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SANDRO PARRINELLO
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MSCA H2020 PROMETHEUS Project Report

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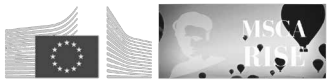

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Preface

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Analysing the Prometheus project requires a long-term retrospective perspective. Multiple lines of research intertwined over the years, often generating unexpected results in line with experimental inquiry. Yet the analysis must go beyond scientific outcomes to include the researchers and human capital that underpinned the project. This is essential because Prometheus focuses on academic exchange and knowledge circulation, and because the human value underlies its themes. The premises of this journey date back to 2010, when, as a non-tenured PhD holder at the University of Pavia, I coordinated workshops and international research activities for the University of Florence, engaging in particular with the University of Oulu in Finland and Petrozavodsk State University in Karelia. At a time when I was still unfamiliar with European project design, I undertook an independent study that led to the successful award of a Marie Curie People grant under the 7th Framework Programme of the European Union. The project WoodenArchitecture (ID: 269185) is built on a strong relationship with the University of Petrozavodsk and focuses on traditional Russian wooden architecture of the Karelian peoples. It studied historic villages and the design of buildings. This work was a natural extension of earlier activities starting in 2006. During these years, I collaborated with various levels of the Russian administration, managing cultural heritage, including major sites such as Kizhi Island, where I spent at least three summers documenting each building. I involved colleagues and Italian companies specialising in restoration, leading to practical experiences that, though mostly unpublished, laid the groundwork for further scientific development. However, the deeper roots of the Prometheus project lie in the long-standing, fruitful collaboration with colleagues from Perm State Polytechnic University in Russia. Following a conference on heritage documentation held in Perm in 2011, a year celebrating cultural friendship between Italy and Russia, I was invited as a visiting professor to contribute to the newly established degree programme in Architecture and Urban Planning. By then, I had become a researcher at the University of Pavia, and activities with Perm were becoming institutionally consolidated. Over the years, this visiting professorship enabled me to coordinate numerous workshops and seminars, strengthening scientific ties with the Department of Urban Planning and encountering strong interest from students in disciplines related to surveying, documentation, and the development of digital technologies applied to heritage protection. This cooperation was sustained by constant reciprocity: many initiatives I organised included active participation from Russian colleagues, who, in turn, regularly involved me in their research activities, fostering a virtuous cycle of academic exchange. The synergy with the Department's leadership led to the creation of a permanent activity at Perm. We set up an experimental lab to acquire advanced equipment and, more importantly, train specialised researchers and technicians. The goal was to raise regional awareness of the strategic importance of architectural documentation. It was the Department Director, Svetlana Maksimova, who provided the decisive impetus for the next phase.

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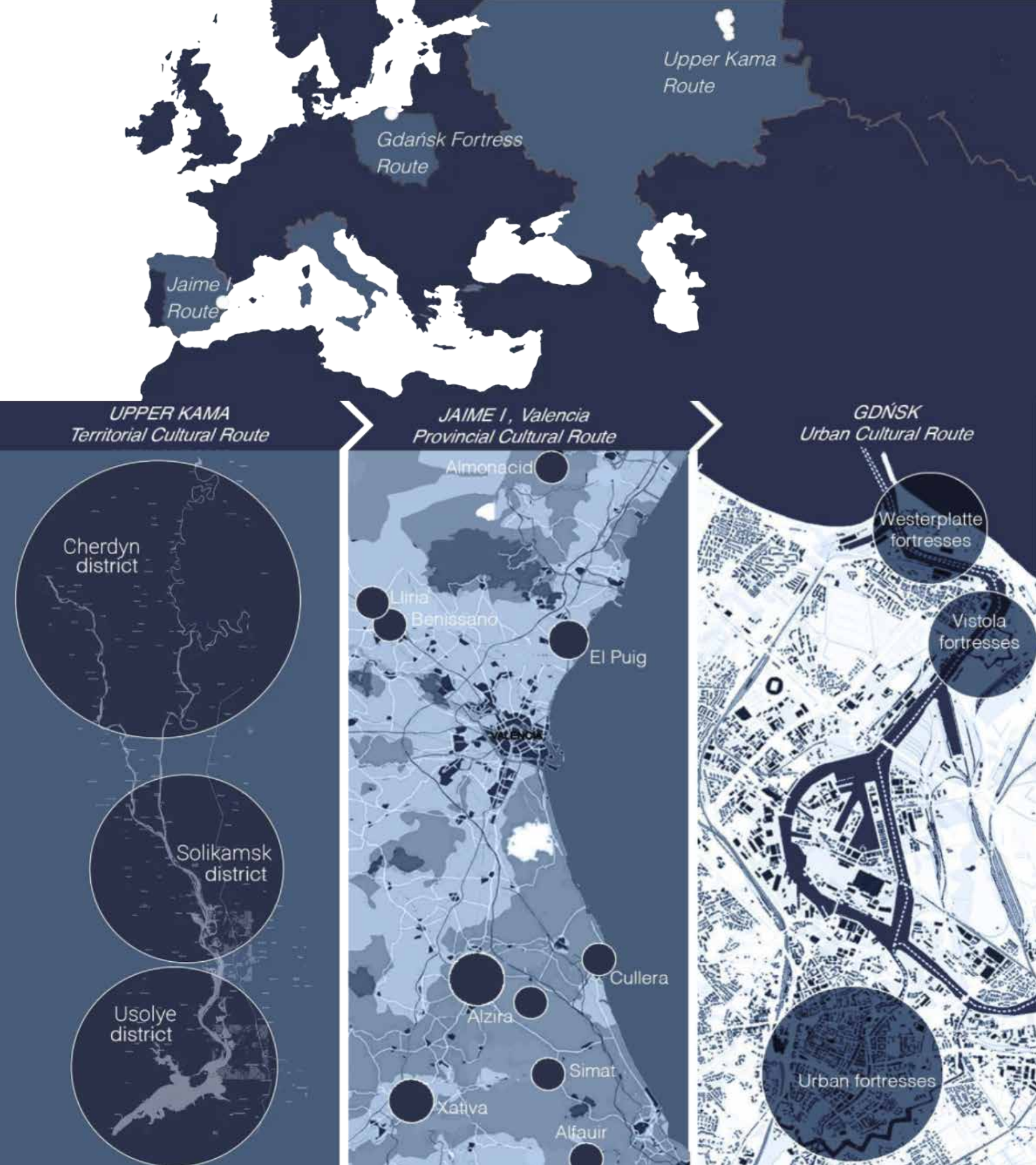
Aware of my interest in traditional Russian architecture and drawing on her strong institutional relationships with the provinces of Solikamsk and Usolye, she proposed concentrating scientific efforts on those territories, particularly the Usolye site. On this basis, following the conclusion of WoodenArchitecture, we began in 2015—when I was an Associate Professor at the University of Pavia—the complex design phase of Prometheus. Unlike the previous project, which was funded on the first attempt, Prometheus required greater resilience: the proposal was submitted to the European Commission over three consecutive calls, receiving final approval only in 2018. This lengthy refinement process allowed the official launch of activities in 2019, initiating a period of research marked by exceptional intensity and enthusiasm. To complete the consortium, I involved colleagues from the Universitat Politècnica de València, with whom I had collaborated within UNESCO-related networks concerning technological analysis competencies. This resulted in a highly balanced international synergy: the Italian component focused on surveying methodologies, the Spanish on construction technologies, and the Russian on territorial and urban aspects. The primary objective of the project was to study the remarkable architectural heritage associated with salt merchants in the border region of the Urals, at the easternmost edge of Europe. Coordinating a large, diverse team with different methods and schedules—especially with time zones—was demanding. Team cohesion takes time beyond the coordinator's enthusiasm. The process is like starting a complex machine that requires shared language, methods, and interpersonal trust, especially in a field that blends technical and human aspects. However, just as the project seemed to have reached full operational capacity, the COVID-19 pandemic in 2020 abruptly interrupted its development. The health emergency struck at the heart of the execution phase, preventing Russian colleagues from completing their secondments and interrupting the Italian team's research stays. During that year, we invested all our efforts in maintaining team cohesion through continuous online meetings and digital initiatives to preserve scientific synergy while awaiting the resumption of in-person activities. Unfortunately, just as a return to normal exchanges seemed imminent, the outbreak of war and the European Commission's decision to suspend all research relations with the Russian Federation brought our original vision to a definitive halt. The results of this intense, albeit fragmented, research period are now collected in the volume dedicated to the Upper Kama. These outcomes represent a document of inestimable value for that region of Europe: a scientific testimony to a remarkable architectural heritage that now appears inexorably destined for oblivion or disappearance. Faced with the impossibility of continuing as originally planned, the project underwent substantial restructuring. The working group sought to develop a deeper reflection on the concept of cultural routes, applying the case study across three distinct scales: territorial, provincial, and urban. This approach enabled the hypothesis that similar protocols could be applied across different European contexts, fostering a more inclusive and adaptable experimental framework. Thanks to collaborations already active in other European projects I was coordinating at the time, it was possible to integrate

colleagues from the University of Gdańsk into the consortium, replacing the Russian partners. This proved to be a strategically successful choice, confirming the importance of cultural cohesion and alignment among unit leaders. The programme revision also included new companies and a radical reorganisation of secondments, redistributing mobility periods among all partners. In retrospect, this restructuring became a strength, though regret remains for the exclusion of Russian colleagues and for the political reasons. The changes improved quality, led to unexpected technical results, and better scientific dissemination. However, the project always needed updated objectives. Fieldwork was enriching, but managing administration and documents was the main challenge. Numerous amendments required constant updates to the project text, sapping energy and limiting focus on scientific work. Ultimately, the project mobilised around fifty researchers and involved approximately 200 students over four years: a significant scientific community that fostered not only research advancement but also strong human connections and friendships. Before Prometheus, I founded DAda-LAB at the University of Pavia, a research, education, and technology-transfer lab in Drawing and Representation, which quickly became a leading centre. Its success led to requests for a similar facility at the University of Gdańsk, resulting in the DAB Lab. Prometheus enabled this symmetrical infrastructure and an integrated university-industry ecosystem. The project acted as an incubator for human capital, fostering professional growth at all levels. Its structure encouraged cross-border integration between academia and industry, facilitating direct knowledge transfer. Students attending summer schools often secured employment within partner companies, while researchers advanced academically, achieving positions as lecturers and associate professors. This growth also included my own appointment as Full Professor, marking my transition from the University of Pavia to the University of Florence, and necessitating a final amendment to ensure continuity. At the conclusion of the project, the research group expressed the desire to continue, requesting a new European proposal to consolidate the network on cultural routes. This request represented the most meaningful recognition: a testament to both the method's validity and the younger researchers' commitment to advancing the work. Some team members have since successfully pursued Marie Curie actions independently. In response, I coordinated the launch of the HEPHAESTUS programme, funded under Horizon Europe (ID: 101182877), currently ongoing. Many participants continue Prometheus research lines, with some former doctoral and postdoctoral researchers now holding leadership roles. I hope these pages provide a comprehensive understanding of the project's structure and evolution. This volume introduces the general methodology, while subsequent volumes detail documentation and analysis at different scales. Finally, I hope that the knowledge developed through collaboration will serve as a lasting asset for each researcher and that each participant retains a personal imprint of the research and places encountered. Ultimately, I entrust this work to the hope that it may contribute to the representation and narration of heritage, preserving the past while looking towards a future Europe that embraces cultural diversity and where drawing and digitalisation play a key role in shaping a shared cultural identity.

PR0METHEUS Project


Upper Kama Route
Gdańsk Fortress Route
Jaime I Route
UPPER KAMA
Territorial Cultural Route
JAIME I , Valencia
Provincial Cultural Route
GDŃSK
Urban Cultural Route
Cherdyn district
Solikamsk district
Usolye district
Almonacid
Lliria
Benissano
El Puig
Cullera
Alzira
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Xativa
Alfauir
Westerplatte fortresses
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PROMETHEUS PROJECT STRUCTURE: MAPPING CULTURAL ROUTES ACROSS PHYSICAL AND TEMPORAL BOUNDARIES

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Main Objectives	To build collaborative intersectoral protocols for low-cost methodology to develop reliable 3D databases and Information Models of Architectural Heritage

PROMETHEUS developed and implemented an integrated and multidisciplinary methodology combining traditional and innovative approaches to assess the state and condition of historical architectural complexes within Cultural Heritage Routes (CHRs), while supporting the definition of management, conservation and maintenance strategies.

The project involved a network of fourtyseven researchers, five academic institutions and five enterprises, enabling the structured management of data derived from digital surveys and technological analyses within collaborative Information Models (IMs). Through a thematic and interdisciplinary framework, PROMETHEUS supported the documentation and organisation of heritage data, fostering cross-cutting knowledge and skills across scientific and professional domains. This approach stimulated a creative and entrepreneurial process, leading to the development of operational protocols in the fields of digitisation services and heritage valorisation.

The project significantly advanced the state of the art in the development of three-dimensional digital archives—specifically Architectural Building Families (ABFs) and Information Models (IMs)—for CHRs. It delivered a cost-effective and reliable "Documentation-for-Intervention" framework, designed to meet the needs of both public administrations and private stakeholders, and to be replicable across diverse European cultural and administrative contexts.

The research was initially grounded in the pilot case of the Upper Kama basin, selected for its complex, under-documented territorial system, characterised by dispersed architectural heritage and a lack of structured conservation tools. The project addressed the absence of reliable documentation systems and the incompleteness of existing census data, producing comprehensive surveys, digital databases and three-dimensional models of architectural and territorial assets. At the scientific level, PROMETHEUS developed a scalable, implementable three-dimensional information system designed as a preparatory tool for heritage management. The system was conceived to be efficient, low-cost, user-friendly and replicable, relying on accessible technologies (such as photographic survey tools) and widely adopted modelling platforms. This enabled both scientific advancement and the creation of concrete opportunities for non-academic actors, particularly in relation to modelling processes and intervention methodologies. After 2022, disruptions from the COVID-19 pandemic and subsequent geopolitical constraints necessitated a reconfiguration of the project's partnership structure and operational framework. As a result, the research scope expanded beyond the initial pilot case. In addition to the territorial scale of Perm, the project incorporated two further Cultural Heritage Routes: the provincial territorial system of Valencia and the urban fortification system of Gdańsk.

List of abbreviation
The text, together with the following sections, employs a series of abbreviations introduced during the writing of the research project. The purpose is to illustrate the logical structure of the proposal, preserving its original framework while providing a useful guide for understanding the organization and evolution of the research.

ABF: *Architectural Building Family(s)*
AP: *Academic Partner(s)*
BH: *Built Heritage*
CHR: *Cultural Heritage Route(s)*
DBMS: *Database Management System(s)*
FM: *Facility Management*
IM: *Information Model(s)*
IML: *Information Model Library(s)*
MMS: *Model Management System(s)*
SME: *Small-Medium Enterprise(s)*
TCM: *Typological Constructive Module(s)*
ToK: *Transfer of Knowledge*
WP: *Work Package(s)*

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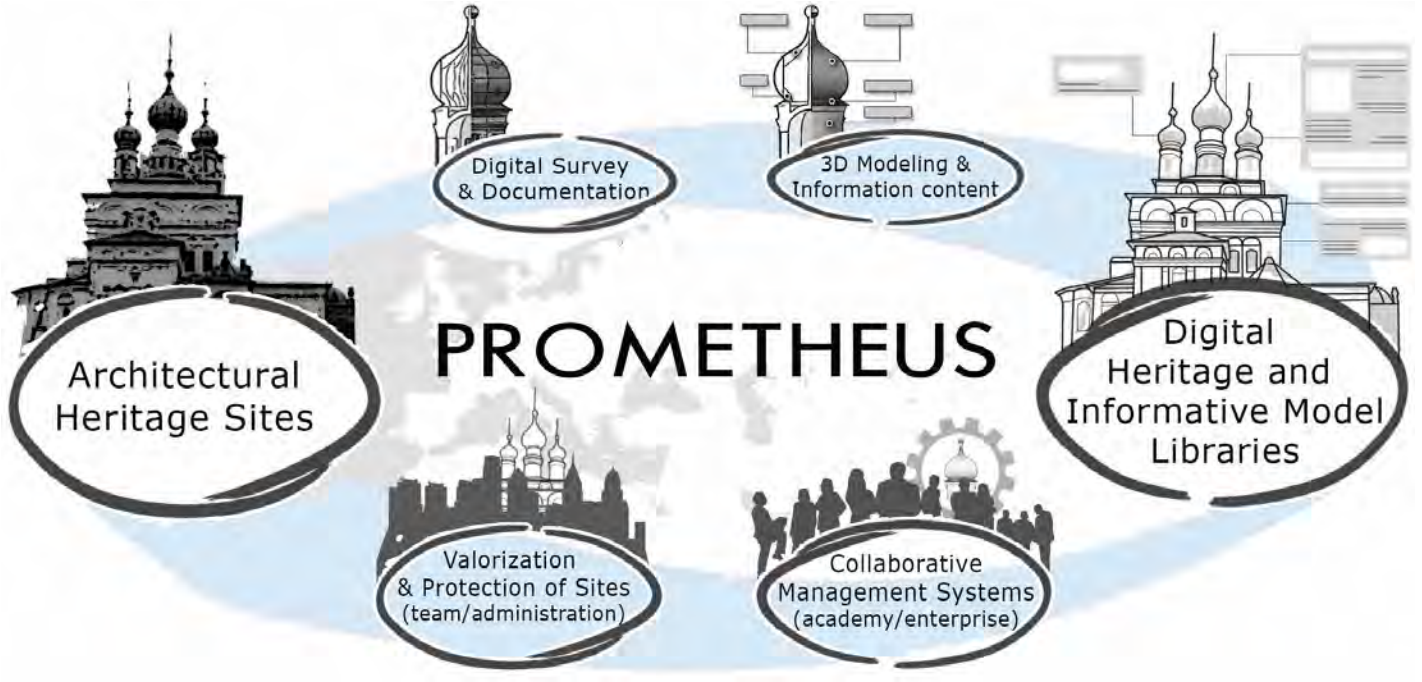


Specific Objectives	Strengthening researchers' and professionals' skills with activities aimed at developing real and remote interdisciplinary actions and tools, for a common language and methodology necessary to implement Collaborative Models Management Systems.

