 to be continued in a second one-week gathering in summer 2019, with follow-up online meetings taking placed between both in-person sessions. The focus of the institute was to 'advance the field of digital art and architectural history through a combination of project-sharing, technology exploration, and academic discussion'.[15] Applicants were expected 'to have a Digital Art History project

underway and a key set of research questions identified, as well as to have demonstrated some progress in developing their research program'.[16]

Our project 'San Julián de Samos: a digital approach' was admitted to participate in the workshop together with eight teams. The project development prior to attend the first session of the summer institute was focused on analysing questions of change over time in a historical site by computer-aided design (CAD) technology as an essential vehicle for research.[17] We aimed to study why and how the monks defined and re-defined the monastic site at San Julián de Samos from its foundation to the present.

Developed research was based on: previous studies (books, articles, book chapters...), primary sources (archival data, historical maps and photographs...), and on-site past-evidence research (remains, measures, fabrics, testimonies...). All this data was collected, organized, and studied for spatial-related research. Then, working strictly on the basis of proven sources and driving into a dialogue between themselves -when they are absent, scarce or ambiguous and hypothesis were needed-, we could generate 2D maps and 3D models that address and visualize questions of change over time.[18] Before the summer institute, we have been working on the project for several years and, as a result, we had already created a series of phased 2D maps and 3D models of the monastic site that recreate its life cycle from the High Middle Ages to the early 21st century (Figure 1). These visualizations present isolated moments in the architectural site's biography, but in the process of making maps and models we did not forget the necessary historical connections between each of them.[19]

Therefore, since the very beginning of this project digital tools were a core part of the research methodology. Only through using them we could promote and gain a fuller understanding of the process by which the monastic site of San Julián de Samos was designed, changed and experienced in accordance with monks' desires; we came to understand their intentions in spatial organization; we learnt how sacred and non-sacred agents and experiences spatially interacted; as well as to what extent human needs, architecture and topography dialogued and influenced each other in all stages of the building evolution that traditional research did not allow.[20]

A set of visual outputs of the existing research were published as fixed images in peer-reviewed papers and book chapters.[21] Although they were a core part of our methodology, as through the process of making them, we acquired knowledge; in academic publications the main argument is still driven by the text. However, we consider that the visual nature of images overcomes the perceptual limitations of writing about space and spatial changes over time.

After the summer institute we proposed taking the step of creating an animation for the project with a twofold purpose. On the one side, we aimed to create a video for a future exhibition in the museum of the monastery to support and enhance the understanding of the historical site for broader audiences.[22] Therefore, we had communicative and pedagogical aims in mind. On the other side, we also conceived the animation as an attempt to overcome the limits that traditional ways of academic dissemination still present for visual-centered projects; as drawings, maps, images and digital graphic products, in general, are still mainly considered and evaluated as complements to the text in academic publications, but rarely as the research outputs themselves.[23]

THE PROCESS OF MAKING

To start with the process of creating the animation, we first thought about why and what we wanted to showcase, how we could make it and what new assets may be added to the existing research. As regards the purpose and focus, we selected a specific time period to explore in the animation: the spatial transformations from High Middle Ages to the early 19th century, prior to secularization. We wanted to give audience a clear explanation about how the monastic site was conceived and changed during the most important historical period in the definition of the monastic compound. This was also an epoch deeply influenced by the constant domain of the religious community, not only within the sacred precinct, but also in the surroundings, with spatial consequences that partially remain currently. The animation aims to be the medium through which audience might better understand the constant spatiotemporal changes of the built past and its relationship with the present spaces.

