

Introduction: Unforeseen Paths towards impactful heritage-based actions

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1. Unforeseen Paths towards impactful heritage-based actions

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Abstract

Within its multifaceted contexts, Architectural Heritage and its vestiges, voices, and values should be reconsidered to reshape the future of borderless territories and intergenerational communities. The use of adaptive methodologies, value-driven exploration, and civic engagement are crucial for paving new *unforeseen paths* in the cultural heritage domain. This chapter provides a brief overview of principles, trajectories, and opportunities enabled by digital exploration tools and advanced design approaches for analysing and preserving heritage sites. Rather than focusing on the distinctive characteristics of each tool used in the case study, we provide an overview of perspectives and findings from this editorial project to tackle the core question: *How can we construct a value-centred model for a critical design process?* These insights lay the foundation for future heritage-related practices that can improve people's lives and serve as powerful catalysts for sustainable development.

Keywords: Heritage sites; Cultural heritage management; Integrated advanced tools; Case-based design; Digital era

Introduction

Advanced digital technologies and methods have ushered in a new era in the field of architectural heritage, providing innovative solutions for its analysis, preservation, and reuse. Over the past two decades, we have witnessed a significant cultural shift driven by grassroots initiatives in research, practical applications, and education. A number of publications map out how digital tools are being used to tackle current and foreseeable challenges faced by architectural heritage and its environment (e.g., Cameron and Kenderdine 2010; Brusaporci 2017, Münster *et al.* 2018, Forte and Murteira 2020, Bolognesi and Villa 2021, Champion 2021).

The question revolves around how we can construct a value-centred model for a critical design process. The contributions included in this volume attempt to tackle this question from different angles, using adaptive methodologies, value-driven exploration, and civic engagement. In charting new, *unforeseen paths* in the cultural heritage domain, the authors explore the assessment of heritage values that go beyond formal or officially recognized parameters. They also pose intriguing questions about the completeness and accuracy of the mapped and processed data (texts, map mashup, photos, temperature parameters) and its use in design projects.

Specifically, this book explores a range of approaches for the analysis of the multi-layered context and architectural elements inherent to culturally significant heritage sites. It provides a rich showcase of projects carried out by interdisciplinary teams, reflecting a range of perspectives and digital expertise gained over long-term projects. These studies engaged researchers and students with a wide array of scientific interests, backgrounds, and qualifications at the intersection of architecture, urban planning, and computing. These contributions feature case studies and recent academic experiences centred around a selection of notable heritage sites, ranging from ordinary building blocks, public squares, synagogues, and archaeological sites to waterscapes and agro-industrial landscapes, spanning across Europe, Asia, and Africa.

Rather than presenting specific design solutions, the main aim of this editorial project is to provide valuable insights that address specific emerging societal needs within different real-world scenarios. This includes developing the contextual and critical understandings of heritage value and strengthening the emotional ties individuals form with the locales they live in or explore, as discussed in Chapters 2, 3, and 6. In Chapter 4, new physical connections are proposed for promoting inclusive growth. In Chapters 5, 11, and 12 there is a strong focus on preserving cultural memory and educating individuals. Other contributions indirectly but significantly address environmental challenges (Chapters 7 and 8), or the impact of time and other factors on building damage (Chapter 9). Finally, Chapter 13 addresses the question of how to develop effective connections between the education, architecture, and industry sectors.

Book contents

The chapter sequence is structured in accordance with the design tools employed, and, within each category, progresses from architectural and urban levels to territorial scales. This represents a coarse-grained cataloguing, acknowledging that most of those contributions encompass multiple levels of analysis, interpretation, and design approach. It also recognises the reality that in many contexts, a variety of often complex or conflicting societal and environmental needs may coexist, giving rise to the research and theoretical questions discussed.

The book begins with the cross-scale socio-spatial analysis using Bill Hillier's theory of Space Syntax (Chapters 2, 3, and 4), followed by the applications of advanced data visualisation techniques, such as laser scanning, sentiment analysis, aerial and terrestrial detailed photogrammetry, infrared thermography, and Heritage Building Information Modelling (HBIM) in Chapters 5, 6, 7, 8, 9, and 10. Next, the book explores the realm of virtual reconstructions (Chapters 11 and 12), before concluding with a focus on the pedagogical aspects of advanced survey and model techniques (point-cloud and HBIM) in Chapter 13.

In more detail, after the Introduction, the following three chapters illustrate the significance of spatial-morphological relationships within contemporary heritage landscapes situated in England, Cyprus, and São Tomé Island. Griffiths, Geddes, and Eloy analyse the spatial elements (road segments and networks) using the space syntax methodology to examine movement patterns and land use. Chapter 2 investigates whether the residential areas constructed on the grounds of six demolished country houses in Warwickshire retain spatial and structural characteristics indicative of their 'ordinary

localities' and how these features contribute to shaping the 'everyday' identity. In Chapter 3, Geddes explores how accessibility in the historic centre of Nicosia is influenced both by the urban form and social bonds, which play a pivotal role in retaining the local population. Moving towards the Gulf of Guinea, Chapter 4 focuses on the current mobility patterns in São Tomé Island, identifying specific design proposals for establishing new connections between distinct districts and villages. Notably, insights into spatial properties found at different scales in Nicosia and São Tomé Island are discussed together with social surveys conducted among the local residents.