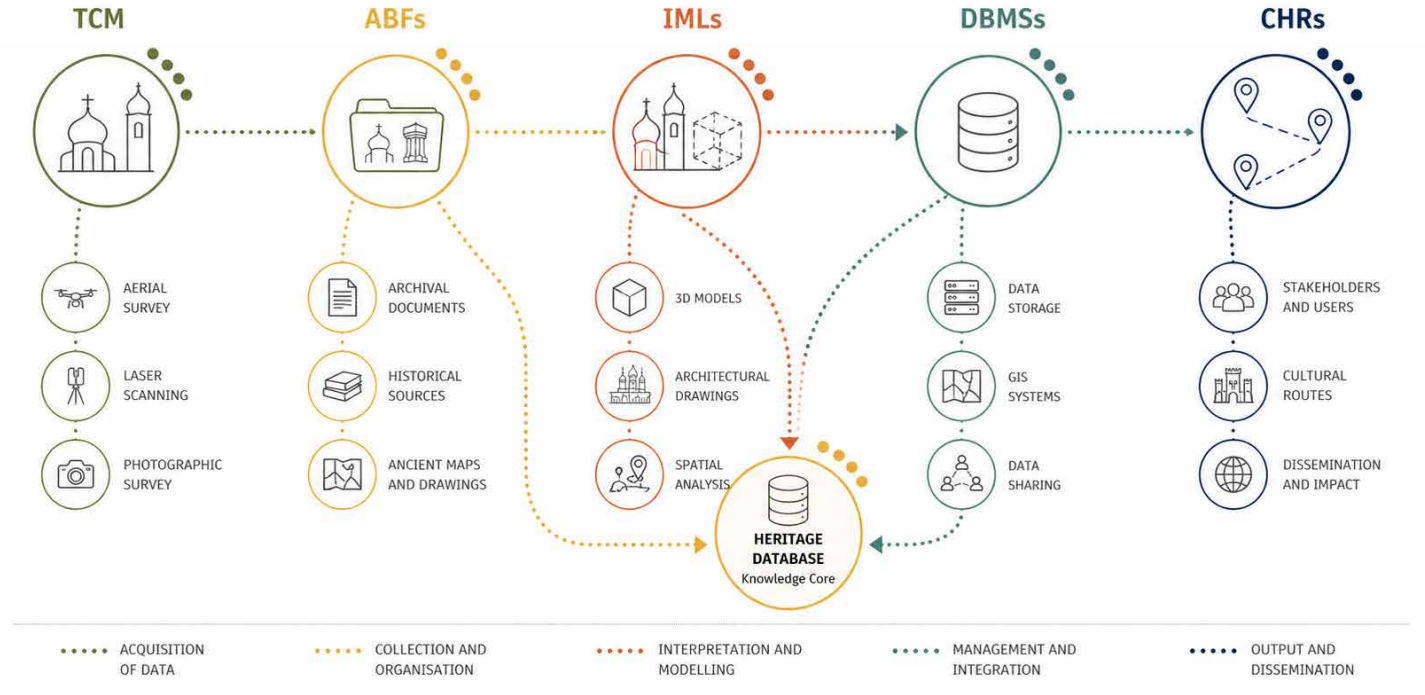
While this transition required adapting the initial evaluation framework, it ultimately strengthened the research outcomes. The methodologies and protocols originally developed for the Upper Kama basin were successfully applied and validated across the Valencia and Gdańsk contexts, characterised by distinct historical, geographical and architectural conditions.

The research design was structured according to a multi-scalar and granular approach, progressing from broad territorial analysis and census activities to detailed architectural investigation at the scale of the individual monument. At the widest scale, the Upper Kama basin was addressed as an extended territorial system whose boundaries are not sharply defined, but rather tend to dissolve into the vast and continuous landscape of the forest. This open-ended condition required methods capable of dealing with dispersed heritage assets, low-density settlement patterns and a landscape in which cultural traces are embedded within a broader environmental *continuum*.

A more circumscribed territorial framework was instead provided by the province of Valencia, where the research focused on an intermediate scale of analysis. Here, the cultural route could be examined through a denser, more legible network of settlements, infrastructure, historic sites, and territorial relationships. This made it possible to test the protocols within a provincial context, positioned between the extensive territorial dimension of the Upper Kama basin and the more precise architectural scale of individual monuments.

The final level of investigation was represented by the fortification system of Gdańsk, where the research moved towards the monument scale and addressed architectural heritage through more detailed documentation, description and assessment procedures. This transition from the open territorial dimension of Upper Kama, through the provincial scale of Valencia, to the architectural scale of Gdańsk enabled the developed methodologies to be validated across three complementary contexts.

The application of the protocols in these heterogeneous environments confirmed their robustness, adaptability and transferability, demonstrating their capacity to operate across different degrees of territorial definition, heritage density and architectural complexity. This approach ensured methodological coherence while enabling targeted validation of tools and processes across different spatial and cultural dimensions. PROMETHEUS demonstrated its relevance across three interconnected levels: On-Mind, In-Site, and Off-Site. At the cognitive level, it fostered a synergic transfer of knowledge among academic and non-academic partners, contributing to the development of a "new" multidisciplinary research and professional profile in heritage conservation and management. At the operational level, it enhanced documentation, analysis and management capacities within the case study areas. At the European level, it validated the transferability and applicability of the developed methodologies across diverse heritage contexts. The project enabled significant scientific advancements by developing innovative approaches to Information Models that integrate geometric representation and structured data within unified documentation systems. It also strengthened collaborative practices through the use of shared databases, remote servers



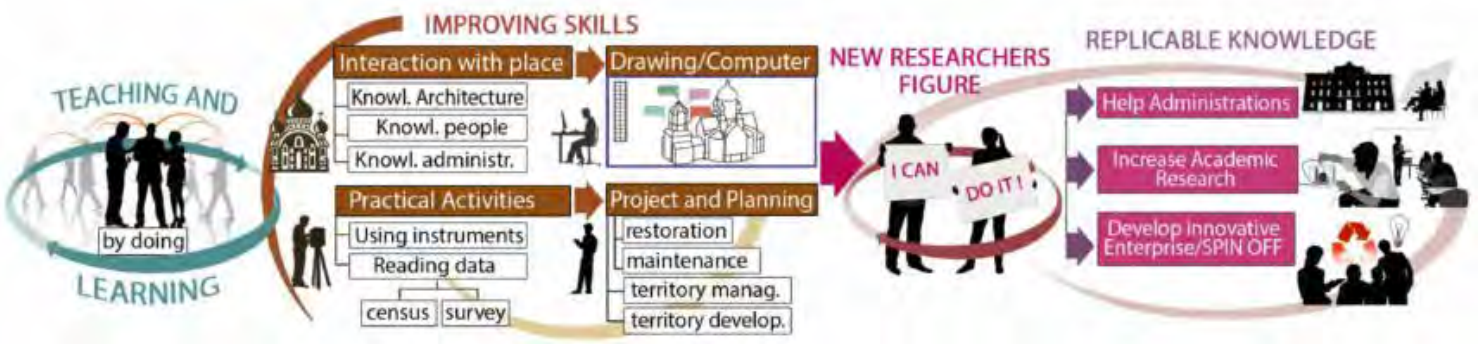
and optimised workflows, supporting coordinated and efficient heritage management processes. PROMETHEUS further contributed to the definition of digital documentation protocols and to the development of a programmatic best practice for Documentation-for-Intervention, supporting the long-term conservation, resilience and valorisation of Cultural Heritage Routes. These outcomes align with international frameworks promoted by organisations such as the Council of Europe, UNESCO, and ICOMOS. The analysis of typological and constructive features across the three case studies enabled the identification of recurring patterns and shared architectural characteristics, confirming the existence of interconnected cultural systems beyond geographical and political boundaries. These findings supported the development of structured digital archives organised as libraries, forming the basis for Typological Constructive Models (TCMs) and their integration into ABFs and Information Models.

Digital modelling was operationalised as procedural modelling, enabling the definition of a coherent "grammar" of architectural forms based on invariant and variant elements. Parametric models and digital tools proved effective as centralised systems for knowledge storage, management and dissemination, supporting the sustainable valorisation of European heritage.

Relevance of research and innovation action

The relevance of the PROMETHEUS research and innovation action is demonstrated by its contribution to advancing the state of the art in the development of three-dimensional digital archives—specifically Architectural Building Families (ABFs) and Information Models (IMs)—for Cultural Heritage Routes (CHRs). The project delivered a reliable and cost-effective "Documentation-for-Intervention" framework, designed to support both enterprises and public administrations, while ensuring replicability across diverse European cultural and administrative contexts.

On-Mind	For researchers and professionals, growing in scientific skills, networking and complementary awareness, defining a collaborative protocol for preservation of CHRs, developed with actions and secondments of research and training.

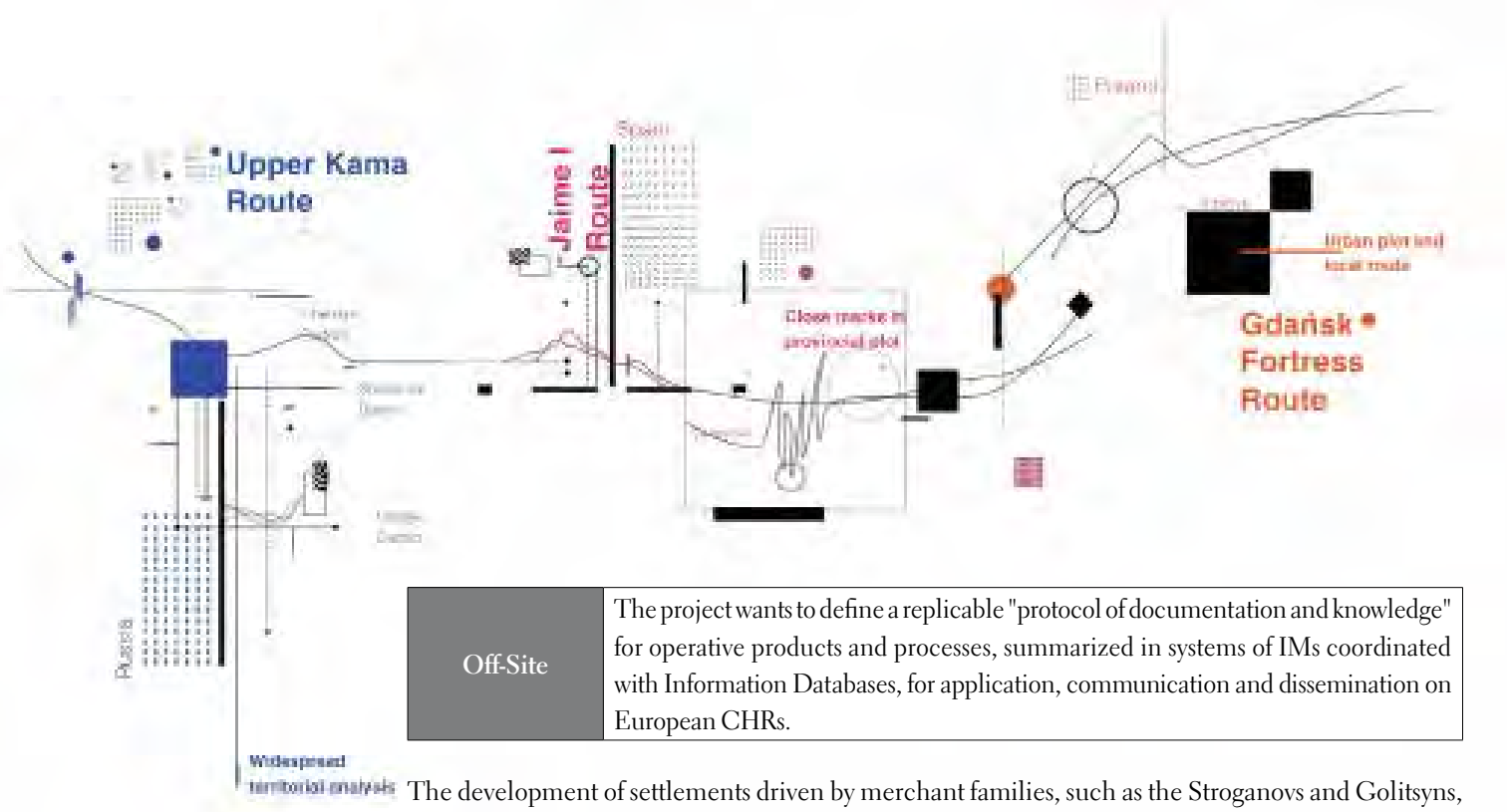


In-Site	Integrated documentation and management actions for monumental architectural heritage across the three pilot cases, aimed at supporting future intervention and valorisation strategies.

This contribution addressed a significant gap between scientific research and professional application, integrating cultural innovation with technological development. The applied research was grounded in a complex and extensive field of experimentation, represented by the three pilot cases, whose scale and heterogeneity provided a suitable environment for testing advanced methodologies. The innovative integration of these elements was reflected in the complementary synergy between academic participants and SMEs, combining scientific investigation with operational capacity and stakeholder engagement.

At the methodological level, PROMETHEUS implemented an innovative framework for managing experimental 3D survey data, enabling the development of advanced Information Models and integrated documentation systems. These systems combined geometric accuracy with structured information content, supporting both analytical and operational processes. Within this framework, Typological Constructive Models were developed and formalised, enabling the definition of Architectural Building Families characterised by high levels of detail and consistency in both geometry and data structure. These models were organised into structured Information Model Libraries, whose criteria were defined, tested and validated throughout the project. The modular components of these libraries were subsequently applied to the development of HBIM models of historical architectural complexes, ensuring coherence between representation, data integration and interpretative processes. The outputs of the modelling activities were further integrated into collaborative database management systems, enabling coordinated access, sharing and updating of information. This supported the implementation of optimised workflows, including remote server management and Facility Management processes, enhancing efficiency and interoperability across stakeholders.

Building on these technological and methodological advancements, PROMETHEUS defined digital documentation protocols to support the management of architectural sites within Cultural Heritage Routes. These protocols were initially tested and validated within the Upper Kama basin during the first phase of the project, up to 2020. This area was selected as a pilot context due to its complexity, territorial scale and critical conservation conditions. The Upper Kama region was selected as an emblematic case study due to the coexistence of significant monumental heritage and widespread criticalities. Located in the northern part of Perm Krai, west of the Ural Mountains, the region extends over approximately 7,000 km² and developed historically as a strategic commercial and industrial crossroads. Its architectural heritage reflects a combination of local traditions and European influences, shaped by trade routes and resource exploitation between the 15th and 18th centuries.



Off-Site	The project wants to define a replicable "protocol of documentation and knowledge" for operative products and processes, summarized in systems of IMs coordinated with Information Databases, for application, communication and dissemination on European CHRs.

The development of settlements driven by merchant families, such as the Stroganovs and Golitsyns, led to the emergence of urban centres including Solikamsk, Cherdyn, and Usolye. These sites display a coherent architectural language, combining wooden traditions with brick masonry influenced by Muscovite Baroque and European stylistic elements.

Despite its cultural significance, the region lacks adequate protection systems, and the reduction of heritage assets since the 20th century highlights the urgency of coordinated documentation and conservation strategies. PROMETHEUS addressed these challenges by developing unified representation methodologies and parametric modelling approaches, based on principles of transparency, communicability and replicability.

The comparative analysis across the three case studies enabled the identification of recurring typological and constructive features, confirming their relevance within the broader framework of European Cultural Heritage Routes. In line with the principles promoted by ICOMOS, particularly those outlined in the Charter on Cultural Routes, the project contributed to recognising interconnected cultural systems that transcend geographical and political boundaries.Within this framework, digital archives were structured as interoperable libraries supporting the definition of shared typological categories and constructive features. Digital modelling was operationalised as procedural modelling, enabling the development of a coherent grammar of architectural forms based on invariant and variant elements. The resulting Information Model Libraries represent a fundamental step towards extending digitisation programmes across European heritage contexts.