The second issue related to how to make it started from and was inspired by the example of multimedia installations showed in the Getty Summer Institute (Figure 2). In particular, we want to highlight two videos designed to complement physical exhibitions presented at the workshop by Cosimo Monteleone. One was devoted to the architectural and urban transformations of the city of Carpi (Italy), from Middle Ages to the 20th century.[24] The other examined the history of the Academy Museum at Venice and its urban context, from the early Renaissance to the 20th century.[25] It was easy to identify common issues between these two previous projects and the research about San Julián de Samos. The main one is the art historical question: to analyse spatial change over time. Besides, the selected case studies are both complex built environments. Not only did they examine one architectural artefact, but a large area in the city. In addition, the starting point for the production of the video was a research carried out previously by collecting and studying historical sources from which next they generated plans and 3D models. These two examples were also structured in an innovative way that favoured future understanding of the historical process with scholarly rigor. The layout of the videos is organized around a vertical timeline that leads the narrative by matching textual information, historical images and plans along with digital reconstructions. Not only was the animation layout carefully designed to favour the understanding of selected spatial changes over time, but it was also created at a pace to give audience time enough to recognize the relationships between text, images, maps and models and, as a result, to gain knowledge.[26]

What assets may the animation add to our existing project? The previous examples demonstrate that an animation is able to extend a scholarly research by sharing it in a clear, accessible but also rigorous manner that allows public to learn about the transformations of historical areas over time. The importance given to visual sources, accompanied by short texts that lead the narrative, turn these animations into powerful pedagogical and communicative tools with an undeniable value.[27] They are able to engage broader audiences with a more attractive and readable presentation than traditional publishing formats. This is the reason why they are usually created for exhibitions in museums that aim to enhance the understanding of the past world.[28] However, their commitment to public engagement through digital presentation

does not reduce their scholarly rigor at all; quite the opposite, the combination of historical data (texts, photographs and maps) together with virtual 2D maps and 3D models ensures the needed intellectual and technical rigor in digital heritage research outputs.[29] In fact, from our view, they are a kind of inverted traditional paper as the visualization-based research and production challenges the creator and viewer to think and learn differently than in textual-based methods. In these animations, the text leads an argument mainly driven by the visual sources, but the thorough examination of historical data and the intellectual research process upon which the videos were made are equally balanced with the ones demanded to traditional scholarship and publication.

The animation designed for our project is titled 'Creating the Monastic Site: from the origins to the 19th century'.[30] It is structured around a vertical timeline that moves from the 7th century to the early 19th century. This timeline divides each video frame into two parts. The left part is devoted to show the sources and built remains; that is, a selection of the historical or contemporary textual and non-textual data collected and used as a foundation upon which the digital recreations were generated. In this part of the animation we can find excerpts of historical texts –which are transcribed or shown as a scanned image of the original document-, historical and present photographs –including the ones of current remains of past buildings-, and some historical plans, though very few are preserved from the period chosen. The right part of the animation is wider. Besides, it is divided into three parts. 2D maps of recreated past phases take up one part. To the right side, another equal-size part of the video layout is fully devoted to showcase parallel the 3D models. In the lower area of the animation we find short texts, in English and Spanish, to lead the narrative as well as the needed references to historical sources used (Figure 3).

This structure and design aims to make readable the spatial transformation of the monastic site through the interaction between 2D and 3D visualizations with historical data and the short textual narrative, all of them around a timeline in motion. It also tries to clearly show the spatial changes at each phase by highlighting them with a fill colour. This way human eye easily finds the focal point at any moment of the animation. Moreover, it intends to make legible the

immediate relationships between each spatial change and sources, but also the distinctions between evidence and hypothesis with a colour code in the 2D maps. The 3D models helps to focus the viewer attention on the changing space by presenting an abstract rendering, instead of a realistic one. The latter would be an option to consider in the future creation of a virtual environment of the monastic site to get a sense of place that privileges the immersive nature of the visualization instead of the spatial-centric view.[31] The understanding of the evolution process is also aided by the pace of the animation that gives public time enough to read, watch, and understand the continuous process of spatial changes over time. All in all, legibility and intellectual transparency are core principles behind the animation structure and design.[32]

