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Franciscan Landscapes

Conservation, Protection and Use of Religious Cultural Heritage in the Digital Era

vol. 2

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UNIVERSITÀ DEGLI STUDI FIRENZE | DIDA DIPARTIMENTO DI ARCHITETTURA

This volume collects the papers presented at the concluding conference of the European project 'F-ATLAS: Franciscan Landscapes: The Observance between Italy, Portugal and Spain' that took place in Assisi, May 11-13, 2023.
The publication underwent a peer-review-based acceptance and qualitative evaluation procedure entrusted to the conference's Scientific Committee using the double peer-blind review system.

F-ATLAS CONFERENCE – Franciscan Observance Landscapes, Assisi, May 11-13, 2023.

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'F-ATLAS – Franciscan Landscapes: the Observance between Italy, Portugal and Spain' project was funded in 2020 by the JPICH 2019 Conservation, Protection and Use Call.

Project Leader: Università degli Studi di Firenze.
Principal Investigators: ISCTE Instituto Universitário de Lisboa, Universitat de Barcelona, Universidade Católica Portuguesa.
Associate Partners: ICOMOS Portugal, Sisma srl, Regione Umbria, Direção Regional de Cultura do Centro, Provincia Serafica di San Francesco d'Assisi dei Frati Minori.

in copertina
Façade of the Basilica di Santa Maria degli Angeli, Assisi (Italy). Drawing by Stefano Bertocci.

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ISBN 978-88-3338-222-7

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DIGITAL DOCUMENTATION FOR THE COMMUNICATION AND ACCESSIBILITY OF CULTURAL HERITAGE

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Abstract

This paper focuses on the possibilities offered by digital documentation to create tools for the dissemination and accessibility of the Franciscan Observance heritage. The two case studies have been selected for their particular characteristics, linked to the historical context of the Observance, the landscape-territorial context and their current use. The idea examined for the first case study is to allow individuals with reduced mobility to access virtually all the conventual spaces that are physically not accessible, solving the issue in a non-invasive way, exploiting the potential offered by the use of digitally acquired data to create a virtual tour. In the second case, the problem of the inability to access a site classified as a Portuguese National Monument was addressed. Thus, a temporary modular exhibition pavilion was designed to contain installations that provide information on the history and architectural development of the convent and fortress and can also be used by blind and visually impaired people.

Keywords: Franciscan Observance, Cultural Heritage, remote accessibility, virtual tour, tactile map

opposite page
Fig. 1
Aerial view of the Eremo. (Photo credits: Federico Ferrari, Marco Medici).

1. Introduction

This contribution deals with the results obtained in the final phase of the Project, focused on the analysis of the data collected during the study of the case studies and the project opportunities offered by them. The research methodology exploits historical and archival sources and integrated digital survey techniques to document and study the network of Observant convents and the routes that connect them for their conservation, protection, and enhancement. This paper illustrates two hypotheses for communicating conventual complexes — one in Assisi, Italy, the other in Caminha, Portugal — and making them accessible to users.

2. Research goals

Many of the complexes analysed by the F-ATLAS project have access problems: some are located outside the main tourist or communication routes, others are located in sites challenging to reach on foot or using transport, others have a spatial distribution rich in height differences and narrow passages, some are in a state of neglect or ruin, or are closed. Therefore, one of the project's aims is to identify guidelines for managing and processing digital data collected during survey campaigns, to produce digital elaborations that allow users to access places of interest virtually. Thanks to the potential offered by the datasheet census and georeferencing in the GIS database, it is also possible to correlate the case studies to create thematic networks of points of interest at the territorial level.

3. Historical framework and architectural features

The two case studies were selected for their particular relevance to the themes dealt with in the F-ATLAS Project and for their intrinsic architectural and landscape characteristics. The historical context in which both convents developed is closely linked to the events of the Franciscan Observance. Therefore, the two sites were considered valid case studies for formulating design hypotheses that would fit into the research of Heritage communication.