Parametric models and digital representation tools proved effective as centralised systems for knowledge storage, management and dissemination, supporting informed decision-making and long-term heritage valorisation. The methodologies developed were tested ensuring their replicability and transferability across different contexts and applications.

Innovative Potential	Development of informative systems based on virtual data linked into multiple database of collaborative HBIM models, increasing territorial archives for the formulation of a methodology to be applied to a cognitive digitisation of CHRs sites.

This demonstrates the scalability, transferability and cross-context applicability of the developed methodologies, highlighting their capacity to operate effectively across diverse and complex European heritage environments. Accurate surveying operations provided the foundation for documenting architectural elements, including their decay patterns and structural conditions. By enabling the identification of key management and intervention priorities, these operations led to the development of diagnostic models that supported the reconstruction of a reliable "state of conservation" for the sites. This, in turn, formed the basis for informed decision-making. Advanced digital modelling techniques were implemented to support a comprehensive architectural digitisation process. Physical objects were structured into spatial modules and enriched with texture-mapped representations of analysed features. They were also translated into optimised three-dimensional databases. Surveying activities provided the primary framework for data integration. This enabled comparisons between real-world artefacts and virtual models and supported advanced analytical processes. Information and knowledge models were organised through a collaborative approach that addressed the needs of different users. The Information Models (IMs), based on the shapes of building parts, brought together data from various sources, including test results, material studies, and historical records. These models work as a combined, compatible system, making it easy to manage, update, and share information. The integration of models within collaborative platforms, particularly through HBIM-based environments, enabled multiple stakeholders to operate simultaneously on shared datasets within specific architectural and territorial contexts. This facilitated the development of methodological protocols applicable to Built Heritage (BH), ensuring continuity beyond the project duration and maintaining active collaboration among researchers, institutions, and stakeholders.

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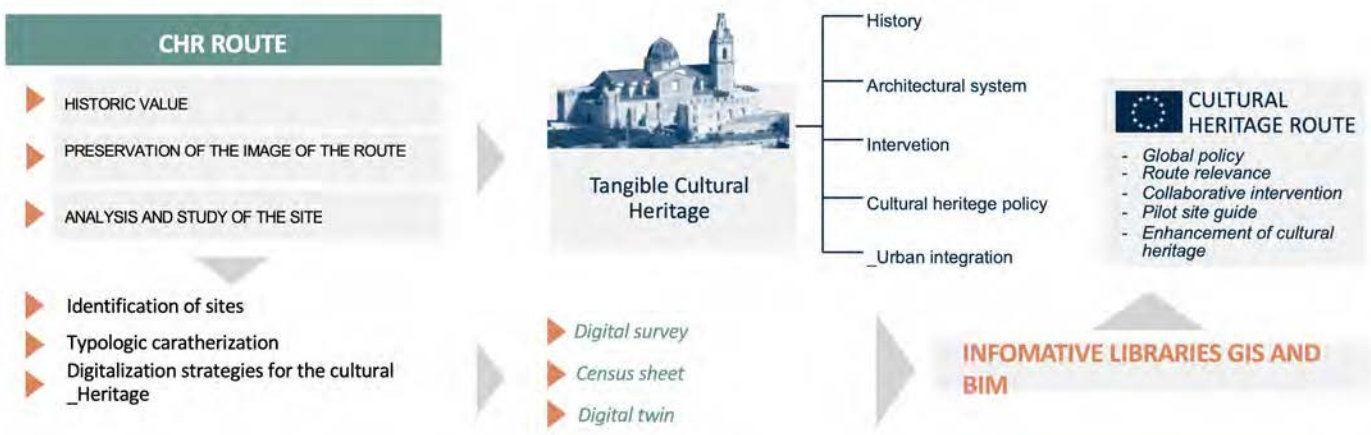
PROMETHEUS developed and implemented protocols for the digitalisation, archiving, and management of cultural assets by integrating and reusing multiple data management methodologies. These methodologies included advanced digital acquisition techniques such as georeferenced point clouds generated from fixed- and mobile-laser scanning, photogrammetric models based on Structure-from-Motion (SfM) approaches, and thermographic analyses, ensuring a comprehensive, multi-level understanding of architectural systems.

Acquired data were structured and standardised into semantic three-dimensional models through reverse modelling. This process optimised geometrical complexity and enabled interaction with database systems organised via query-based descriptors. These models served as multidimensional information containers. They were integrated into Multimedia Management Systems (MMS) platforms that combined BIM and GIS environments. This supported architectural analysis and territorial planning, as well as collaborative monitoring processes.

The coherence of these methodological efforts was maintained through implementation within a sequence of interconnected phases. These phases are introduced and detailed in the following order: initial site analysis and documentation, development and population of digital libraries and models, and implementation of collaborative protocols.

The first phase focused on site survey activities and the classification of analytical methods and protocols. This included identifying and defining the boundaries of the pilot case study. An illustrated atlas of local architectural heritage was developed and supported by archival research. Metric surveys and diagnostic investigations were conducted. These activities generated measurement databases, technological inventories of building components and multi-scale documentation outputs. Concurrently, interdisciplinary knowledge transfer processes enabled the definition of shared analytical languages and synthesis tools.



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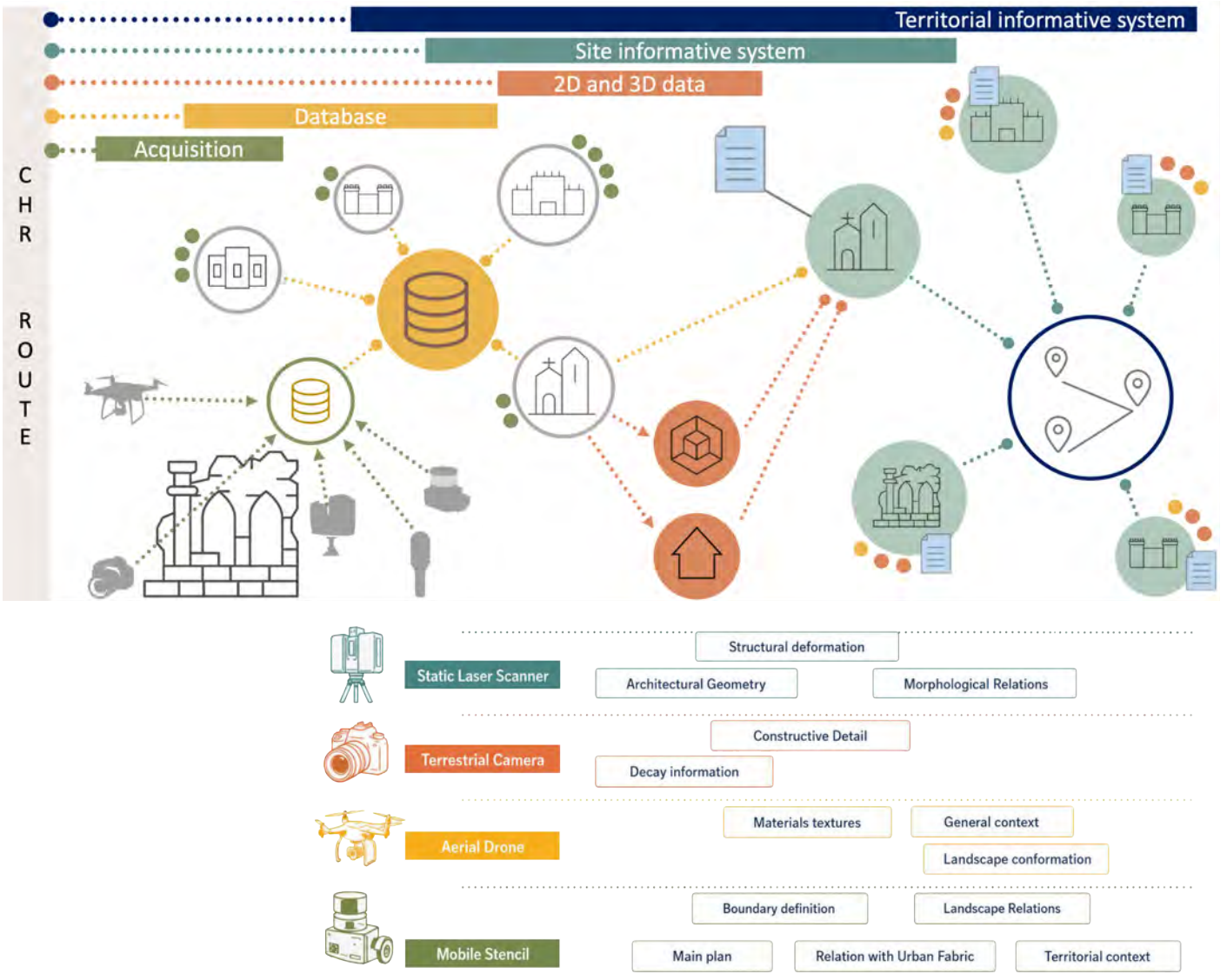
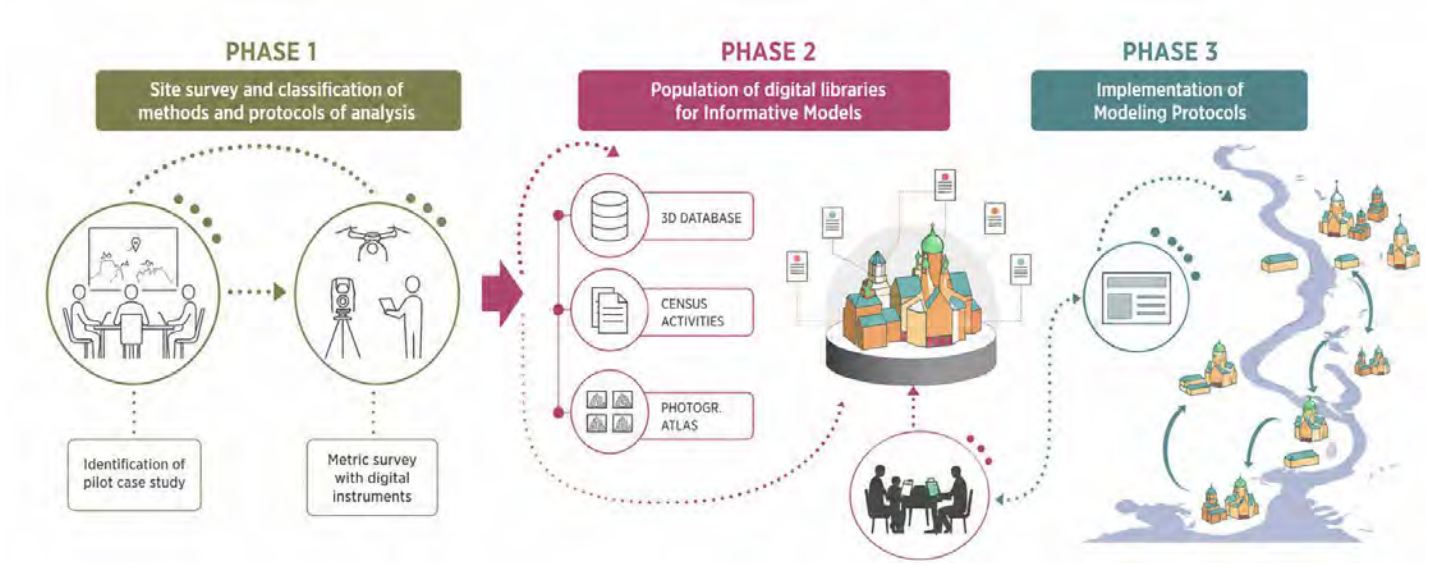


This supported the development of strategies and the creation of three-dimensional archives.

The second phase was dedicated to the population and structuring of digital libraries for Information Models. At the outset, descriptors for architectural features were defined and digital records for database management were created. Subsequently, systems for analysing degradation phenomena and conservation conditions were developed and applied across selected case studies. Following this, three-dimensional models of architectural heritage were generated, leading to the formalisation of Typological Constructive Models and Architectural Building Families and their integration into Information Models. Afterwards, database validation processes were extended across representative buildings, which enabled the development of interconnected management systems to support conservation, musealisation, and valorisation strategies. Finally, these activities contributed to consolidating a shared methodological language, thereby facilitating the implementation and quality control of intervention programmes.



The transition to the third phase focused on implementing collaborative modelling protocols. Information Models were optimised for completeness, scalability, and data richness. Dedicated Database Management Systems were developed to enhance accessibility and usability.

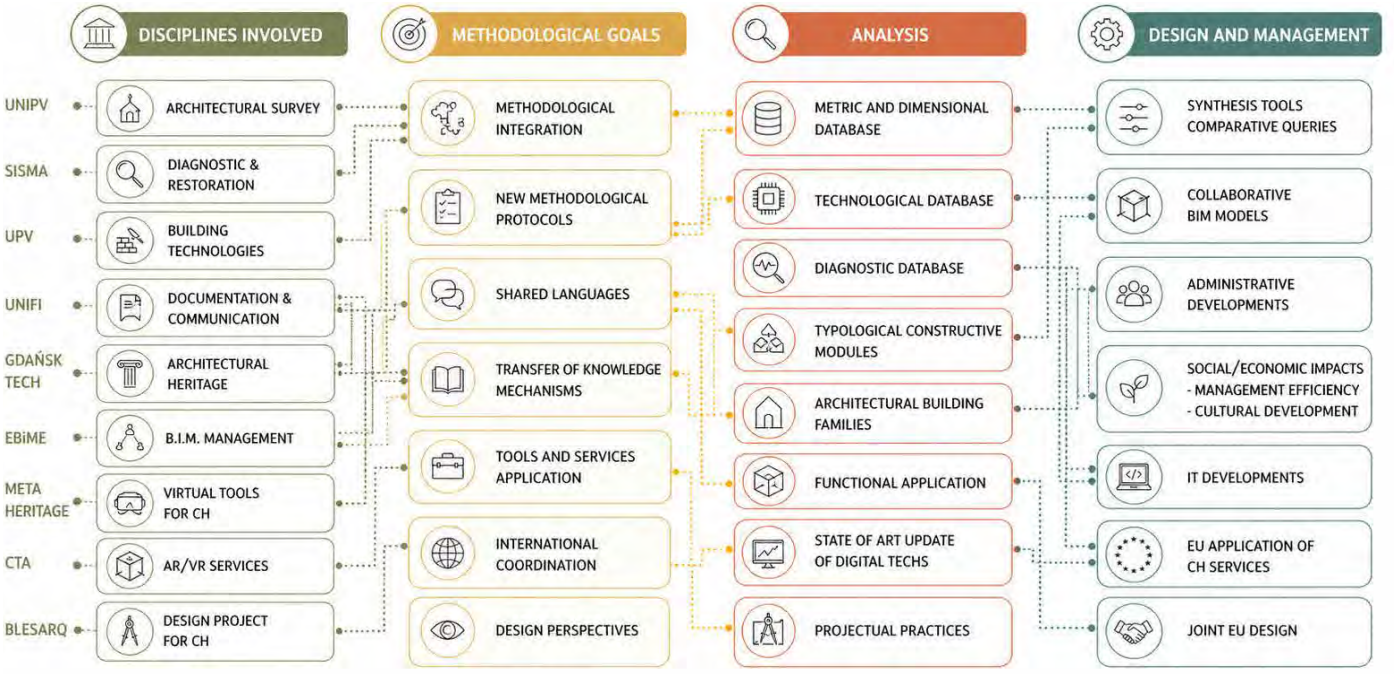
These systems were then integrated with local planning and management tools. This integration enabled the production of thematic maps and supported coordination among conservation, territorial planning, and heritage management processes. Operational protocols were defined to support public institutions, administrations, and private stakeholders responsible for planning, management, and intervention activities for Built Heritage. Particular attention was given to communication and dissemination activities. This ensured effective engagement with target stakeholders. It also promoted the integration of research, enterprise and end-user perspectives. The application of this methodological framework across the three case studies—the Upper Kama basin, the provincial context of Valencia and the fortification system of Gdańsk—enabled the validation of tools and processes. These covered a range of spatial scales and cultural environments. This demonstrates the scalability, transferability and cross-context applicability of the developed methodological approach, confirming its effectiveness in supporting the documentation,

management and valorisation of Cultural Heritage Routes across Europe. The methodological structure was implemented through this sequence of interconnected phases. Initially conceived during the project design stage in relation to the Upper Kama pilot case, this phased framework was subsequently expanded through its application to additional case studies allowing further refinement and demonstrating its replicability across highly diverse contexts.
These contexts, while differing in scale, typology and geographical conditions, were effectively aligned through the adoption of a shared methodological approach.

Interdisciplinary and multidisciplinary knowledge involved

Multi Disciplinary Focus	Different knowledge fields, perspectives and expertise are required to work together, producing shared languages and thus a common culture of research and experience. A multidisciplinary framework is therefore a prerequisite for planned objectives and research goals. Each partner will bring its specific knowledge, sharing different capacities of synthesis and approach to study and conservation of historical BH.