In order to make this animation, we created 302 video frames built upon 27 maps and 27 3D models that visualize the evolving nature of the monastic site (Figure 4). All these digital reconstructions were expressly rendered for the animation with a specific size and point of view maintained all along 30-minutes video length, approximately. The animation does not show isolated pre-selected stages or a series of the most important changes. On the contrary, this digital technology allows us to depict time and to show the continuous multiple phases in the centuries-old process of spatial transformation at San Julián de Samos. This is much more difficult, or even highly unlikely to achieve with analogue forms of dissemination.[33] Therefore, this feature makes possible to be more rigorous when we analyse and show each historical change, as the latter has not been limited to just one moment or time period. The analysis and the final product encompass changes in their temporal continuity.

The main focus in this animation is the couple of a map and a 3D model, previously generated to show spatiotemporal changes (Figure 5). To visualize spatial change, either 2D or 3D, involves shaping it in a graphic way. To visualize is to make something visible to the human eye, something that was previously abstract. In architectural history, the latter might be an entity that was lost or one that currently extant, but was deeply altered over time; but it might be also the project designed and never built to transformed or redefined the existing entity. To make these digital visual reconstructions involves dealing with questions of scale, shape, measures and relations between the different parts of each architectural artefact analysed and its

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context that conventional scholarship is unlikely to face. This happens due to the tools used for the research that do not allow nor require the kind of knowledge that making digital visualizations implies.[34] As a consequence, a set of questions are not addressed, and the analysis derived is not as rigorous as the former. As Paul Jaskot argues when he reflects about digital methods of social network analysis and spatial analysis, 'we do this work not merely because we can – we do it because it is analytically the most rigorous'.[35]

Making this animation demanded a thorough historical analysis to approach the whole complexity of the question of change over time. When we display a timeline in motion, we cannot dismiss the examination of any stage of the whole process of transformation; that is, there cannot be any temporal gap from an analytical point of view. All changes and transitions from one to another must be visualized when they took place, based on historical sources, but also dealing with their ambiguity. In the animation, we are not creating a frozen image of a particular moment of temporal transformation, but a series of the multiple phases in motion that, on the whole, defined the continuous transformation of a complex built environment (Figure 6). Time factor is depicted by the animation, but this implied rigorousness in our analysis and technical development that other means of dissemination do not demand. As a consequence, through the process of making the animation, we discovered that we gain a better understanding of the changes and their relationships and, by doing so, we are able to enhance everyone's engagement with an ever-changing environment.[36]

The animation is, in fact, a diachronic model in motion of spatiotemporal changes that integrates multiple data and research outputs in a single digital product prepared for public dissemination. The user is able to watch a set of complimentary contents in each single step or time stage of the animation: a 2D map, a 3D model, a selection of data and a short textual narrative. Each of them plays a different role in the virtual final product. In other words, the added value of the animation emerges from the combination of disparate information and spatial representations altogether. This way, we consider that it does overcomes some limitations of other type-focused means of dissemination.

The monastery of San Julián de Samos and its context is a dynamic architecture and has gone through different phases of changes and development. Our main goal is to understand and communicate the evolving nature of the complex built environment. As a result, the spatial, temporal, material, human and historical aspects of the monastic architecture do not lend to become an isolated geometric representation. One 2D map or plan showcases the monastic spaces in relation to each other and their context at a specific time period. It makes visible the formal and functional relations within the whole monastic compound. The 3D model of the same time period allows humans to better visualize the past physical realm as it adds a third present in the world that cannot be achieved in 2D. This gives every user on the product a better, more natural, intuitive way to understand the historical space. Both are tools that allow us to virtually visit a past space that no longer exist, because it is lost -as it happens with the medieval church and cloister-, deeply altered, or just imagined and never built.