3.1. Eremo delle Carceri, Assisi, Italy

The Eremo delle Carceri is a sacred site located on Mount Subasio, near Assisi, Italy. It was established in the 13th century around a pre-existing chapel dedicated to the Holy Mary. The caves where St. Francis and his companions lived in seclusion can still be seen

within the sacred oak forest. The convent underwent architectural expansions by the Observant community, specially blessed Trinci and St. Bernardino of Siena, between the 14th and 15th centuries. The church of St. Bernardino, the refectory, and the dormitory were added during this period (Di Giampaolo, 2013; Mercurelli Salari, 2013). In 1602, the Eremo came under the Reformed friars' custody until the various Franciscan movements were unified in 1897 (Canonici, 1991). The Reformed friars worked to consolidate the architectural structures in the 17th to 19th centuries.

The Eremo has been recognised as a UNESCO World Heritage site since 2000 (https://whc.unesco.org/en/ list/990, accessed on 30 March 2023). The Eremo is part of the Umbrian romitorial complexes, along with other sites like S. Francesco a Tuoro, S. Maria della Spineta, SS.ma Pietà del Farneto, S. Bartolomeo di Cibottola, Scarzuola, Buonriposo, S. Michele a Baschi, Speco di Narni, and Romita di Cesi (Canonici, 1991). These complexes are strategically located near main cities and municipalities, emphasising widespread diffusion at the territorial level (Pellegrini, 1984). This choice of location served the religious communities' apostolic and meditative activities (Pellegrini, Paciocco, 2001;

Fig. 2
Aerial view of the fortress and convent of Santa Maria da Ínsua. Photo credits: Pietro Becherini.

Amonaci, 1997; Canonici, 1991).

3.2. Santa Maria da Ínsua convent, Caminha, Portugal

The Santa Maria da Ínsua convent in Caminha, Portugal, is one of the earliest Observance convents built in the country, along with three others in the Norte region. Founded in 1392 on a small island south of the river Minho mouth by Franciscan Observants from Spanish Galicia, it originated from an oratory built on the site of a pagan temple (Teixeira, 2010; Rodrigues et al., 2020). In the 17th century, the convent expanded and was surrounded by a fortress. However, in 1834, the Franciscans were forced to leave due to the dissolution of religious orders in Portugal. The Ministry of War managed the complex, followed by the Navy Ministry. In 1910, the fortress and convent were classified as National Monuments, but they are currently abandoned and inaccessible to the public. In 2016, a plan was made to lease the property for a lodging establishment, with construction adaptation scheduled for 2022-2023 (Becherini et al., 2022). The complex can be accessed by boat, with a ravelin protecting the main entrance of the fortress and four bastions and a wedge along the outer perimeter. Inside the fortress are military quarters and a powder magazine. The convent's buildings are arranged around a central cloister, with the church, chapter room, kitchen, refectory, vegetable garden, and sacristy distributed along its sides. The friars' cells are on the first floor. A digital survey in September 2021 revealed

that the fortress buildings were well-preserved, except the military quarters that lacked roofs. The convent buildings were in poor condition, with the first floor inaccessible due to gaps in the wooden floors. There were signs of restoration using incongruent materials, and degradation on the walls due to water movement from ocean tides entering the structures.