The PROMETHEUS work programme was implemented through a strongly interdisciplinary and collaborative research approach, integrating academic participants (APs) and SMEs within a shared operational and scientific framework. Researchers from different scientific sectors within the architectural domain worked in close cooperation to develop applied Information Models, bridging theoretical research and professional practice between universities and enterprises.
The project also capitalised on pre-existing expertise developed within previous international research initiatives, notably the Marie Skłodowska-Curie project "Wooden Architecture" (2012–2015), which focused on the digital documentation of traditional wooden architecture in the Karelia region. This background knowledge provided a solid methodological foundation, supporting the development of advanced documentation systems and facilitating effective interaction with institutional stakeholders.
Each participating institution and research group contributed actively across the project's different phases, ensuring complementary integration of specialised competences. The interdisciplinary structure encompassed expertise in digital survey and spatial data analysis, technological documentation of constructive elements, diagnostic methodologies for conservation and restoration planning, and the development and implementation of Building Information Modelling systems for architectural applications and administrative processes.
Further contributions included advanced research in architectural and urban heritage documentation, restoration analysis, conservation technologies, digital representation techniques, and historical interpretation, supported by virtual laboratories and public-sector collaboration.



The integration of expertise in image processing, virtual and augmented reality, and interactive digital environments enabled the development of innovative tools, including software solutions, mobile applications and immersive visualisation systems.

In addition, the project benefited from competencies in architectural design and technological innovation within three-dimensional digital platforms, supporting rehabilitation processes and design scenarios. These were complemented by specialised knowledge in digital strategies for cultural heritage communication, including virtual immersion, user engagement and dissemination through VR/AR technologies. This multidisciplinary integration ensured a comprehensive approach to the documentation, analysis, management and valorisation of Cultural Heritage Routes, enabling the effective combination of scientific research, technological innovation and professional application.

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The PROMETHEUS approach to knowledge sharing was designed to support the development of professional researchers operating within a joint documentation system, characterised by its multidisciplinary and intersectoral nature. This required not only the integration of technical competences, but also the adoption of a renewed conceptual framework for understanding the significance and management of Built Heritage (BH) sites. Traditional research approaches often rely on fragmented data storage and discipline-specific knowledge production, resulting in isolated contributions that limit the potential for integrated interpretation. In contrast, PROMETHEUS promoted a shift from segmented research practices to a holistic, collaborative model in which knowledge was co-created and shared across disciplines and sectors. This transition enabled a deeper impact not only at the operational ("In-Site") and academic ("Off-Site") levels, but also at the cognitive ("On-Mind") level, fostering interdisciplinary awareness and critical thinking among researchers. The project placed particular emphasis on the development of researchers' capacities beyond their specific fields of expertise, promoting an integrated understanding of methodologies, tools and analytical frameworks. This approach was essential for addressing complex societal challenges related to cultural heritage, requiring the combination of scientific knowledge, technical skills and strategic planning capabilities. A key added value of the project was represented by structured networking activities, Transfer of Knowledge (ToK) processes and secondments, in line with the principles outlined in the European Charter for Researchers. These mechanisms enabled participating researchers to expand their competencies, engage with different disciplinary perspectives and actively contribute to a shared research environment. Exposure to diverse approaches and methodologies encouraged critical reflection and facilitated the identification of aspects that would not have been considered within a single disciplinary framework.vThe Transfer of Knowledge processes supported the progressive alignment of languages, skills, information systems, technical tools and operational procedures among participants. Knowledge exchange was embedded throughout all phases of the project, ensuring that both theoretical insights and practical competencies were continuously shared and consolidated. Working sessions, collaborative activities and joint investigations enabled the circulation of expertise, strengthening both individual capacities and collective performance. This integrated approach significantly improved the quality of technical and methodological outputs, while also fostering the development of a sustainable network of professional relationships. The establishment of such networks ensures continuity beyond the project's duration, leveraging remote communication tools and collaborative platforms, and contributes to the long-term impact of the PROMETHEUS initiative. This approach ensured effective knowledge co-creation across disciplines and sectors, strengthening the project's innovation capacity, adaptability, and long-term sustainability.

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Methodology for Knowledge Sharing

The methodology for knowledge sharing within PROMETHEUS was structured around a threefold impact framework—On-Mind, In-Site, and Off-Site—ensuring a comprehensive and integrated approach to Transfer of Knowledge (ToK) across disciplines, sectors, and contexts.

At the On-Mind level, researchers regularly interacted to share and combine their expertise. This deliberate exchange encouraged interdisciplinary teamwork and supported independent ideas. Researchers from various areas—such as architectural survey, constructive analysis, urban planning, diagnostic methods, and project management—took part in structured secondments. These secondments placed them in different work settings, where they could address complex problems together using their shared knowledge and flexible approaches.

At the In-Site level, researchers developed knowledge through hands-on engagement with architectural heritage. They treated buildings as primary sources of information. Field activities included surveys, diagnostic analyses, and documentation. Targeted secondments allowed researchers to work together directly at heritage sites. This process deepened their understanding of architectural systems and improved their methods for on-site intervention and site management.

At the Off-Site level, the knowledge generated through on-site activities was extended and enriched through interaction with a broader network of European contexts. The mobility of researchers across partner institutions and enterprises enabled exposure to diverse Cultural Heritage Routes and management practices, including those associated with the Gdańsk fortification system and the provincial context of Valencia. This exchange fostered awareness of different scientific approaches, administrative frameworks and operational solutions, including concrete actions and programmes implemented by SMEs. Interaction, comparison, and application across multiple contexts continuously expanded learning processes, ensuring that they were not confined to individual disciplines or case studies through the PROMETHEUS knowledge-sharing methodology.

As a result, both individual competencies and collective capacities were strengthened, contributing to the development of a cohesive and resilient research and innovation framework. This demonstrates the effectiveness of a multi-level knowledge-sharing strategy. It supports interdisciplinary collaboration, methodological consistency, and the transferability of results across diverse European heritage contexts. The Transfer of Knowledge (ToK) strategy implemented within PROMETHEUS was based on a comprehensive set of complementary activities, including focused lessons, field-based surveys, professional workshops, training courses and experimental laboratory work. These activities were carried out both within the laboratories of participating universities—such as DAda Lab, I+D+i and DSLab—and within the operational environments of SMEs, including SIΣMA and EBIME, ensuring a balanced integration between academic research and professional practice. Particular attention was devoted to enhancing the career perspectives

Secondment Action	ToK among partners will take place during activities planned in secondments, realizing mobility and in-built return of knowledge with a direct comparison of minds and resources between APs and SMEs for the development of research activities.

of Early-Stage Researchers (ESRs), both within academic and non-academic sectors, while also reinforcing the institutional roles of participating laboratories. Field-based activities represented a key component of the ToK framework, combining open-air lectures with practical survey exercises to promote direct engagement with heritage sites and strengthen awareness of their cultural value. These were complemented by laboratory activities aimed at developing teamwork and problem-solving skills, particularly in relation to post-processing workflows, methodological design and tool development within the facilities of partner institutions. Workshops and International Summer school were organised as bidirectional knowledge exchange mechanisms, enabling secondees to present their methodologies and research outcomes to host institutions, while also learning from local expertise and practices. These interactions contributed to the development of shared methodological approaches, particularly in relation to Cultural Heritage awareness and sensitisation. In parallel, seminars and lectures were structured as unidirectional knowledge transfer activities, allowing researchers to present specific topics or research progress, and to disseminate acquired competences through tailored sessions at their home institutions. The project also included a series of international conferences (Italy M16, Spain M26, Russia M36), targeting both academic and non-academic audiences and contributing to the broader dissemination of results. Technical meetings with public administrations were organised to present project objectives, outcomes and benefits, encouraging the evaluation and potential adoption of the developed protocols. Practical demonstrations of new methodologies and Information Model (IM) development were carried out through training events delivered by SMEs and hosted within partner institutions, ensuring direct engagement with institutional stakeholders. In addition, remote collaborative platforms were implemented to facilitate continuous knowledge exchange among researchers during and after the project, supporting the long-term sustainability of ToK processes and enabling the acquisition of digital collaboration practices during secondments.

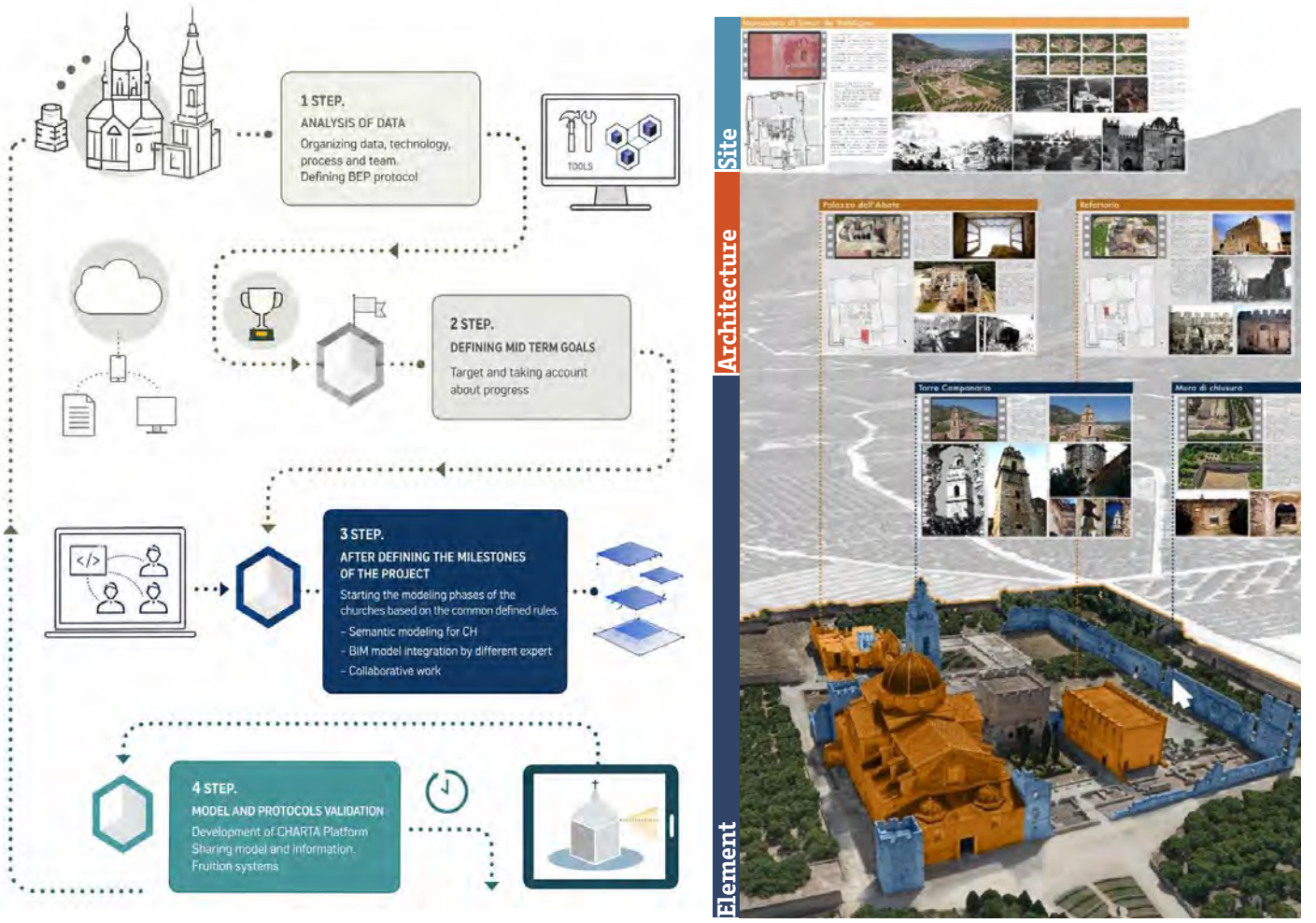
The research programme required the establishment of a structured network connecting experts from different disciplines with the historical and territorial contexts of the target sites. This network was partially built upon pre-existing collaborations among participating researchers, whose expertise in their respective fields was well established.

The inclusion of non-academic partners significantly strengthened the applied dimension of the project, bridging academic research with professional practice and operational needs.The coordinating institution, the University of Pavia (UNIPV), played a central role in consolidating

Scientific Network	Architectural representation (UNIPV) and technological analysis (UPV) are aimed to the application of information for territorial planning. Thus, it is necessary to integrate data with BIM protocols (EBIME) and restoration programs (SIΣMA).

and expanding this network, leveraging its established collaborations with partner organisations. All researchers were directly involved in achieving the project objectives and research goals, participating in activities conducted both during secondments and within their home institutions. For experienced researchers (ERs), secondments enabled them to integrate advanced skills into their specific research domains while expanding their professional expertise in the management of architectural and territorial heritage. This process supported the valorisation of extended cultural basins within European Cultural Heritage Routes (CHRs) and laid the foundation for future international research collaborations. For SME partners, the secondments facilitated the acquisition of advanced methodologies and technologies in surveying, construction sciences, and digital modelling, derived from academic research and intersectoral collaboration. This knowledge was translated into practical applications in restoration, conservation and heritage management processes. The project strengthened SMEs' capacity to adopt innovative tools and approaches, positioning them to deliver competitive, replicable services within the European heritage sector. Early-stage researchers (ESRs) benefited from an expanded research environment, gaining exposure to international contexts and interdisciplinary approaches. This experience enhanced their awareness of the professional implications of conservation practices and strengthened networks with both academic and industrial partners. At the same time, experienced researchers consolidated and extended their expertise through collaboration with international peers, contributing to knowledge exchange and capacity building across institutions. Career development was supported through both the acquisition and dissemination of knowledge, benefiting students, professionals and stakeholders involved in the conservation of cultural heritage at risk. Over the course of the project, the University of Pavia (UNIPV) research team was significantly expanded through the inclusion of additional researchers at both early- and advanced-career stages. These participants actively contributed to project activities, engaging in secondments and collaborative exchanges.
Their work focused on key areas such as territorial-scale database management, landscape analysis, GIS-based methodologies, BIM and HBIM modelling, digital archiving and technological analysis of built heritage. Through interaction with international partners and diverse cultural contexts, these researchers further developed their competencies and research perspectives. The inclusion of the University of Florence (UNIFI) as a new partner further strengthened the consortium by enhancing collaboration with SME partners such as SIΣMA and expanding the pool of expertise. Researchers from UNIFI contributed in areas including architectural representation, three-dimensional modelling, database validation, urban-scale infrastructure analysis, communication

strategies, and the digital enhancement of heritage. CTA, MetaHeritage and SIΣMA actively participated in secondments towards academic institutions, contributing to the exchange of expertise in digital technologies and applied solutions for Cultural Heritage. BLESARQ and Ebime while not involved in outbound secondments, played a key role as a hosting partner for academic researchers. Overall, these partners significantly contributed to the Transfer of Knowledge processes, enhancing both the technical capabilities of SMEs and the integration of academic and professional practices.. The Transfer of Knowledge activities carried out during these periods contributed to increasing their technical expertise and awareness of advanced digital methodologies applied to Cultural Heritage. These partners benefited from the adaptation and specialisation of methodological approaches, enabling them to refine their service offerings and align them with the specific requirements of heritage documentation, intervention and valorisation. Overall, the secondment programme contributed to the development of a highly specialised and interdisciplinary network of researchers and professionals, capable of advancing innovative solutions for the documentation, management and promotion of Cultural Heritage Routes at both local and international levels. The monitoring and coordination of project activities were ensured through a structured governance system comprising several complementary boards and committees, each with specific responsibilities in project management, scientific supervision, monitoring, dissemination, and risk management. This organisational framework enabled the consortium to effectively monitor implementation of the work plan, ensuring transparency, regular communication among partners, and timely verification of activities, milestones, deliverables, secondments, and the budget. The **Management Board** (MB) was responsible for the overall management of the project. It included senior representatives from all participating organisations and acted as the main decision-making body. Given the relatively focused structure of the



research network, which involved 14 researchers from five institutions in different countries, and the linear organisation of the work plan, the need for an additional Steering Committee was limited. For this reason, the functions usually assigned to a Steering Committee were covered by the Management Board itself. The MB was responsible for defining the partnership agreement, establishing rules and decision-making procedures, approving and monitoring the work plan, verifying that activities remained aligned with the planned objectives, managing potential conflicts, supervising financial management, and reorienting the work plan when necessary. A partnership agreement was also signed to define the contributions allocated by each beneficiary to support visiting researchers from partner organisations. The members of the MB included ER24 Szczepański, ESR21 Bursich, ER1/ER55 Parrinello, and ER6 Palmero. The **Monitoring Committee** (MC) played a key role in the operational follow-up of the project and involved mainly younger members of the partner institutions. Its task was to develop and update a detailed monitoring plan covering activities, expected results, milestones, deliverables, budget, secondments, and implementation progress. This committee regularly checked that the project activities were proceeding according to the work plan and reported to the Management Board before each annual project meeting, or earlier if there were relevant inconsistencies or delays. In this way, the MC ensured continuous internal control and supported the early identification of possible critical issues. Its members included ESR16 La Placa, ER25 Borucka, ER31 Cortés, and ESR61 Lumini.