In any case, a single 3D model is as abstract as one 2D map in what refers to spatiotemporal knowledge, as it represents a frozen stage of an alive and never complete process. In our work we are interested in the changing space and the connections between each stage, so we explore no fewer than twenty-seven phases of the site's biography. When we represent the 2D map of each stage together with the 3D model we extend our sensory reach and minimize the short-comings of their use in solitude. We can better understand, first, and then showcase, why a particular change took place, what the spatial change tells us about people who designed and lived in that space, and how this change is related to the earlier stage, the one before it, but also the successive architectural evolution, to cite only a few set of questions.

By adding to the previous graphical contents a textual narrative we seek to promote the engagement of public, which is a key factor in the future conservation of cultural heritage as ICOMOS charters stress. If we presented the graphical outputs without any sort of narrative, users may feel lost or bore as they watched a predefined animation. With a short explanation of the changing process at each time period, we aim to keep the goal of the animation in user's mind as well as their attention. This way, our objective is to further their interest and learning experience as well as the future success of the digital product.

The narrative is not a long-form text as it could be in an academic publication. Here the long-form content is mainly graphical as we seek an effective communication. However, the animation also includes research data such as historical photographs or archival documents that gives the user a sense of seriousness and transparency in the process of learning, without being overloaded with information that could after explore. Here we interrogate the narrative mode through which the visual and textual evidence and previous research outputs are gathered to present a coherent and effective story. The animation aims to become a permanent part of the site's interpretative infrastructure without the high cost, maintenance and development complexity that other digital technologies demands, such as VR or AR.

This animation as a language for communication about research in cultural heritage opens up new vistas of public dissemination produced as both scholarship and public outreach. It is limited as any other means of presenting the past, but it also creates new opportunities as it is not only a model constructed from words and fixed images, but also movement through time which is closer to the human real experience of spatiotemporal changes.

CONCLUSIONS

In the context of our project about the monastic site of San Julián de Samos, we work outside conventional practices in the field of history of monastic architecture by having a focus on space and on its dynamic transformation over time, by using digital visualization and by being interdisciplinary, in order to gain and communicate new knowledge about this complex built environment. With the process of making the animation we move the project towards a new stage focused on the engagement of a broader audience in understanding how the monastic site evolved in a specific time period. Along with the animation, we are working on the implementation of other means of dissemination based on web-mapping and virtual reality[37] all of which involve the publication of a two-dimensional record of the computer-based visualization outputs and their migration into different formats. These are strategies that ensure access and long-term sustainability of the digital outcomes and documentation, as the London Chapter (2009) highlights.

The animation can dynamically visualized the past realms in their temporal continuity through a combination of images, historical sources, maps, models and short texts that favours an easy, but reliable quick perception of spatial changes by the viewer. It was designed as intellectually and technically rigorous as other established means of communication. We argue that the work developed proved that an animation is an effective means to show the research outcomes outside and in academia, especially for case studies in which graphic methods are an integral part of the research.

Moreover, in the process of making the animation we also discovered a set of benefits for our project that turn multimedia production into a research tool for cultural heritage itself, as it happens in the case of intellectual drawing of maps and models with digital technologies. An animation extends the potentials of static representations by re-creating space in motion. In other words, it allows the scholar to visualize time and, as a result, it comes to be a means that demands a thorough reasoning behind the process of making to ensure an accurate and integral study of spatial changes in time continuity. This way, we consider that the animation becomes a powerful tool in which the act of making leads the scholar to a critical evaluation of the research sources and outputs in order to remove the gaps between the abstract space of texts and the concrete space of the graphic visualization of a changing built environment, but also to achieve a coherent dialogue between them within a dynamic representation.

All in all, not only does the animation turn into a means of dissemination, but it is also a tool for historical analysis, and both aspects are, in our view, an added value to the existing project, which has been enhanced on the academic, pedagogical and communicative levels.

END NOTES

[1] ICOMOS, 'ICOMOS charter for the interpretation and presentation of cultural heritage sites' (Paris, 2008), https://www.icomos.org/en/resources/charters-and-texts, last accessed 6 April 2020.