4. Data collection

Integrated digital survey campaigns were carried out for both convents, with LIDAR and aerial and close-range photographic instrumentation. The purpose was to acquire reliable morphological and dimensional data of the internal and external spaces of the two convents and the surrounding context in compliance with the project's primary goals. Simultaneously, bibliographical and archival research was carried out to gather historical information about the evolution of the conventual complexes over the centuries and their relationship with the events concerning the movement of the Franciscan Observance (Cottini et al., 2023; Rodrigues et al. 2020). The methodologies employed were consistent with those used for the documentation of the other case studies of the F-ATLAS project and consolidated within the research team (Cioli, Cottini, u.p.; Cottini, Becherini, 2023; Soler et al., 2023; Volzone et al., 2023; Becherini et al. 2022; Cioli, Lumini, 2021; Bordini et al., 2021; Bertocci et al., 2020; Pancani, 2017). The raw data acquired were eventually processed in line with the project's specific objectives to obtain heterogeneous data: 3D point clouds, three-dimensional mesh models, and cataloguing data sheets – that can be used to investigate the collected material. The data is then correlated within a GIS database, which also provides geospatial information on the network of convents between Italy, Portugal and Spain.

4.1. Accessibility issues

The digital survey of the Eremo delle Carceri highlighted some critical access, mainly due to the volumetric increases made over time and the architecture's adaptation to the place's topography. Steep gradients characterise the distribution of the convent rooms. The paths that lead inside the refectory, to the cells of the friars on the upper floor, to the cave of St. Francis, and to the caves of the hermits within the sacred wood are connected by paths with strong gradients, irregular steps or passages reduced in height and width (Cottini, 2022a). The criticalities of access to the convent of Santa Maria da Ínsua appear evident considering its particular location: the transport service through small boats is managed by local companies and is available only at certain times of the day, depending on the tides, and on the island there are no paths dedicated to people with disabilities, nor refreshments and toilets. Access to the fortress's interior is managed exclusively by the association Diver (https://diverminho.

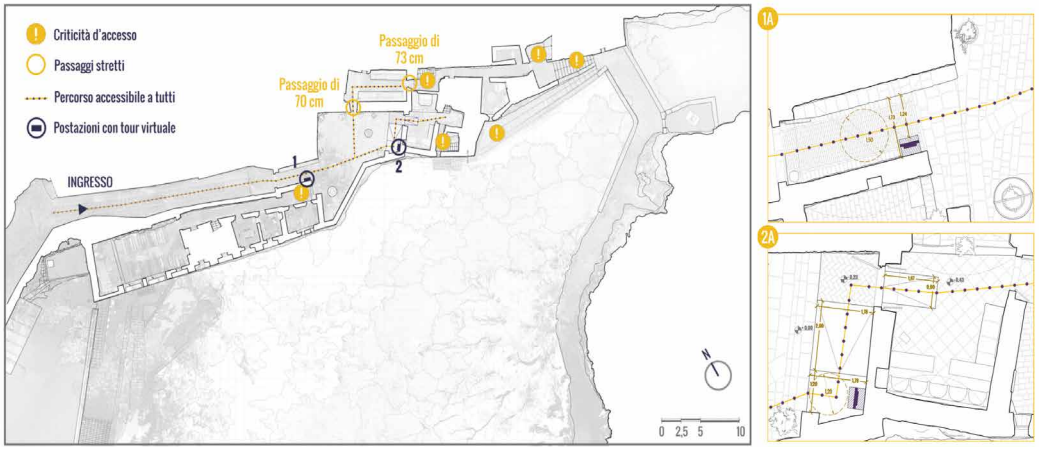


Fig. 3
Accessibility issues inside the Eremo delle Carceri complex. Credits: Carlotta Assirelli.

pt) and is only possible through defined routes to avoid unsafe structures. Considering that the entire complex will be converted into luxury accommodation in the coming years, it has been established that a remote-use system is the best solution to continue ensuring access to this protected heritage (Volzone et al., 2023).

5. The projects

The research focused on the possibility of using data obtained from integrated surveying techniques and historical documentation to create valuable products for the dissemination and accessibility of the two conventual complexes.