The **Scientific Board** (SB) was established to guarantee the scientific quality of the project activities and outputs. It included experienced researchers from the different disciplinary areas involved in the project and was responsible for supervising the methodological coherence, academic relevance, and scientific reliability of the research results. Through its work, the SB contributed to maintaining a high level of scientific consistency across the various activities, particularly in relation to documentation methodologies, digital survey procedures, data processing, and the development of project outputs.
The members of the SB included ER25 Borucka, ER57 Wojciechowska, ER4 Picchio, and ER1/ER55 Parrinello. The **Advisory Board** (AB), composed of external experts, supported the Scientific Board in assessing the project's scientific value. Its contribution was particularly important for the independent evaluation of deliverable quality, verification of milestones, and monitoring of lead times. The board included two or three external specialists in academic research, who were involved at specific phases of the project and participated in supervisory meetings alongside the other board members. This external perspective strengthened the transparency and reliability of the project evaluation process. The **Dissemination and Communication Committee** (DC) was responsible for verifying the organisation, implementation, and effectiveness of dissemination and communication actions. A dedicated dissemination and communication plan was prepared and shared with the Management Board, ensuring that the project results were communicated to both scientific and non-specialist audiences. The committee monitored the impact of communication activities, including publications, events, workshops, conferences, and public engagement initiatives. Its members included ESR26 Kowalski, ESR22 Giardini, ESR2 Dell'Amico, and ER31 Cortés. This governance structure was supported by the UNIPV team's long-standing experience in Italian and European research projects focused on architectural documentation and cultural heritage. In particular, the project manager, ER1 Parrinello, brought extensive experience in coordinating international projects and multidisciplinary working groups. All boards and committees met during project meetings and maintained regular contact through digital communication tools, including online meetings, email exchanges, and telematic platforms. This proved particularly important for maintaining continuity in coordination and monitoring, especially during periods when physical meetings or field activities were limited. The project also included a risk management strategy. The main risks identified were unfavourable weather conditions during secondments and possible difficulties accessing heritage sites for survey operations. To reduce the possibility of delays, the project timetable was carefully planned, and local partners played an essential role in supporting the safe implementation of activities. Their knowledge of Cultural Heritage Routes, local administrative procedures, and territorial conditions helped to ensure access to monuments and survey areas. Although geographical, administrative, and political conditions were not considered major threats to the project implementation, detailed planning was carried out at the beginning of the project, with particular attention to securing access to sites and guaranteeing the feasibility of survey operations.

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Individuals Interaction	The interaction between participants will promote intersectoral and international exchange of knowledge on Built Heritage, covering the stages from architectural documentation to collaborative planning and administration of monuments on territory.

PROMETHEUS represents, in the long term, a foundational step towards the establishment of a joint European research framework dedicated to the study and management of Cultural Heritage Routes (CHRs). This framework is based on both material and immaterial knowledge transfer, enabling the integration of researchers' competencies within a shared, collaborative environment for the investigation of architectural heritage and cultural landscapes.

The project contributes to strengthening research and innovation potential within Europe by addressing the complexity of CHRs, which are shaped by diverse historical, cultural and territorial dynamics, including commercial routes, political boundaries and religious systems. Despite their diversity, these heritage systems share deeper structural and semantic characteristics that can be organised into typological "libraries" of architectural and constructive components.

PROMETHEUS advances this perspective by enabling the systematic identification and classification of such features, and by supporting the digitisation of landscapes, monuments, and archaeological sites through unified documentation protocols and Information Models (IMs). This approach allows heritage to be managed at both the level of individual sites and within broader territorial networks, facilitating coordinated action by public administrations, heritage institutions, and international organisations such as UNESCO and ICOMOS.

While previous research conducted by the consortium focused on isolated case studies, PROMETHEUS extends this approach to large-scale cultural basins, enabling the development of integrated documentation and management systems. This contributes to the recognition and establishment of protected heritage areas and supports the advancement of conservation strategies at both European and global levels.

The project generates impact across three interconnected dimensions. At the scientific level, it defines a comprehensive methodology for the knowledge, representation, and management of Built Heritage (BH), integrating academic research and professional practice through collaboration among academic participants and SMEs. At the technological level, it promotes the adoption of Information Modelling and collaborative digital systems, providing a robust foundation for the development of standardised procedures in restoration, conservation and urban management. At the societal level, it contributes to strengthening the sense of shared cultural identity, in alignment with European frameworks such as Horizon 2020 and the European Year of Cultural Heritage 2018.

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WP1
Preliminary analysis on target site

WP2
Documentation and survey strategies

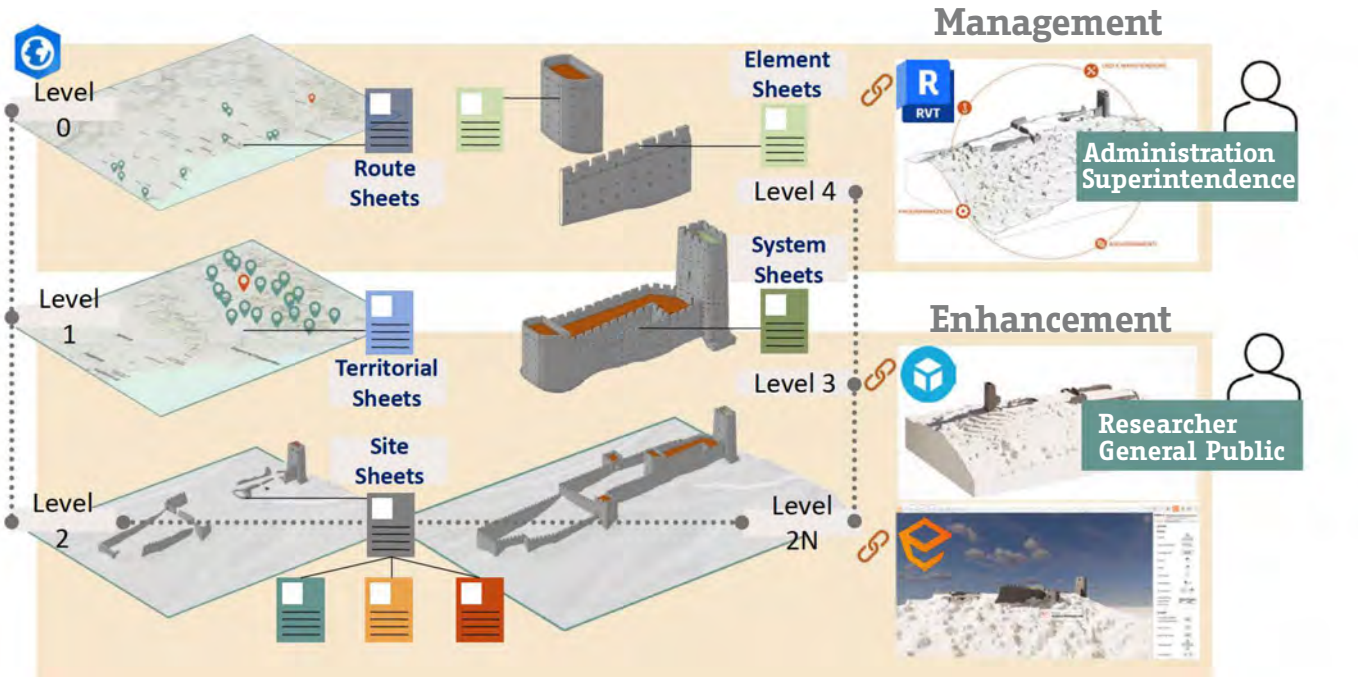
WP3
IM Library operation and validation

WP4
Finalization of CHR "Charta"

Digitalisation strategy applied to widespread built heritage

Individuals Interaction	The interaction between participants will promote intersectoral and international exchange of knowledge on Built Heritage, covering the stages from architectural documentation to collaborative planning and administration of monuments on territory.

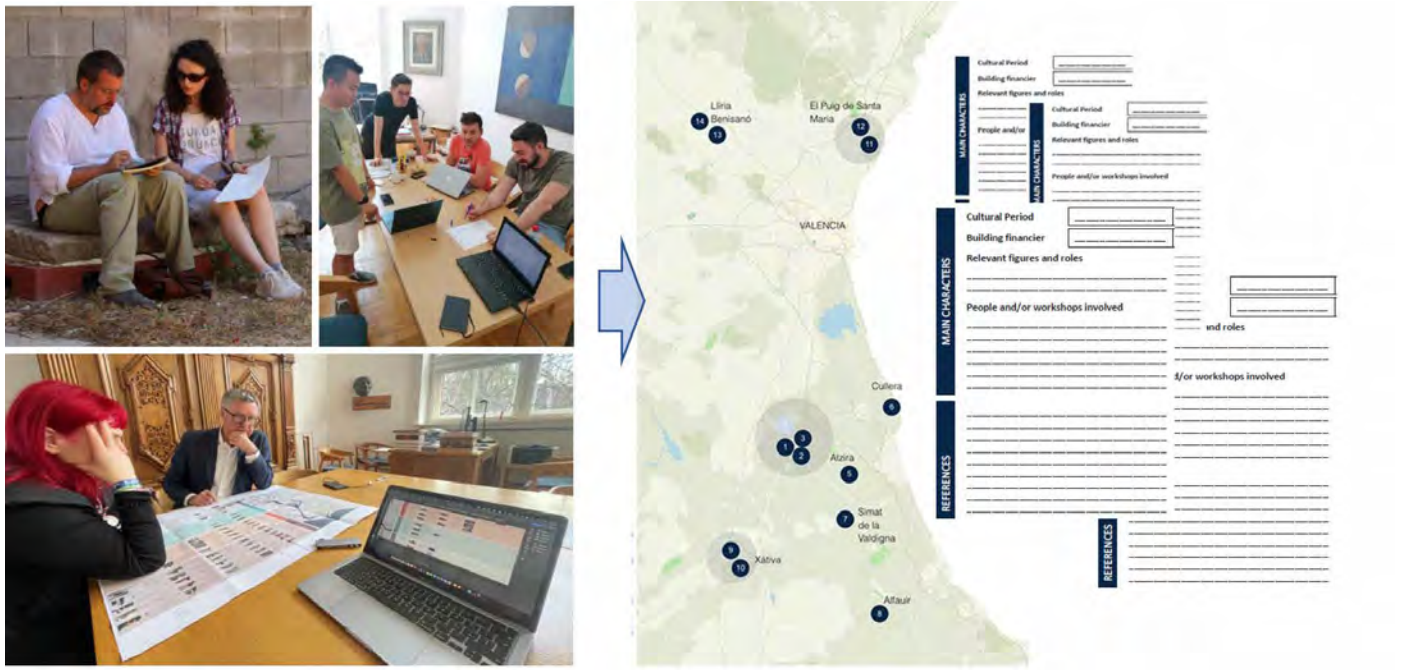
The implementation of Information Models within Database Management Systems enables the integration of design, management and diagnostic data, improving coordination among stakeholders and reducing inefficiencies in intervention processes. The validation of the methodology within the Upper Kama pilot case demonstrated the effectiveness of a multi-level documentation system, structured through hierarchical descriptors linking territorial, architectural and constructive data. This system supports decision-making processes, including risk assessment, intervention prioritisation and conservation planning, while facilitating collaboration with local administrations.The extension of the methodology to additional contexts, including the fortification system of Gdańsk and the provincial context of Valencia, confirmed its adaptability and scalability across diverse European environments. The project thus acts as a bridge between research, heritage sites and institutional stakeholders, enabling the activation of concrete intervention strategies aligned with European policies. The consortium benefits from strong international collaborations and institutional engagement, including active participation in heritage-related programmes and committees. The involvement of SMEs specialised in conservation and digital services further enhances the practical applicability of results and supports future exploitation opportunities. A structured dissemination strategy was implemented through a dedicated plan, ensuring continuous engagement with key target groups, including academic researchers, professionals, public administrations and students. Activities include scientific conferences, technical meetings, lectures, workshops, summer schools and publications, supporting both the visibility and uptake of project results. Knowledge transfer mechanisms also ensure the reintegration of acquired competences into partner institutions, thereby amplifying the project's overall impact.

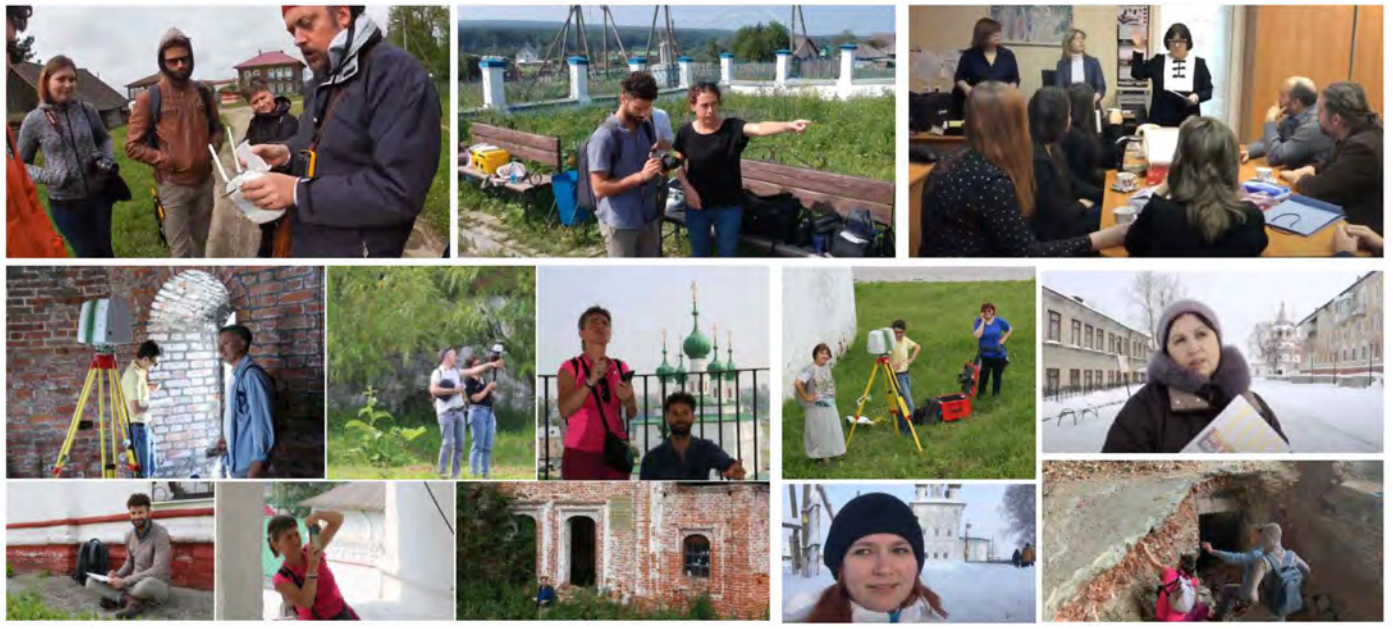


Expected impacts in terms of exploitation include the use of project results as a foundation for further research initiatives, contributions to standardisation activities within international frameworks, and the development of new services by SMEs and academic spin-offs in the field of architectural "Documentation-for-Intervention". Although direct commercial exploitation was not the primary objective at the proposal stage, particular attention has been devoted to protecting Intellectual Property Rights and managing research outputs, in compliance with European regulations. Background knowledge and expertise have been clearly identified to ensure effective collaboration and to support future development opportunities. Overall, PROMETHEUS establishes a scalable and transferable methodological framework, capable of supporting the digital documentation, management and valorisation of Cultural Heritage Routes across Europe and beyond. This demonstrates the strategic relevance, long-term sustainability and cross-context applicability of the PROMETHEUS approach in strengthening European research and innovation capacity in the field of Cultural Heritage.