[2] See, for example, D. Favro, 'Se non è vero, è ben trovato (If not true, it is well conceived) Digital immersive reconstructions of historical environments', *Journal of the Society of Architectural Historians*, 71-3 (2012), 273-277; N. Camerlengui and G. Schelbert, 'Learning from Rome: making sense of complex built environments in the digital age', *Journal of the Society of Architectural Historians*, 77-3 (2018), 256-266; A. Giordano and K. L. Huffman, 'Advanced technologies for historical cities visualization', *Disegnarecon*, 11-21 (2018), ED.1-ED.3.

[3] S. Münster, T. Köhler and S. Hoppe, '3D modeling technologies as tools for the reconstruction and visualization of historic items in humanities. A literature-based survey', in A. Traviglia, ed., *Across Space and Time. Papers from the 41st Conference on Computer Applications and Quantitative Methods in Archaeology* (Amsterdam, 2015), 430-411.

[4] B.K. Tan and H. Rahaman, 'Virtual heritage: reality and criticism', in T. Tidalfi and T. Dorta, *Joining Languages, Cultures and Visions: CAADFutures 2009* (Montréal, 2009)*, 143–156.

[5] J.P., Farrugia and F. Mérienne, 'Augmented reality', in A. Bentkowska-Kafel and L. MacDonald, ed., *Digital Techniques for Documenting and Preserving Cultural Heritage* (Croydon, 2018), 207-210.

[6] D. Harris, 'Architectural history's futures', *Journal of the Society of Architectural Historians*, 74-2 (2015), 147-151; L. King, J. F. Stark and P. Cooke, 'Experiencing the digital world: the cultural value of digital engagement with heritage', *Heritage & Society*, 9-1 (2016), 76-101.

[7] D. Calabi, 'Memory, narrative and display – city museums in recent initiatives and debates', *Planning Perspectives*, 24-3 (2009), 385–390; E. Svalduz, 'Researching, interpreting and representing: reflections on a few experiences (M9, Carpi, VV and the Accademia)', in D. Calabi, ed., Built City, *Designed City, Virtual City. The Museum of the City* (Rome, 2013), 121-135; C. Monteleone, I. Friso and F. Panarotto, 'For the fifth centenary of the ghetto in Venice: virtual transformations of architecture and city at the Doge's palace', *Disegnarecon*, 9-17 (2016), 3.1-3.12; P. Borin, 'An integrated information management system for consistent historic narratives and visualizations. Ghett/App for the Venetian ghetto', *Disegnarecon*, 9-17 (2016), 4.1-4.9.

[8] S. Chattopadhyay, 'Architectural representations, changing technologies, and conceptual extensions', *Journal of the Society of Architectural Historians*, 71-3 (2012), 270-272; D. J. Staley, *Computers, Visualization, and History: How New Technology Will Transform Our Understanding of the Past* (Hoboken, 2015), 123-127; E. Sullivan, A. David Nieves and L. M. Snyder, 'Making the model: scholarship and rhetoric in 3-D historical reconstructions', in Jentery Sayers, ed., *Making Things and Drawing Boundaries. Experiments in the Digital Humanities* (Minnesota, 2017), 301-316.

[9] The main ones are the following: 'London chapter for the computer-based visualization of cultural heritage, version 2.1', February 2009, http://www.londoncharter.org/index.html/, last accessed 6 April 2020; 'The Seville principles. International principles of virtual archaeology', 2011.

[10] The Digital Samos project is accessible at: https://digitalsamos.udc.es/index.html. In August 2018, it was selected by the Getty Foundation to feature its Digital Art History Initiative page, https://www.getty.edu/foundation/initiatives/current/dah/index.html. In February 2020, it was awarded with a special mention in the second edition of the Hispanic Digital Humanities Prizes, HDH 2020.