In examining this first set of contributions, we grasp the multifaceted significance of connectivity systems, intricately interwoven with the layered urban, rural, or territorial fabric. In Warwickshire, the road layouts serve as a historical record of usage, while in Nicosia, they mirror the diverse social composition. In São Tomé Island, they are viewed as catalysts for socio-economic development and social proximity.

In Chapter 5, Laing takes up the theme of ordinary built structures and the set of values perceived by communities, the same topic addressed by Griffiths. The author explores the relevance of perceived cultural value, distinct from formal heritage assessments, and highlights how the widespread use of digital data can lead to a reassessment of the importance of 'everyday' artefacts in the built environment in society.

The second group of chapters (Chapters 6, 7, 8, and 9) explores the limitations and opportunities of utilising an extensive array of automated computational tools that merge cultural heritage approaches with data science.

Similarly to Chapter 5, personal narratives take centre stage in Chapter 6, albeit relying on textual content rather than visuals. Stellacci and Moro undertake the sentiment analysis of online reviews, highlighting the significance of reshaping urban policies for historically vulnerable landscapes based on civic engagement. The authors delve into the assessment of the on-site experience of *Piazza Maggiore* in Bologna, as perceived by travellers who posted their comments on *TripAdvisor* from 2013 to 2020.

While Stellacci and Moro encourage city planners and designers to draw inspiration from a sequence of sentiment scores grouped in boxplots, Aydin and his team of the *Shlomo* project investigate the transect representations of Mardin, a picturesque water-based historical urban landscape in Southeastern Turkey (Chapter 7). They demonstrate how a historically informed approach – *heritage urban transect* – combined with insights derived from the application of advanced computational tools, can significantly influence local policies, including strategies to mitigate pluvial flooding.

Similarly, in Chapter 8, Melsom focuses on the complex dynamics between water landscapes and their future development. The author delves into the application of advanced survey tools, combining aerial data collection, terrestrial photogrammetry, and machine learning models. Melsom demonstrates how to identify long-lasting planning priorities in the Balinese landscape, specifically focusing on Subak Uma Lambing. This approach takes into account dynamic factors such as weather, market demand fluctuations, and sustainable agricultural practices, while also considering the interests of stakeholders, the local economy, and other ecological aspects.

Through an extensive literature review, Chapter 9 analyses the applications of remote non-destructive techniques (NDTs) to historic buildings, namely terrestrial photogrammetry combined with non-stimulated infrared thermography.

The third set of chapters (Chapters 10, 11, 12, and 13) provides interdisciplinary insights into data representation of architectural heritage and its surrounding environment using computer-aided modelling (excluding physical models).

Chapter 10 investigates the challenges of integrating Heritage Building Information Modelling (HBIM) into conservation practice, utilising 13th-century Seljuk *madrasas* (schools) in Türkiye and their fascinating geometric patterns as case studies.

In Chapter 11, Martens and Peter explore the digital reconstruction of demolished synagogues in Vienna. This study proposes a discourse about data accuracy, the inherent incompleteness of virtual models, and their longevity, drawing from insights gathered from the *SCIODOC* and *IDOVIR* projects.

In Chapter 12, Antunes discusses the implication of the integration of autonomous virtual humans – also known as non-player characters – into virtual reality (VR) experiences. His exploration includes social surveys concerning situatedness and the embodied encounter with space, in the context of *Shilb VR*, a VR simulation of Silves, a mediaeval city in Portugal. Through an exploration of user experiences, cognitive reactions, and emotional involvement, Antunes reveals how VR influences architectural phenomenology, human-computer interaction, and the development of significant spatial narratives. Our path leads us full circle to Chapter 2, where a convergence emerges between the archaeological discourse on spatial morphology (Chapter 2) and the realm of virtual modelling (Chapter 12).

Aligning with the conclusions proposed by Kayasü *et al.* (Chapter 10) on the relevance of using HBIM in architectural practice, Del Duca provides an up-to-date overview of the incorporation of Scan-to-BIM and HBIM into current educational programs in Portugal (Chapter 13). The author begins with a brief comparative analysis across Europe, then delves into the technological and expertise requirements necessary for modernising higher education in Architecture and related disciplines. The objective is to define pedagogical development areas to enhance students' competence and competitiveness in the job marketplace, drawing upon her firsthand experience at the Faculty of Architecture of the University of Lisbon.

Final thoughts

In reflecting upon the contributions gathered in this book, it becomes apparent that the field of architectural heritage is undergoing a profound transformation, driven by a synergic integration of advanced digital methodologies and interdisciplinary collaborations. These patterns play a crucial role in sustainable and future-proof co-design environments, which necessitate systematic communicative and collaborative opportunities between a wide array of professional experts and civic society, as well as a substantial degree of creativity, focus, and security in the design process (Jannack *et al.* 2015).

While the exploration of this topic is far from being exhausted, this book aims to foster further dialogue about the significance of grassroots activities, research endeavours, and educational initiatives that may inspire the creation of fresh ideas, paving the way for *unforeseen paths* of interdisciplinary collaboration and impact. The structured sequence of chapters indicates the interplay between advanced design tools, socio-spatial analyses, and interdisciplinary investigations from both the micro and the macro levels. In undertaking *unforeseen paths*, the authors advocate for balanced and thoughtful approaches that combine technological innovation with a deep appreciation for the cultural and social significance of our built environment.

To conclude our overview, we can recall Del Duca's pragmatic perspective, which asserts that the future favours those who demonstrate a willingness to adapt, re-examine their viewpoints, and enhance their interpretative and operational tools to foster a thoughtful and critical approach. We believe that this book fulfils this vision.

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