Development and sustainability of new and lasting research collaborations

The PROMETHEUS project has contributed to the development of sustainable and long-term research collaborations, supported by advanced virtual and remote communication tools. These infrastructures enable continuous interaction among researchers, facilitating the exchange of knowledge and ideas beyond the duration of the project and extending the impact of Transfer of Knowledge (ToK) activities. Through this approach, PROMETHEUS has ensured the effective integration of complementary competences brought by project partners, enhancing both individual capabilities and the overall quality of collaboration. The combination of academic and non-academic expertise has resulted in a cohesive and interconnected research environment, capable of





Main Contribution	Improvement of research focuses on preservation and valorisation of architectural heritage of sites constituting European CHRs (and similar), based on the definition and exploitation of protocols and tools for the intervention of administrations and heritage committees

supporting interdisciplinary and intersectoral innovation. In this context, the SME partner EBIME has played a key role by introducing fully digital workflows based on advanced BIM collaborative platforms, remote servers and virtual workstations. These tools were progressively adopted during the project implementation (particularly between years 2 and 3) and are expected to remain operational beyond its completion, ensuring continuity of collaboration and supporting the long-

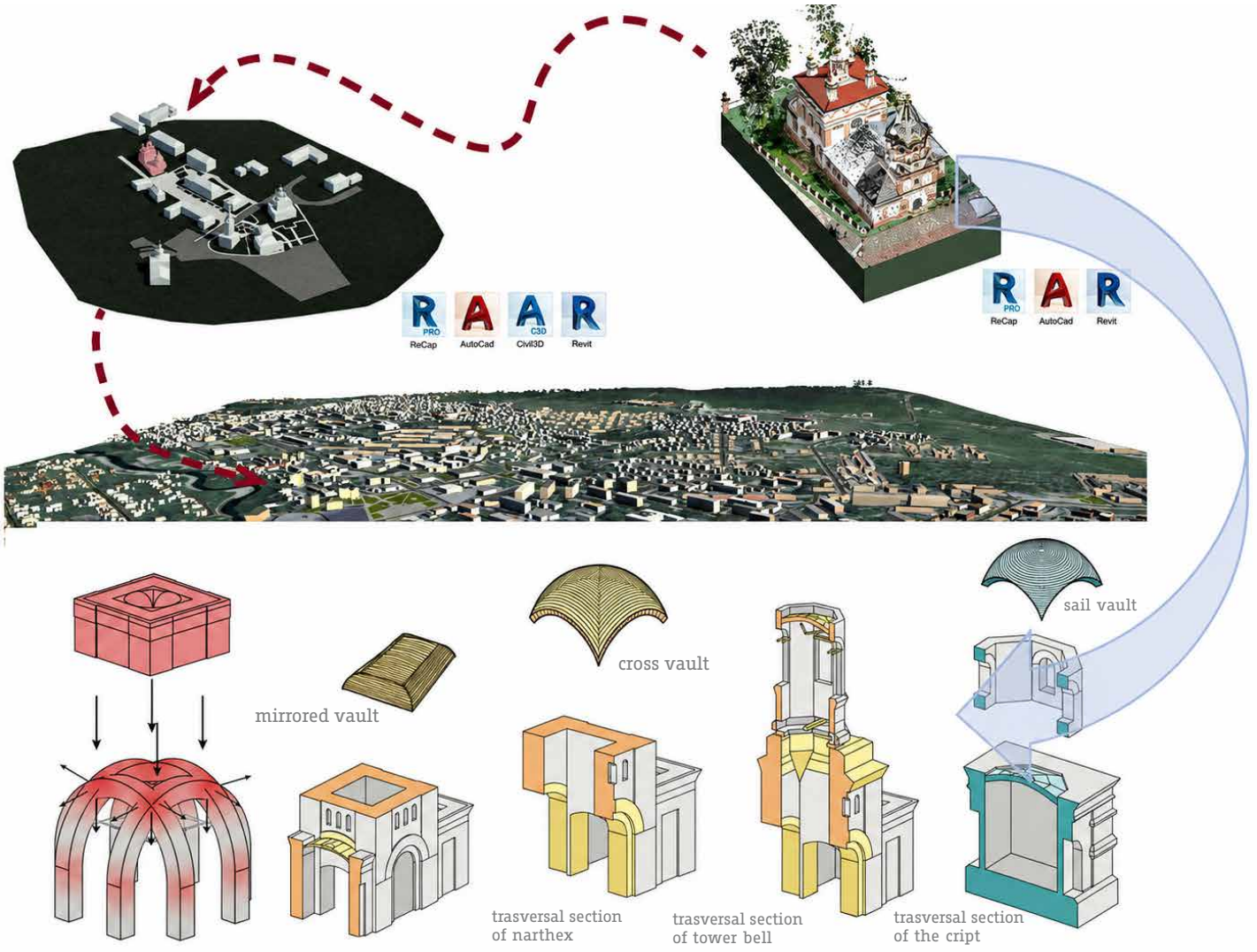
term sustainability of research activities. The overarching objective of this framework is to develop an interconnected research system in which knowledge, skills and methodologies are shared across institutions and geographical contexts. This enables researchers—both those directly involved in PROMETHEUS and those engaged through subsequent collaborations—to operate within a unified and coordinated environment, while remaining physically distributed across multiple locations. Such a model supports the simultaneous engagement of researchers on different Cultural Heritage sites, fostering a collective and integrated approach to documentation, analysis and intervention. In this way, PROMETHEUS lays the foundation for a distributed European research network capable of acting as a "shared knowledge system" for the study and management of Cultural Heritage Routes.

Enhancing the potential and future career perspectives of staff members

Secondments were implemented as key instruments for fostering direct exchange and collaboration among partners, enabling the transition from individual cooperation to structured and operational research networks. Intersectoral mobility was specifically designed to enhance complementary competences and to strengthen researchers' capacity to contribute to complex programmes of heritage management and administrative intervention. The organisation of secondments was aligned with the knowledge needs of hosting institutions and coordinated with the project phases and Work Packages, ensuring targeted and effective Transfer of Knowledge (ToK). Throughout these exchanges, strong collaborative relationships were established among researchers, academics and professionals, contributing to the development of long-lasting partnerships.

Secondments hosted by SIΣMA focused on bridging academic research with professional services, particularly in the organisation and structuring of documentation data and Information Models (IMs) for practical intervention processes. These activities were primarily concentrated during the post-survey phase (early year 2) and the model finalisation stage (year 3). EBIME hosted secondments dedicated to the implementation and optimisation of Information Models and to the transfer of knowledge related to collaborative protocols and remote data interaction. These exchanges, concentrated between years 2 and 3, supported the development of advanced methodologies for distributed and network-based workflows.

Academic institutions—including the University of Pavia (UNIPV), the Polytechnic University of Valencia (UPV), the University of Florence (UNIFI) and the Gdańsk University of Technology (GUT)—hosted secondments mainly focused on model finalisation, dissemination and communication activities. These were distributed across the three years of the project and supported the optimisation of digital archives and the transfer of results to European stakeholders and heritage institutions. Additional SME partners, including CTA, METAHERITAGE and BLESARQ, contributed by hosting secondments aimed at integrating academic knowledge with professional services and digital production systems.

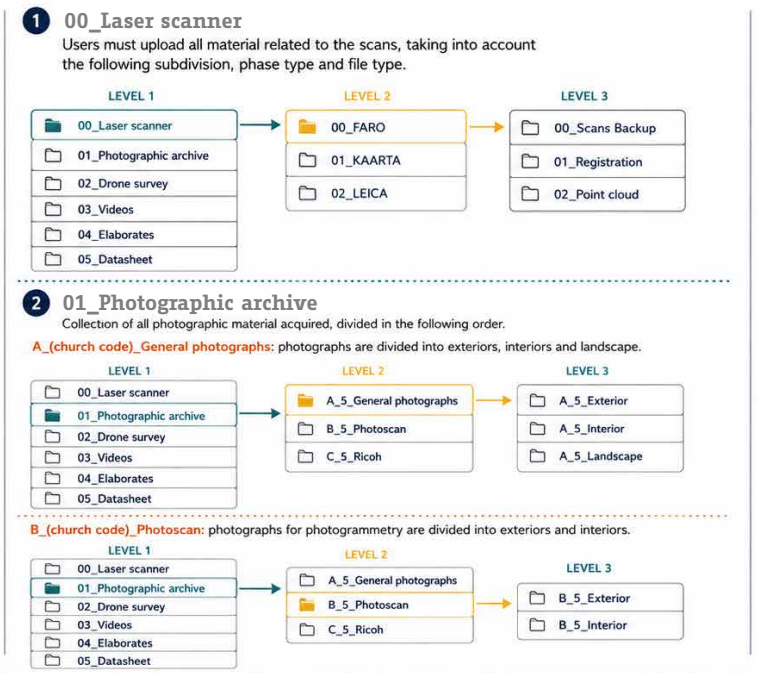


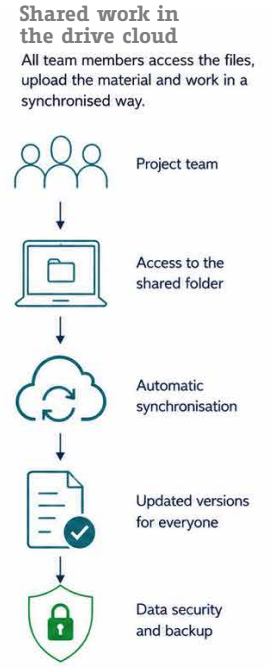
Scientific Research	The project will develop operation knowledge and programmatic protocols for the protection of Cultural Heritage through a cognitive and replicable process

These activities supported the development of 2D and 3D applications for the communication, implementation and practical use of project outcomes. The strengthening of existing collaborations, combined with the new partnerships established during the project, has laid the groundwork for long-term cooperation. In this perspective, PROMETHEUS represents a first step towards the future development of a joint European research laboratory, based on the continuous exchange of researchers and knowledge—both material and immaterial—dedicated to the study and management of architectural heritage and cultural landscapes within the framework of Cultural Heritage Routes. The PROMETHEUS project contributes significantly to strengthening research and innovation potential within Europe by addressing the complexity and diversity of Cultural Heritage Routes (CHRs). These heritage systems originate from a wide range of historical and cultural dynamics—including commercial networks, political boundaries

Applied Research	The development of a territorial archive of UpK, capable to manage 100s of buildings linked to their own information, improves the application and diffusion of innovative abilities and instruments of protection of UpK heritage by local administrations.

and religious landscapes—and are characterised by layered territorial and architectural structures shaped by both European and extra-European influences. Despite their diversity, CHRs share underlying typological and semantic features that can be systematically organised into "libraries" of architectural and constructive components. PROMETHEUS advances this perspective by enabling the identification, classification and digital representation of these features, supporting the large-scale digitisation of historical landscapes, monuments and architectural complexes. This approach facilitates the application of unified documentation protocols and Information Models (IMs), allowing heritage to be managed both at the level of individual sites and within broader territorial networks. While previous research conducted by the consortium focused on isolated case studies, PROMETHEUS extends this approach to entire cultural basins. This shift enables the development of integrated documentation and management systems, supporting the recognition and establishment of protected heritage areas and contributing to the advancement of conservation strategies at both European and international levels. The project generates impact across three main dimensions. At the scientific level, it defines a comprehensive methodology for the knowledge, representation and management of Built Heritage (BH), integrating academic research and professional practice through collaboration between academic institutions and SMEs. At the technological level, it promotes the use of Information Modelling and collaborative digital services, supporting the development of standardised procedures for restoration, conservation and urban management. At the societal level, it contributes to reinforcing a shared European cultural identity,





Preservation Methodology	The action will encourage the cooperation between partners and public authorities to promote programs and concrete activities on documentation and valorisation (included restoration and conservation activities) of CHRs architectural assets.

Main folder division
01. Multimedia
02. Deliverables_official files
03. Historical information of CH

WP. 1 Preliminary analysis on target site
WP.2 Documentation campain and survey protocols definitions
WP.3 im library operation and validation
WP.4 Finalisation of IMS and exploitation of results
WP.5 Transfer of knowledge
WP. 6 Communication and dissemination strategy
WP. 7 Project management and monitoring

in line with frameworks such as Horizon 2020 and initiatives such as the European Year of Cultural Heritage 2018. The implementation of IMs within structured Database Management Systems enhances coordination among stakeholders by integrating design, diagnostic and management data. This contributes to reducing inefficiencies in intervention processes and supports interoperability between different actors involved in heritage conservation. The validation of the methodology within the Upper Kama pilot case demonstrated the effectiveness of multi-level documentation systems, structured through hierarchical descriptors linking territorial, architectural and constructive data. These systems enable advanced decision-making processes, including risk assessment, prioritisation of interventions and conservation planning, while facilitating collaboration with local administrations. The methodological framework developed within PROMETHEUS also supports the activation of concrete territorial strategies, including the definition of buffer zones, the planning of conservation interventions and the promotion of educational initiatives for the recovery of traditional construction practices. In this way, the project establishes a direct connection between research outcomes and operational applications, acting as a bridge between heritage sites, local administrations and institutional stakeholders. The consortium benefits from strong international collaboration and active participation in heritage-related programmes and committees, including UNESCO and ICOMOS. The involvement of SMEs specialised in conservation and digital technologies further enhances the practical applicability of results and supports future development and exploitation opportunities. Long-standing collaborations among partners, as well as their engagement in international networks, represent a significant added value for the project, particularly in terms of dissemination and transfer of results into operational programmes.

These relationships contribute to positioning PROMETHEUS within a broader European and global research ecosystem, fostering the development of new partnerships and initiatives.

Quality and efficiency of the implementation - Work Packages

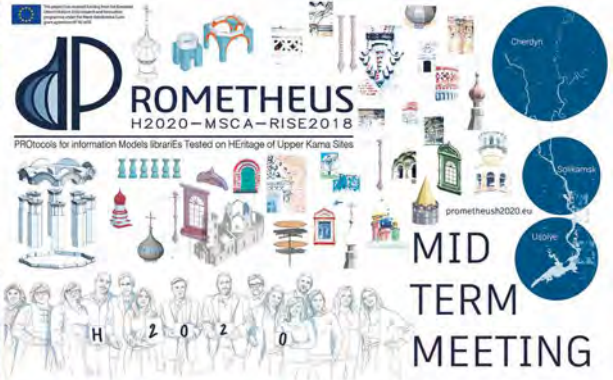
The PROMETHEUS work plan followed the logical sequence of three methodological phases. These were articulated into four core Work Packages (WPs). Dedicated WPs addressed Transfer of Knowledge (ToK), Communication and Dissemination, and Project Management. This ensured a comprehensive and well-coordinated implementation framework. The planning of research activities was informed by the consortium's previous international experience, including a Marie Skłodowska-Curie action focused on wooden architectural heritage in the Karelia region (on the Russia–Finland border). This experience provided a relevant benchmark for defining best practices in structuring both the research design and the operational work plan. The organisation of WPs reflected the multifaceted roles of participating researchers, who contributed not only to research and development activities, but also to supervision, mentoring, management and administrative tasks. In line with the principles outlined in the European Charter for Researchers, the allocation of tasks and secondments was designed to ensure appropriate working conditions and to optimise each participant's effective contribution. Gender balance was systematically considered throughout the project's planning and implementation. In particular, approximately 60% of secondees were female researchers, a proportion reflected in the project's decision-making structures, contributing to an inclusive and balanced governance framework. Beyond MSCA-funded secondments, further exchanges between beneficiaries supported project implementation. These additional secondments were financed through institutional resources and formal partner agreements. This ensured continuity and flexibility in task execution. The research activities were primarily carried out during secondment periods, in close collaboration with the hosting institutions. As a result, the Total Person Months (TPM) exceed the Secondment Months (SM), since TPM includes not only the time spent by secondees but also the contribution of hosting researchers and staff.

WP no.	Work Package Title
WP1	Preliminary analysis of target site
WP2	Documentation campaign and survey protocols definition
WP3	IM Library operation and validation
WP4	Finalization of IMs and exploitation of results
WP5	Transfer of knowledge
WP6	Communication and dissemination strategy
WP7	Project management and monitoring
WP8	Ethics requirements

Dissemination, communication, and management activities were integrated into several Work Packages. They took place during secondments and with internal organisational support. As a result, TPM and SM values do not fully capture the full effort spent on these activities, which also involved administrative and technical staff. The structured organisation of Work Packages, along with coordinated secondments and complementary activities, ensured quality, efficiency, and coherence in project implementation. This supported the achievement of objectives and delivery of expected results.