[11] The main studies about the history of the monastery of San Julián de Samos from art and religious approaches are the following: A. López Peláez, El monasterio de Samos: estudio histórico (Lugo, 1894); M. Castro, 'Un monasterio gallego', *Boletín de la Comisión Provincial de Monumentos Históricos y Artísticos de Orense*, IV/82-83-84-85-86 (1912): 113-120, 136-143, 163-171, 189-195, 201-208; M. Durán, *La Real Abadía de San Julián de Samos: estudio histórico-arqueológico* (Madrid: 1947); P. Arias Arias, *Historia del Real Monasterio de Samos* (Santiago de Compostela, 1950); P. de la Portilla Costa, *Monasterio de Samos Guía histórico-artística* (Lugo, 1978); M. Arias Cuenllas, *Historia del monasterio de San Julián de Samos* (Samos, 1992); P. de la Portilla Costa, *Monasterio de San Julián de Samos. Historia de dos restauraciones (1880 y 1951)* (A Coruña, 2003); M. C. Folgar de la Calle, 'A construcción do gran mosteiro de San Xulián de Samos. Cen anos de transformacións arquitectónicas', in E. Fernández Castiñeiras and J. M. Monterroso Montero, ed., *Arte benedictina nos camiños de Santiago. Opus Monasticorum II* (Santiago de Compostela, 2006), 149-178; M. C. Folgar de la Calle and A. E. Goy Diz, *San Xulián de Samos: Historia e arte nun mosteiro. Opus Monasticorum III* (Santiago de Compostela, 2008).

[12] The research project was started in: E. López-Salas, 'The monastery of San Julián de Samos (Lugo-Spain), a study and interpretation of the monastic space and its evolution' (unpublished PhD. Thesis, University of A Coruña, 2015).

[13] The instruction was lead by Paul Jaskot, Victoria Szabo, Mark Olson, Hannah Jacobs, Ed Triplett, Ludovica Galeazzo, and Kristin Huffman, from Wired! Lab at Duke University (USA), and Andrea Giordano, Cosimo Monteleone, and Paolo Borin, from Università degli Studi di Padova (Italy). A workshop overview is available at https://sites.duke.edu/duke_arthist_3dgeo/. P. B. Jaskot et al., 'Shaping the discipline of digital art history. A recap of an advanced summer institute on 3-D and (geo)spatial networks', *The Iris. Behind the Scenes at the Getty*, December (2018), https://blogs.getty.edu/iris/shaping-the-discipline-of-digital-art-history/, last accessed 4 May 2019.

[14] The official website of the project 'Visualizing Venice' is available at: http://www.visualizingvenice.org/visu/.

[15] Venice International University, *VIU Summer School - Visualizing Venice Summer Institute - Advanced Topics in Digital Art History: 3D (Geo)Spatial Networks Brochure*, 2017, https://www.univiu.org/study/summer-schools/visualizing-venice, last accessed 12 December 2017.

[16] Venice International University, *VIU Summer School - Visualizing Venice Summer Institute*.

[17] We used regular CAD instead of historical BIM because of the limitations that the latter still presents for historical reconstruction. The main one is the difficulty to properly describe the actual irregularities of historical complex built environments, which are key in our case study. The snags of HBIM for historical reconstruction are examined by S. Boeykens, S. Maekelberg and K. De Jonge, '(Re-)creating the past: 10 years of digital historical reconstructions using BIM', *International Journal for Digital Art History. Digital Space and Architecture*, 3 (2018), 62-85, https://doi.org/10.11588/dah.2018.3.32544, last accessed 16 January 2021. Cited here at 72-75.

[18] A. Betkowska-Kafel highlights that 'the visualization-based method of scholarly investigation always involves thorough examination of primary and secondary sources in a variety of formats', and she also argues that this method 'may only be recognized as valid and ethical (...) when accompanied by paradata, i.e., the documentation of the evaluative, analytical, deductive, interpretative, and creative decisions made in the course of research'. A. Betkowska-Kafel, '"I bought a piece of Roman furniture on the internet. It's quite good but low on polygons."-Digital visualization of cultural heritage and its scholarly value in art history', *Visual Resources: An International Journal on Images and Their Uses,* 29/1-2 (2013), 38-46, https://doi.org/10.1080/01973762.2012.761117, last accessed 18 May 2019. Cited here at 38-39.