5.1. A virtual tour for the Eremo delle Carceri

The proposal for the Eremo delle Carceri includes the design of an interactive portal accessible both remotely via the web and on-site through touch-screen totems. The portal collects various data, including a virtual tour of the conventual spaces, historical and geographical information, multimedia materials, and details on how to reach the location. The data synthesises *in situ* and archive research activities, presented user-friendly for a non-specialised audience. The design model follows Garrett's experience design approach, prioritising the user's expectations and choices throughout the product development (Tosi, 2018; Garrett, 2011). Historical information is summarised and presented along a timeline, focusing on significant events in the Eremo's history, accompanied by images. The evolution of the convent is showcased through three-dimensional models, illustrating its progressive growth and changes over time.

opposite page
Fig. 4
Virtual Tour of the internal and external spaces of the Eremo delle Carceri. Credits: Carlotta Assirelli.

Accessibility information is presented on interactive maps, including access methods and cycling-pedestrian paths in Subasio Park and the Sacred Wood of the Eremo. The virtual tour employs spherical photographs connected along a defined path, providing a 360° view of the external and internal environments of the Eremo. Interactive info boxes offer additional information about the decorative elements and historical context of the settings. The virtual tour is especially important for enabling individuals with reduced mobility to virtually access spaces that may not be physically reachable (Cottini, 2022a; D'Acunto, Friso, 2022).

5.2. A pavilion for the convent and the fortress of Santa Maria da Ínsua

The pavilion design for the convent and fortress of Santa Maria da Ínsua aims to preserve the memory of this heritage, which is currently in a state of decay and will soon undergo significant changes, making it inaccessible. The pavilion consists of four identical modules. It creates a path that narrates the history of Santa Maria da Ínsua and provides information about thematic routes connecting it to other regional and national points of interest. The modules are made of mobile panels, allowing flexibility in appearance to suit specific needs and maintaining a connection with the surrounding area. The project focused on designing a tactile product for blind and visually impaired individuals to explore the spaces of the convent and fortress, understand their layouts, and learn about the original uses of the rooms. A tactile map was created using laser-cut plexiglass layers. The ground floor plan of the architectural complex was simplified and schematised to enable blind individuals to form a mental image of the represented architecture. The fortress and convent are visually contrasted through red and white plexiglass plates, respectively, with a distinguishable touch pattern applied to the fortress.

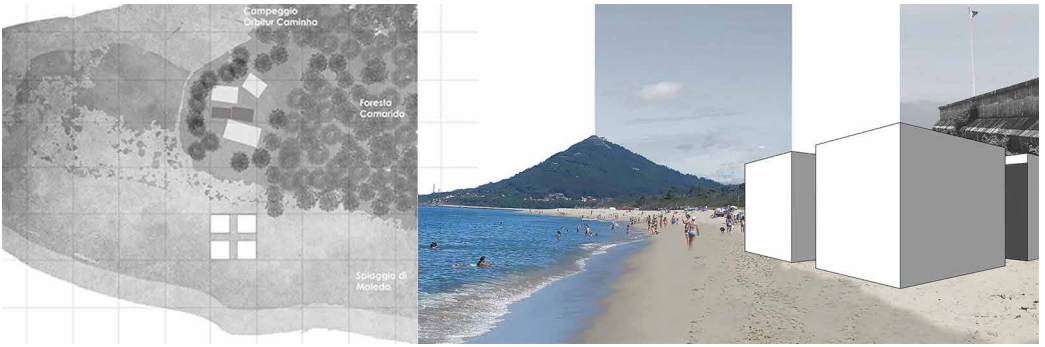


Fig. 5
The pavilion inserted in the context of the beach of Moledo (credits: Luigi Perrotta).