OPENING CONFERENCE FOR PROJECT PRESENTATION
EU H2020 - R&I - MSCA - GA N° 821870
PROMETHEUS
PROtocols for information Models librariEs Tested on HEritage of Upper Kama Sites
27TH FEBRUARY, 2019 - ROOM 414 - h. 14.00
EUROPEAN PROJECT
CONFERENCE PROGRAM
PRESENTATIONS
INTERVENTIONS
YEAR 1_2019
YEAR 2_2020
YEAR 3_2021
FOR CONTACT AND FURTHER INFORMATION


INTERNATIONAL SUMMER SCHOOL 2019
PROMETHEUS
H2020 European Project RISE
PROtocols for information Models librariEs
Tested on HEritage of Upper Kama Sites
22 JULY - 4 AUGUST, 2019
UPPER KAMA, RUSSIA
FOR CONTACT AND FURTHER INFORMATION


PROMETHEUS
H2020-MSCA-RISE2018
PROtocols for information Models librariEs Tested on HEritage of Upper Kama Sites
prometheush2020.eu
MID TERM MEETING
H 2 0 2 0


PROMETHEUS
II TELEMATIC MEETING


PROMETHEUS
IV TELEMATIC MEETING
PROGRAM


PROMETHEUS
III TELEMATIC MEETING
15-03
2021


PROGRAM
28-09
2020
WHERE Online conference
Microsoft Teams


2ND EDITION
PAVIADIGIWEEK
DIGITAL ARCHITECTURE WEEK IN PAVIA
Virtual environments and digital simulations for development of cultural identity in the Digital Age
25.9.2023 - 29.9.2023

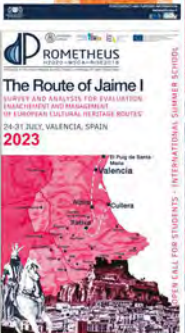
PAVIA
27 settembre 2019
SHARPER


Cultural Heritage Comes Digital
A dashboard of virtual fruition sustaining Community in the access to Heritage


PAVIADIGIWEEK
DIGITAL ARCHITECTURE WEEK IN PAVIA
Virtual environments and digital simulations for development of cultural identity in the Digital Age
19.9.2022 - 23.9.2022

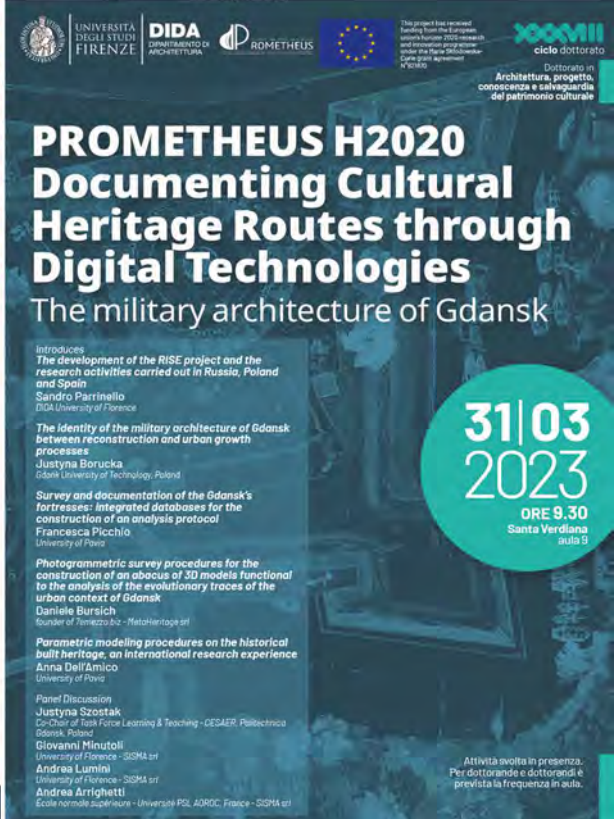

The Route of Jaime I
16-26 JULY, VALENCIA, SPAIN
2022


The Gdańsk Fortress Route
2-10 JULY, GDAŃSK, POLAND
2023


The Route of Jaime I
24-31 JULY, VALENCIA, SPAIN
2023


PROMETHEUS
H2020-MSCA-RISE2018
PROtocols for information Models librariEs Tested on HEritage of Upper Kama Sites
Prometheus H2020
The Route of Jaime I
INTERDISCIPLINARY ACTIONS FOR THE DOCUMENTATION AND ELABORATION OF AN INFORMATION SYSTEM ON CULTURAL HERITAGE ROUTES
29th NOVEMBER, VALENCIA, SPAIN
2023
INTERNATIONAL CONFERENCE
WHERE
El Puig de Santa Maria
Valencia
Alzira
Cullera
Xàtiva
Alicante
Aula Magna
Escuela Técnica Superior de Ingeniería de Edificación
Universidad Politécnica de Valencia
prometheush2020.eu


PROMETHEUS
H2020-MSCA-RISE2018
PROtocols for information Models librariEs Tested on HEritage of Upper Kama Sites
PROMETHEUS H2020
INTERDISCIPLINARY ACTIONS FOR THE DOCUMENTATION AND ELABORATION OF AN INFORMATION SYSTEM ON CULTURAL HERITAGE ROUTES
27 OCTOBER, GDAŃSK, POLAND
2023
INTERNATIONAL CONFERENCE
WHERE
Urban plot and local route
Gdańsk Fortress Route
Venue:
Kunszt Wódny: Targ Sienny 4,
22-100 Gdańsk, Polska
prometheush2020.eu


UNIVERSITÀ DEGLI STUDI FIRENZE
DIDA DIPARTIMENTO DI ARCHITETTURA
PROMETHEUS
XXXIII ciclo dottorato
Dottorato in Architettura, progetto, conoscenza e salvaguardia del patrimonio culturale
PROMETHEUS H2020
Documenting Cultural Heritage Routes through Digital Technologies
The military architecture of Gdansk
Introduces
The development of the RISE project and the research activities carried out in Russia, Poland and Spain
Sandro Parrinello
DIDA University of Florence
The identity of the military architecture of Gdansk between reconstruction and urban growth processes
Justyna Borucka
Gdańsk University of Technology, Poland
Survey and documentation of the Gdansk's fortresses: integrated databases for the construction of an analysis protocol
Francesca Picchio
University of Pavia
Photogrammetric survey procedures for the construction of an abacus of 3D models functional to the analysis of the evolutionary traces of the urban context of Gdansk
Daniele Bursich
founder of Timezzo Srl - MetaHeritage srl
Parametric modeling procedures on the historical built heritage, an international research experience
Anna Dell'Amico
University of Pavia
Panel Discussion
Justyna Szostak
Co-Chair of Task Force Learning & Teaching - CESAER, Politechnica Gdańsk, Poland
Giovanni Minutoli
University of Florence - SISMA srl
Andrea Lumini
University of Florence - SISMA srl
Andrea Arrighetti
École normale supérieure - University PSL AOROC, France - SISMA srl
31|03
2023
ORE 9.30
Santa Verdiana
aula 9
Attività svolta in presenza.
Per dottorande e dottorandi è prevista la frequenza in aula.

Anna Dell'Amico
University of Pavia
anna.dellamico@unipv.it

Communication and dissemination plan

Dissemination Plan	APs will be actively involved to exploit and disseminate research results to target audience through scientific research channels and Heritage Committees. SMEs will be involved in disseminate project operative results and business services to enterprises, administrations and entrepreneurial stakeholders.

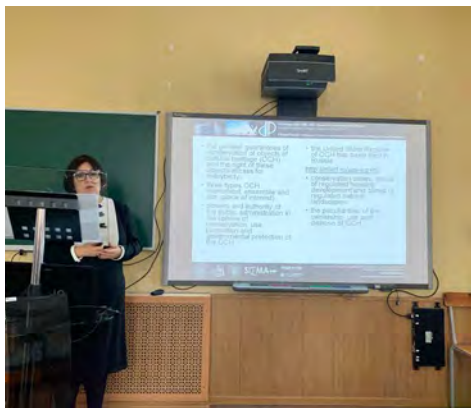
Researchers monitored the project's outputs to identify potential protection issues prior to publication or dissemination. The beneficiary granted, on a royalty-free basis, access to the background necessary for the research activities, in compliance with the Grant Agreement requirements. To regulate ownership and related aspects, a partnership agreement was established between the beneficiary and the partner organisations involved in the project, complementing the provisions of the Grant Agreement. Results of commercial or industrial interest have been protected in accordance with the Industrial Property Code (Italian Legislative Decree no. 30 of 10 February 2005), as well as relevant European regulations and internal rules. Communication and dissemination activities were structured through the Communication and Dissemination Plan (WP6), which coordinated knowledge sharing among beneficiaries and guided the external communication of the project. The plan defined communication and business objectives, target audiences, key messages, communication channels, and strategies to overcome potential barriers. It also promoted access to relevant information, including Open Access principles, enabling users to retrieve and archive data for future use. The Communication and Dissemination Committee oversaw the preparation and implementation of the plan, working closely with the communication offices of partner institutions to maximise outreach. Continuous feedback from target groups and project participants was collected and used to refine subsequent activities. Dissemination was approached as an iterative, long-term process aimed at building sustained relationships with users rather than one-off interactions. The communication strategy focused on three main objectives: communicating the research action, promoting EU funding programmes and strategies, and disseminating project outputs. In all cases, the ultimate goal was to highlight the connection between scientific research on Cultural Heritage, its professional application, and its contribution to addressing societal challenges.

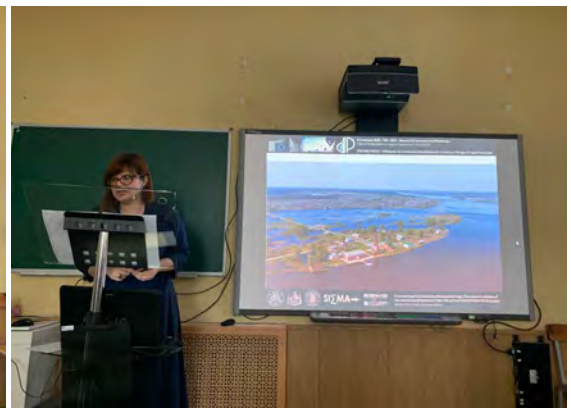
Target group	Goals and results of the dissemination strategy
Academia	Make available the results of the research action; stimulate the scientific dialogue; increase the research network established in the action; highlight contribution of the research to the protection of European Cultural Heritage.
Professionals	Showcase how scientific research supports the development of services
Public Entities	Showcase how the action addresses societal needs (CHR conservation and management)
Students	Showcase the integration between academic research and professional activities; stimulate scientific aspiration of young researchers.

Referee List (DOI 10.36253/fup_referee_list)
FUP Best Practice in Scholarly Publishing (DOI 10.36253/fup_best_practice)

The language used was intended to be accessible to a broad audience while also supporting technical communication in specialised contexts.

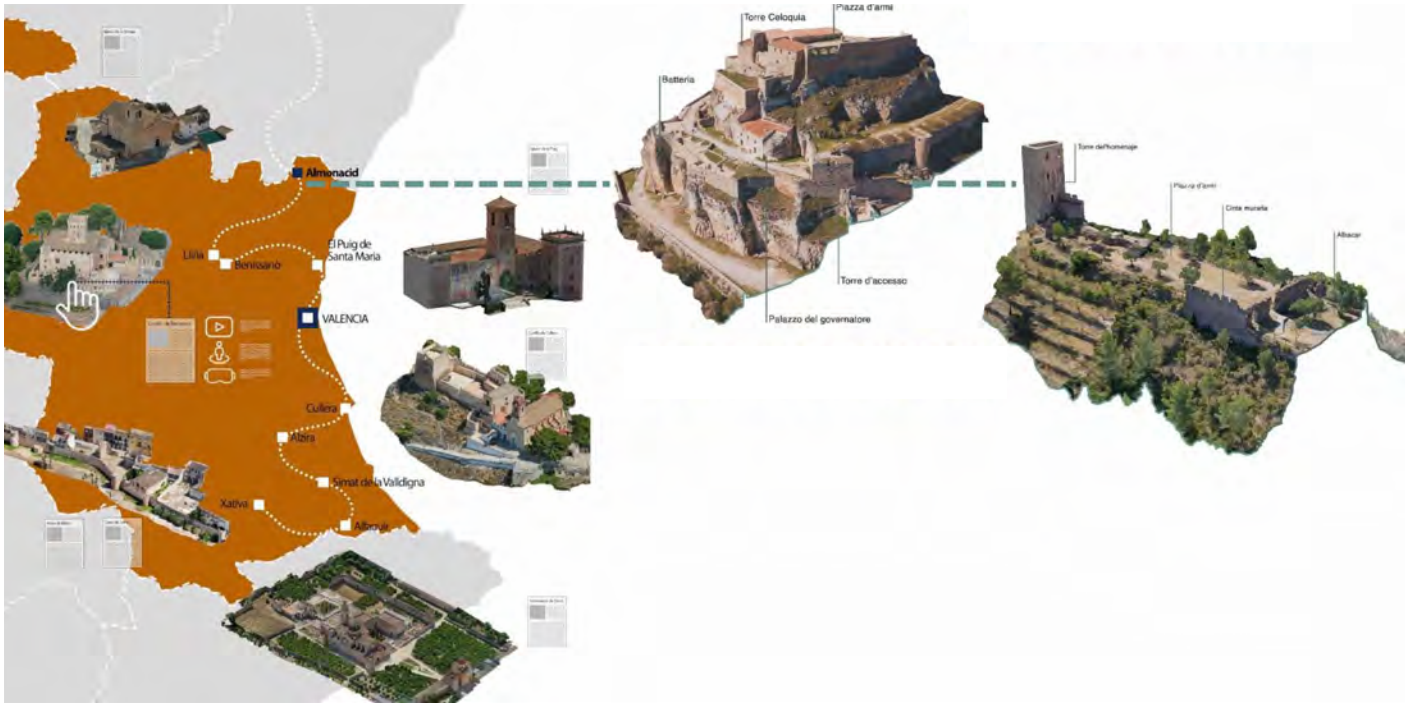
Aligned with its primary objective of promoting documentation systems for Cultural Heritage Routes relevant to local and European administrations, the PROMETHEUS project has fostered renewed dialogue on the concept of widespread Cultural Heritage and the requirements for its development by local institutions. The methodological protocol was assessed through pilot actions at multiple scales: territorial (Cherdyn, Solikamsk, and Usolye districts), provincial (Valencia), and urban (Gdańsk). Heritage managers, supervisors, and institutional stakeholders, in collaboration with the scientific team, identified the need for advanced documentation systems that provide higher visual quality and improved data interconnectivity to support more effective management and intervention processes. The project's cultural and scientific significance has been widely disseminated through participation in international conferences and events (including UID International 2019, 2020, and 2023 in Italy; EXCO 2020 in Spain; Documenting the Historical Architectural Heritage Using Digital Technologies 2021 in Japan (online); Resiliart Debate 2022 in Mexico (online); CIPA 2023 in Italy; and SHARPER – European Researchers' Night 2020–2023). These activities have positioned the project within European heritage protection practices and highlighted the potential replicability of the PROMETHEUS methodology across similar Cultural Heritage Routes in other European countries.





Scientifically, the project benefited from a broader range of case studies than initially anticipated, enabling experimentation with integrated advanced digital survey technologies such as terrestrial laser scanning (TLS), Mobile LiDAR (Kaarta and BLK2GO), and unmanned aerial vehicle (UAV) platforms (DJI Phantom, Spark, and Mavic). This expanded technological framework demonstrates the rapid evolution of digital tools over the past few years. The integration of architectural, territorial, and technological survey methodologies improved data coordination and provided a more comprehensive understanding of local heritage, including the historical processes that influence construction and decay. The research team's organisational structure facilitated effective coordination and dialogue among partners, further strengthened by the establishment of an extensive network of researchers and practitioners, particularly following changes in the partnership structure. The collaborative framework's impact extended beyond the project, as demonstrated by the successful funding of two additional joint projects in 2023 (Gdańsk University of Technology with the University of Florence, and the University of Pavia with Gdańsk University of Technology).

Scientific activities within PROMETHEUS have significantly advanced research in cultural heritage digitisation and the professional development of young researchers, graduates, and technical specialists involved in the project. The international and multidisciplinary consortium fostered a dynamic environment for ongoing exchange among universities, SMEs, cultural institutions, and local administrations.



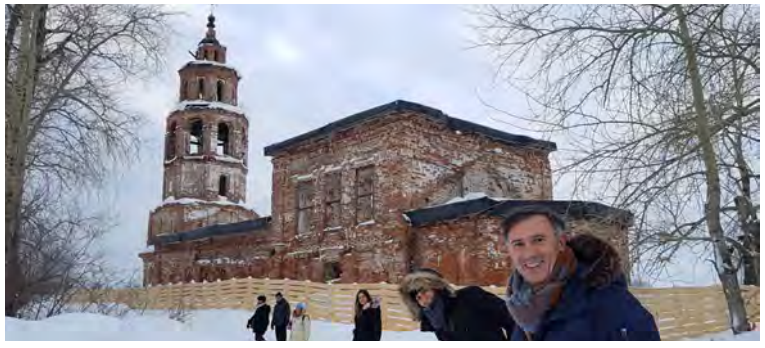
Through this collaborative framework, participants shared methodologies, technical expertise, and operational approaches for digital survey technologies, heritage management systems, data interoperability, and digital twin development. This reciprocal exchange of knowledge was among the most valuable outcomes of the project, strengthening both scientific competencies and professional skills across the partnership.

The project also created significant opportunities for international academic mobility and professional growth. Researchers involved in PROMETHEUS participated in visiting lectures, seminars, workshops, field activities, and training initiatives organised across partner institutions and countries. These experiences promoted direct interaction among different academic traditions and operational practices, enabling participants to compare approaches to heritage conservation, documentation strategies, and technological applications within diverse cultural and institutional contexts. Workshops and collaborative survey campaigns facilitated the transfer of practical and theoretical knowledge, supporting the development of enduring professional relationships and international research networks. Students and graduates who participated in the project have subsequently advanced their careers through employment within partner companies and institutions, involvement in new collaborative research projects, and access to international funding opportunities. In particular, the network and expertise developed through PROMETHEUS contributed to pursuing further academic and professional initiatives, including Marie Skłodowska-Curie fellowship applications and other European research programs focused on cultural heritage documentation and digital innovation. The strong interaction among partners also generated new opportunities for joint teaching activities, future international workshops, and collaborative educational initiatives that continue beyond the

official project duration. The project has reaffirmed the central role of academic institutions in guiding research and innovation, while also emphasising the complementary contributions of small and medium-sized enterprises (SMEs), whose practical expertise supports the development of effective tools and operational procedures for conserving and managing cultural heritage sites. Transparency is prioritised in both research management and outcomes. Methodological explanations are structured to ensure transparency, particularly in relation to model reliability analysis. The project promotes internal discussions and remains open to the scientific community for sharing and discussing each stage and result of its development. Replicability, both of individual actions and the entire digitisation system for Cultural Heritage Routes (CHRs), is central to the project's methodological approach and objectives. Re-use considerations address both data reproducibility for various purposes and the interoperability of databases, which must include modification and adaptation criteria consistent with this vision. Open Data Sharing is a fundamental policy for both the research network and future users. Ensuring that the produced databases are compatible with widely used heritage database systems (e.g. Open-Heritage.eu) is a key aspect of dissemination and system operation. Regarding open communication of results, in addition to tools tested with heritage management partners and events involving citizens, all publications and research outcomes are intended to be made available through common dissemination channels and open access publications. In this sense, the impact achieved has exceeded project expectations. Such a high number of participants on the one hand allowed the coordinator to develop his staff and project management skills, and on the other led to the division into compact international transdisciplinary working groups, whose training stimulates participants at every level. Three final project events were organised, one in each partner country. The first, 25-29 September 2023, organised by UNIPV. The event saw the participation of over 150 people from 8 European universities and national and international companies. The cycle of workshops, events, and seminars concluded in conjunction with the presentation of the project at the European Researchers' Night. The second, 25-27 October 2023, organised by GdanskTech, saw the participation of stakeholders and cultural associations from Gdansk and the creation of an interactive exhibition presenting the digital results obtained. The third, 29 November 2023, organised by UPV, saw the participation of universities and companies (in person and remotely) in a conference and a final exhibition narrating the entire Prometheus project.