[19] No fewer than four hundred computer-aided design 2D maps, including building plans, sections, 3D models, and analytical drawings, among others, were created for the research.

[20] For a deeper insight in the added research value, see: E. López-Salas, 'The reform of Samos abbey between 1491 and 1637: uncovering the logic of the architectural changes', *Imago Temporis. Medium Aevum*, 11 (2017), 345-383, https://doi.org/10.21001/itma.2017.11.14, last accessed 15 January 2021; E. López-Salas, 'Decoding the planning rules of the monastic urban and rural forms around Samos abbey', in M. Abel, ed., *Medieval Urban Planning: The Monastery and Beyond* (Newcastle upon Tyne, Cambridge Scholars Publishing, 2017), 46-74.

[21] A comprehensive list of the research outputs of the project 'San Julián de Samos: a digital approach' can be found at: https://digitalsamos.udc.es/research.html.

[22] The animation might be used in a future exhibition at the monastery that will offer public the chance of learning how this monastic site was conceived and change over time, if we get the needed funding.

[23] An effort to create evaluative criteria in the field of graphic research outputs is needed, as much as in the case of digital scholarship. The lack of recognition and scarce funds in the field of digital art and architectural history are permanent hurdles, difficult to assume by young scholars. In Spain digital scholarship is not still considered for academic promotion, although some efforts to establish evaluative criteria have been carried out by the Society of Hispanic Digital Humanities (HDH) and the network ARACNE for the last years. See: Asociación de Humanidades Digitales Hispánicas (HDH), 'Documento de recomendaciones para la evaluación y reconocimiento de la investigación llevada a cabo en el ámbito de las humanidades digitales', https://humanidadesdigitaleshispanicas.es/la-

asociacion/documentos/, last accessed 17 April 2020; ARACNE – Red de Humanidades Digitales y Letras Hispánicas, 'Criterios', http://www.red-aracne.es/recursos/criterios, last accessed 7 April 2020.

[24] Laboratorio di Disegno e Rappresentazione (LDR Lab) - ICEA at Università degli Studi di Padova, *Construire la città dal XX secolo ad oggi*, 2015. Video for the exhibition *Costruire il Tempio*, Città di Carpi (Italy), September 18, 2015-june 6, 2016, curated by Andrea Giordano, Manuela Rossi, and Elena Svalduz.

[25] VISU Lab at Università Iuav di Venezia, and LIM Lab and LDR Labs at Università degli Studi di Padova, *History of a Site and Its Transformations. From 'Carità' alle 'Gallerie dell'Accademia'*. Video, https://drive.google.com/file/d/0B7upxEtJ8JHNa0NFT0dxdUFVVXM/view?pref=2&pli=1. E. Svalduz, 'Architectural and urban change over time. The school, church and monastery of Santa Maria della Carità', in K. L. Huffman, A. Giordano and C. Bruzelius, ed., *Visualizing Venice Mapping and Modeling Time and Change in a City* (New York, Routledge, 2018), 36-42.

[26] C. Monteleone, 'Visualizing Venice. A historical overview of the role and application of architectural and urban modeling', in Huffman, Giordano and Bruzelius, *Visualizing Venice Mapping and Modeling Time and Change in a City*, 69-70; Svalduz, 'Architectural and urban change over time', 38-39.

[27] Betkowska-Kafel, 'I bought a piece of Roman furniture on the internet', 42.

[28] S. Hatchwell et al, 'Born digital: early career researchers shaping digital art history', *Visual Resources: An International Journal on Images and Their Uses*, 35/1-2 (2019), 171-179, https://doi.org/10.1080/01973762.2019.1553448, last accessed 18 May 2019. Cited here at 173-174.