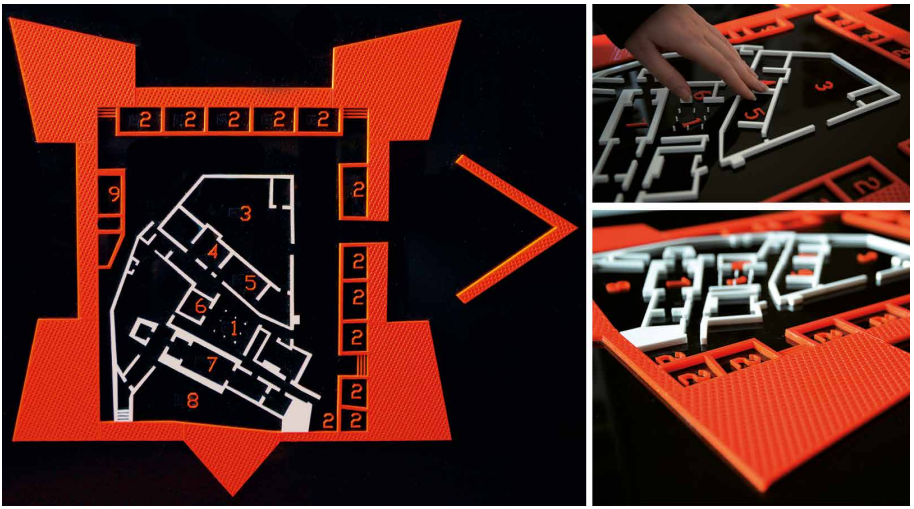
Arabic numerals and Braille labels identify the different functions of the fortified and conventual spaces, helping blind and visually impaired visitors comprehend the various architectural areas. The design of the tactile map considered ergonomic aspects, including the threshold for tactile sensation, which influenced the data synthesis and product dimensions (Cottini, 2022b). This approach ensures the map is user-friendly and enhances the experience for individuals with visual impairments (Gussoni et al., 2008; Riavis, Cochelli, 2018).

6. Conclusions

The collected material from survey campaigns plays a crucial role in improving the communication and accessibility of Heritage sites. For the Eremo delle Carceri, a well-designed virtual tour is advantageous for on-site and remote use. The virtual tour allows visitors to explore inaccessible areas to those with physical impediments while disseminating information about the complex to a broader audience. The design hypothesis focuses on a non-invasive solution to maintain the site's nature while enhancing accessibility. Similarly, for Santa Maria da Ínsua, digital data collection enables the availability of Heritage elements to the public, even remotely. The data can be processed to create products for people with disabilities, such as tactile maps for the visually impaired and blind (Cottini, 2022b; Sdegno, Riavis, 2020).

Virtual digital tools aim to complement real experiences, not replace them. Heritage virtualisation involves scientific digitisation, designing access to digital content, studying User Experience, and training specialised personnel for managing digital Heritage. Geolocation and GIS technologies can integrate isolated architectural complexes into local tourist routes, further enriching the overall experience for visitors (Cottini, 2022a; Cottini, 2022b).

opposite page
Fig. 6
On the left, the tactile map of the convent and fortress of Santa Maria da Insua. On the right, some map details show the different tactile patterns used (credits: Luigi Perrotta).



Combining these operations widens the means of knowledge dissemination, preserving the essence of Heritage while embracing digital advancements (D'Acunto, Friso, 2022; Clini et al., 2022).

Bibliographical references

Amonaci A. M. 1997, *Conventi toscani dell'Osservanza Francescana*. Milano: Silvana Editoriale.

Becherini P., Volzone R., Cottini A. 2022, *A 3D model for architectural analysis, using aerial photogrammetry, for the digital documentation of the convent of Santa Maria da Ínsua, on the northern border between Portugal and Spain*, in Parrinello S., Barba S., Dell'Amico A., Di Filippo A. (eds.). *D-SITE. Drones - Systems of Information on culTural hEritage for a spatial and social investigation. Proceedings of D-SITE Conference*. Pavia, 16-18 June 2022, vol. 2, pp. 94-103. Pavia: Pavia University Press.

Bertocci S., Cioli F., Cottini A. 2020, *Paesaggi francescani: rilievo digitale e documentazione dell'Eremo delle Carceri ad Assisi, Umbria*, in Minutoli G. (ed.). *Simposio internazionale REUSO 2020. Restauro: temi contemporanei per un confronto dialettico.* Proceedings of the Conference. 30 October 2020, pp. 698-707. Firenze: didapress.