[29] This follows two main principles of the 'London chapter for the computer-based visualization of cultural heritage': to 'promote intellectual and technical rigour in digital heritage visualisation', and to 'ensure that computer-based visualisation processes and outcomes can be properly understood and evaluated by users'.

[30] The animation is accessible at the project website: https://digitalsamos.udc.es/animation.html.

[31] S. Jeffrey, 'Challenging heritage visualization: beauty, aura and democratisation', *Open Archaeology*, 1 (2015), 144–152, https://doi.org/10.1515/opar-2015-0008, last accessed 16 January 2021.

[32] Presenting the evidence that has been used to produce computer reconstructions of historical buildings is needed to create reliable heritage visualizations and to walk towards the degree of scientific credibility that is only assigned to peer-reviewed papers up to now. This is called "Intellectual transparency" by the London chapter. C. Capulli, C. Mosconi and F. Nevola, 'The 3D model of the lost church of San Pier Maggiore. From primary data to a transparent visualization for public engagement', unpublished paper presented at the *International Conference on Cultural Heritage and New Technologies*, Vienna, Austria, 4-6 November 2019; Betkowska-Kafel, "I bought a piece of Roman furniture on the internet', 42-43.

[33] S. Bonde, A. Coir and C. Maines, 'Construction–deconstruction–reconstruction: the digital representation of architectural process at the abbey of Notre-Dame d'Ourscamp', *Speculum. A Journal of Medieval Studies*, 92-S1 (2017), S288-S320, https://doi.org/10.1086/694169, last accessed 28 April 2019. Cite here at S290.

[34] S. Münster, K. Friedrichs and W. Hegel, '3D reconstruction techniques as a cultural shift in art history?', *International Journal for Digital Art History. Digital Space and Architecture,* 3 (2018), 38-60, https://doi.org/10.11588/dah.2018.3.32473, last accessed 13 April 2019. Cited here at 49.

[35] P. B. Jaskot, 'Digital art history as the social history of art: towards the disciplinary relevance of digital methods', *Visual Resources: An International Journal on Images and Their Uses*, (2019), 21-33, https://doi.org/10.1080/01973762.2019.1553651, last accessed 18 May 2019. Cited here at 24.

[36] Plans and models present isolated moments in a building's life, but an animation force us to face the complete process of spatiotemporal changes. As a consequence, it emerges what Elena Svalduz called 'a new form of intellectual reasoning *through* modeling'. Svalduz, 'Architectural and urban change over time', 36.

[37] E. López-Salas, A. Xuíz-García, Á. Gómez and C. Dafonte, 'CultUnity3D: a virtual spatial ecosystem for digital engagement with cultural heritage sites', *Proceedings of the 3ʳᵈ XoveTIC Conference*, 54-1 (2020), https://doi.org/10.3390/proceedings2020054027.

FIGURES

Figure 1. Phased computer-aided design reconstructions of the monastic site of San Julián de Samos in four stages: the High Middle Ages, the Late Middle Ages, the early 17th century and the mid-18th century. Author.

Figure 2. Workflow diagram of the research methodology and the process of the animation production. Author.

Figure 3. Layout of the animation 'Creating the Monastic Site: from the origins to the 19th century': timeline, 2D maps, 3D models, photographs, sources and narrative. Author.

Figure 4. Frames 2 to 11 of the animation 'Creating the Monastic Site: from the origins to the 19th century' presenting the general structure. Author.

Figure 5. Frames 80 to 89 of the animation 'Creating the Monastic Site: from the origins to the 19th century' showing the village of Samos in 1553 and the first steps towards the construction of the Cloister of the Nereids. Author.

Figure 6. Frames 150-159 of the animation 'Creating the Monastic Site: from the origins to the 19th century' showing the work in progress to build the Big Cloister and a new church from late 17th century. Author.