Bertocci S. 2020, *Paesaggi francescani: la regola dell'Osservanza tra Italia, Portogallo e Spagna*, in Bertocci S., Parrinello S. (eds.). *Architettura eremitica. Sistemi progettuali e paesaggi* culturali. Atti del V Convegno Internazionale di Studi. Firenze, 29-30 September 2021, pp. 302-307. Firenze: Edifir.

Bordini E., Brizzi S., Ferretti R. 2021. *Analisi preliminari per la documentazione del Santuario del Beato Antonio Vici a Stroncone: il contributo del rilievo digitale e della termografia*, in Atti del Convegno REUSO Roma 2021.

Bruno I. 2019, *Comunicazione e accessibilità culturale. L'esperienza di Museo Facile*, in Il capitale culturale, n. 20, 2019, pp. 297-325.

Canonici L. 1991, *I Francescani nell'Umbria. I - Storia della Provincia Serafica (1208-1991)*, Assisi: Edizioni DACA e Porziuncola.

Cioli F., Cottini A. (under publishing), *The convent of São Francisco do Monte in Viana do Castelo (Portugal): an integrated digital survey for the understanding of the architecture and its landscape*, in RIPAM9 Lisboa 2022 – Rencontres Internationales du Patrimoine Architectural Mediterraneen.

Cioli F., Lumini A. 2021, *Il Santuario del Sacro Speco di San Francesco a Narni. Rilievo architettonico e ambientale per la comprensione dei rapporti tra architettura e paesaggio*, in Atti del Convegno REUSO Roma 2021.

Clini P., Quattrini R., Nespeca R., Angeloni R., D'Alessio M. 2022, *In dialogo con i musei: innovazione e trasformazione digitale per una nuova visione del patrimonio*, in Bistagnino E., Battini C. (eds.). Dialoghi | Dialogues. Visioni e visualità | Visions and visuality. Proceedings of UID Conference 2022. Genova, 15-17 September 2022, pp. 505-520. Milano: FrancoAngeli.

Cottini A. 2022a, *La documentazione digitale per la comunicazione del Patrimonio Culturale: il caso dell'Eremo delle Carceri ad Assisi*, in Bistagnino E., Battini C. (eds.). *Dialoghi | Dialogues. Visioni e visualità | Visions and visuality.* Proceedings of UID Conference 2022. Genova, 15-17 September 2022, pp. 1432-1447. Milano: FrancoAngeli.

Cottini A. 2022b, *Digital documentation for the accessibility and communication of two Franciscan Observance convents*, in Càndito C., Meloni A. (eds.). DAI - Il Disegno per l'Accessibilità e l'Inclusione, pp. 462-475. Alghero: PUBLICA.

Cottini A., Becherini P. 2023, *Integrated investigation methodologies for architectural Heritage conservation and promotion: La Romita di Cesi (TR), Umbria, Italy*, in VITRUVIO - International Journal of Architectural Technology and Sustainability, 8, pp. 84-93.

Cottini A., Guarducci A., Salvestrini F. 2023, *I frati Minori e la regolare Osservanza: storia, diusione, insediamenti. Primi report da una ricerca in corso*, in Ravesi R., Ragione R., Colaceci S. (eds.) *Rappresentazione Architettura Storia - La diusione degli ordini religiosi in Italia e nei Paesi del Mediterraneo tra Medioevo ed Età Moderna*, tomi I-II, Atti del Convegno Internazionale 10-11 maggio 2021.

D'Acunto G., Friso I. 2022, *Narrative codes and expressive styles in the Virtual Museum*, in Bistagnino E., Battini C. (eds.). *Dialoghi | Dialogues. Visioni e visualità | Visions and visuality*. Proceedings of UID Conference 2022. Genova, 15-17 September 2022, pp. 531-538. Milano: FrancoAngeli.

Di Giampaolo 2013, *Pietre che parlano. Conventi chiusi e Conventi aperti della Provincia Serafica di San Francesco*, Assisi: Provincia Serafica di San Francesco dei Frati minori dell'Umbria.

Galofaro F., Gasperi D., Proni G., Ragonese R. 2013, *Semiotica e ICT per i Beni Culturali*. Milano: FrancoAngeli.

Garrett J.J. 2011, *The elements of User Experience*. Berkeley: Peachpit.

Gussoni M., Parlangeli O., Tosi F. 2008, *Ergonomia e progetto della qualità sensoriale*. Milano: FrancoAngeli.

Hollebeek L., Clark M., Andreassen T., Sigurdsson V., Smith D. 2020, *Virtual Reality through the Customer Journey: Framework and Propositions. In Journal of Retailing & Consumer Services*, 55 (July). https://doi.org/10.1016/j.jretconser.2020.102056 (last accessed on 28/02/2022).

Mercurelli Salari P. 2013, *Eremo delle Carceri*. Perugia: Quattroemme.

Pancani G. 2017, *Rilievo delle lastre tombali del Camposanto Monumentale di Piazza dei Miracoli a Pisa*, in Restauro Archeologico, 2/2017, pp. 74-89. DOI: I: 10.13128/RA-222.

Pellegrini L. 1984, *Insediamenti francescani nell'Italia del Duecento*. Roma: Laurentianum.

Pellegrini L., Paciocco R. 2001, *I Francescani nelle Marche. Secoli XIII-XVI*. Milano: Silvana.

Riavis V., Cochelli P. 2018, *Toccare per vedere: la conoscenza di architetture attraverso la rappresentazione tattile / Touching for seeing: understanding architectures through tactile representation*, in Albisinni P. et al. (eds.) *UID 2018 - Rappresentazione materiale/immateriale - Drawing as (in) tangible*. UID Unione Italiana Disegno – Atti del 40° Convegno internazionale dei Docenti delle discipline della Rappresentazione / Proceedings of the 40th International Conference of Teachers of the disciplines of the Representation, Milano 13-15 September 2018. Roma: Gangemi Editore.

Rodrigues A. M., Fontes J. L., Andrade M. F. 2020, *La(s) Reformas En El Franciscanismo Português En La Edad Media*, in Hispania Sacra, LXXII (145), pp. 51-63.

Sdegno A., Riavis V. 2020, *Toccare la profondità: restituzione prospettica e percezione aptica inclusiva*, in Disegnare Idee Immagini, XXXI (60), pp. 72-83.

Soler M., Ferretti R., Cioli F. 2022, *The Monastery of Sant Miquel d'Escornalbou Tarragona, Spain): multidisciplinary research for the understanding of the relation between the religious complex, the territory and the European Franciscan network*. In VITRUVIO - International Journal of Architectural Technology and Sustainability, 8, pp. 94-109.

Teixeira V. G. 2010, *O Movimento Da Observância Franciscana Em Portugal, 1392-1517: História, Património e Cultura de Uma Experiência de Reforma Religiosa*. Porto: Editorial Franciscana.

Tosi F. 2018, *Ergonomia & Design. Design per l'ergonomia*. Milano: FrancoAngeli.

Volzone R., Becherini P., Cottini A. 2023, *Integrated digital survey for the documentation, understanding and valorization of Cultural Heritage: Ínsua fort in Caminha (Portugal)*, in Bevilacqua M., Ulivieri D. (eds.) *Defensive Architecture of the Mediterranean, Vol. V. Proceedings of the International Conference on Fortifications of the Mediterranean Coast*, FORTMED 2023 - Pisa, 23-25 March 2023, pp. 1171-1178. Pisa: Pisa University Press.