Visual Atlas of Project Events and Activities


RISE
Research and Innovation Staff Exchange
Proud the EU has invested in our project
Reaching Innovative Staff Everywhere
Unit A3
Marie Skłodowska-Curie
Research and Innovation Staff Exchange



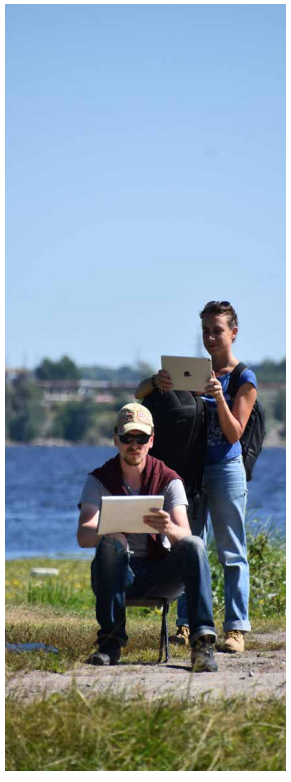

Dicra Lab

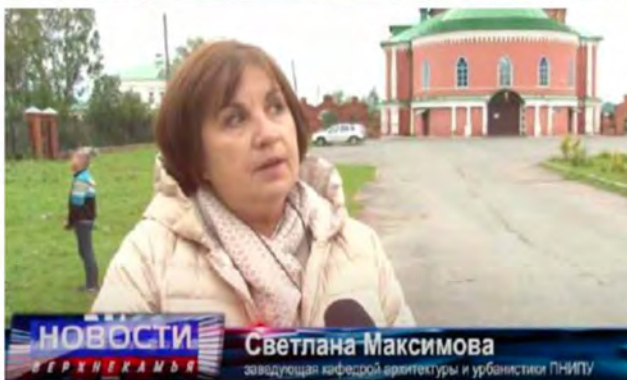








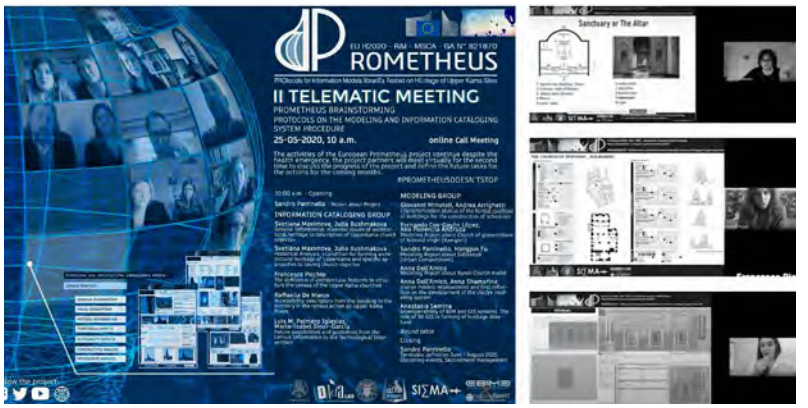




Сандро Парринелло
профессор университета UNIPV, Италия

НОВОСТИ
Светлана Максимова
заведующая кафедрой архитектуры и урбанистики ПНИПУ

During the COVID-19 pandemic, the project ensured continuity through telematic meetings and digital collaborative activities

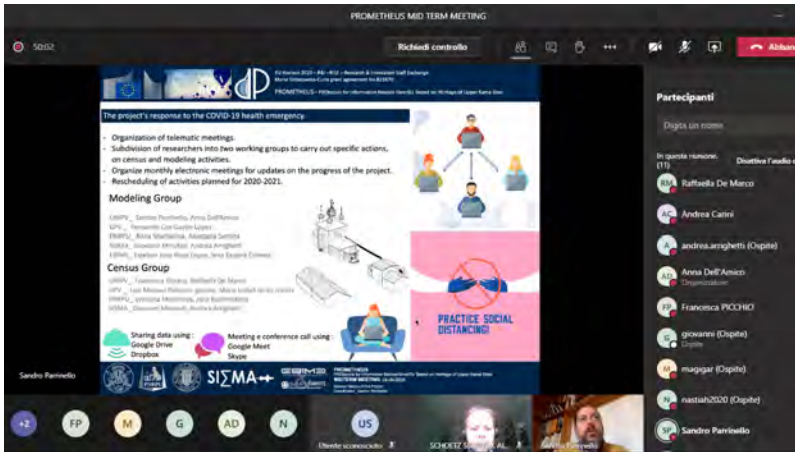
I Telematic meeting, 23rd March 2020

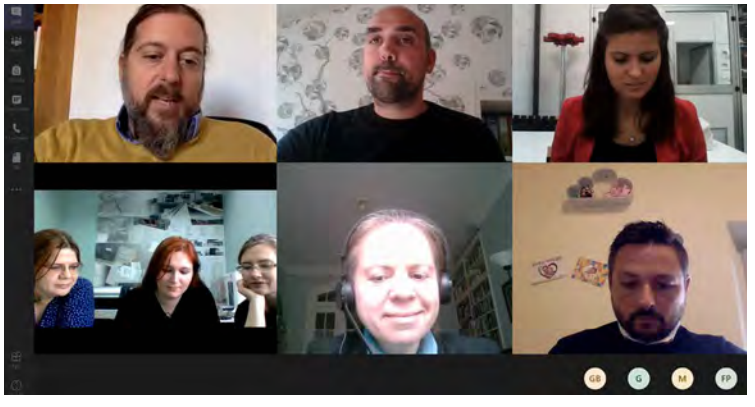
II Telematic meeting, 25th May 2020



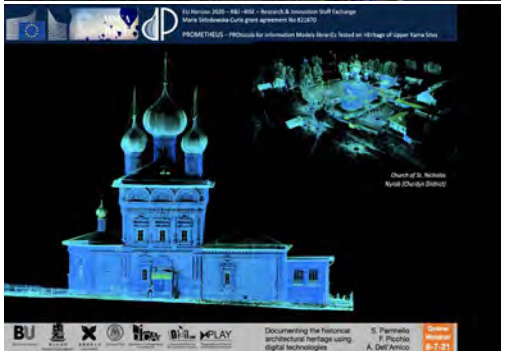
III Telematic meeting, 28th July 2020

Mid-Term meeting, 28th September 2020



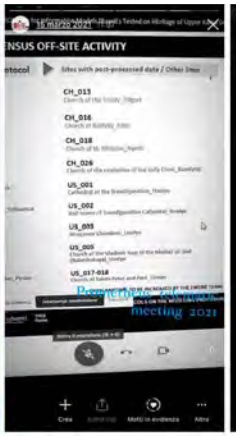



Cultural Heritage comes digital L'evento fa parte di Sharper – Notte Europea dei Ricercatori a Pavia
Video in diretta registrato
Notte dei Ricercatori - Pavia
EU Horizon 2020 – R&I –RISE – Research & Innovation Staff Exchange
Marie Skłodowska-Curie grant agreement No 821870
PROMETHEUS – PROtocols for information Models librariEs Tested on HEritage of Upper Kam
Anna Dell'Ami...
zoom

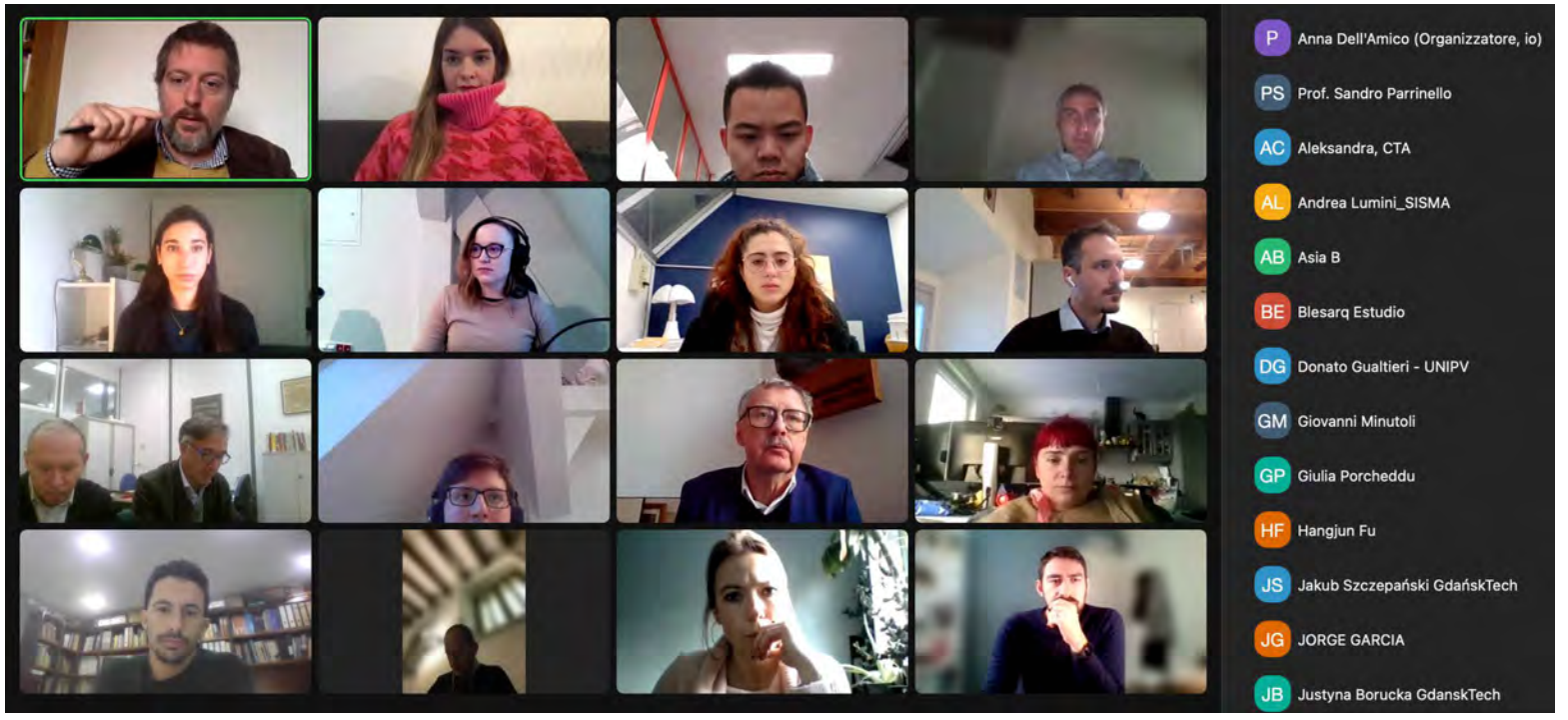


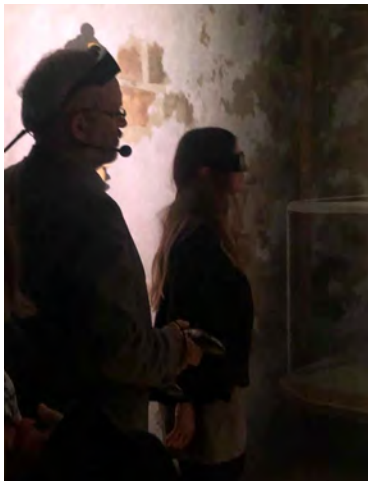

DashboarDAda
Solikamsk Historical Center
PROMETHEUS

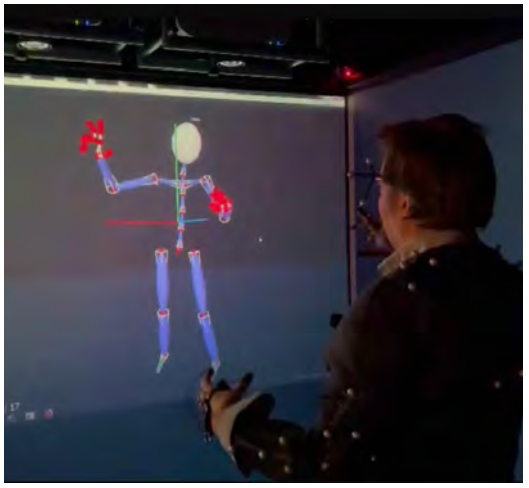

PROMETHEUS
IV TELEMATIC MEETING
PROGRAM
15-03
2021

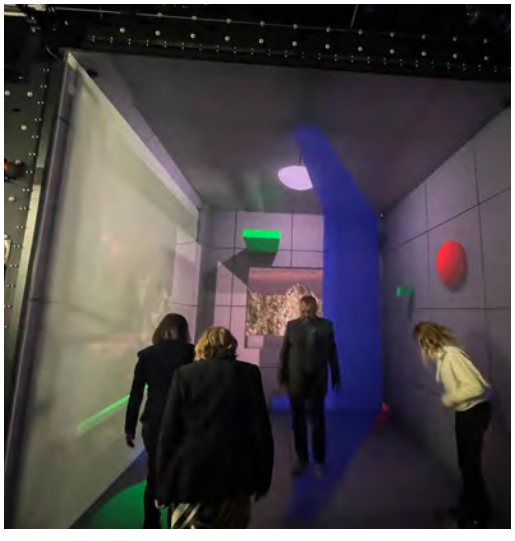

ENSUS OFF-SITE ACTIVITY


Prometheus telematic


Anna Dell'Amico (Organizzatore, io)
Prof. Sandro Parrinello
Aleksandra, CTA
Andrea Lumini_SISMA
Asia B
Blesarq Estudio
Donato Gualtieri - UNIPV
Giovanni Minutoli
Giulia Porcheddu
Hangjun Fu
Jakub Szczepański GdańskTech
JORGE GARCIA
Justyna Borucka GdanskTech











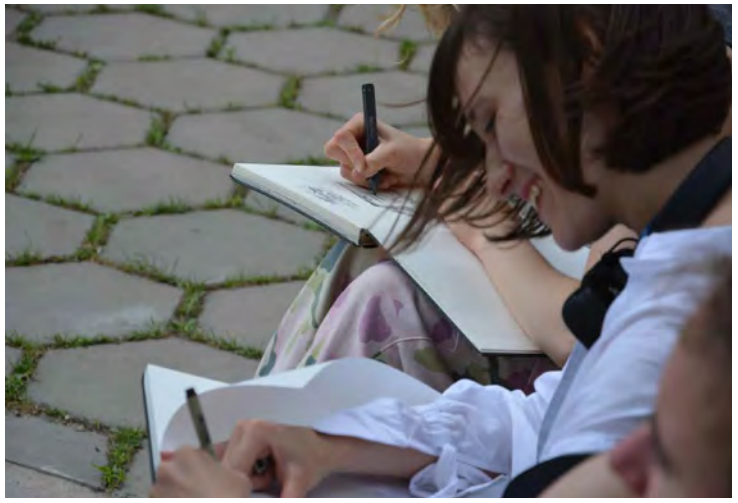






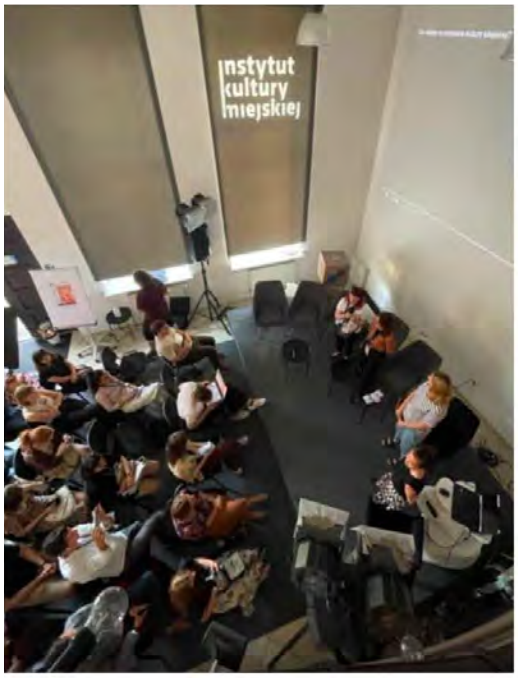
The Route of Jaime I


ROMETHEUS
The Route of Jaime I





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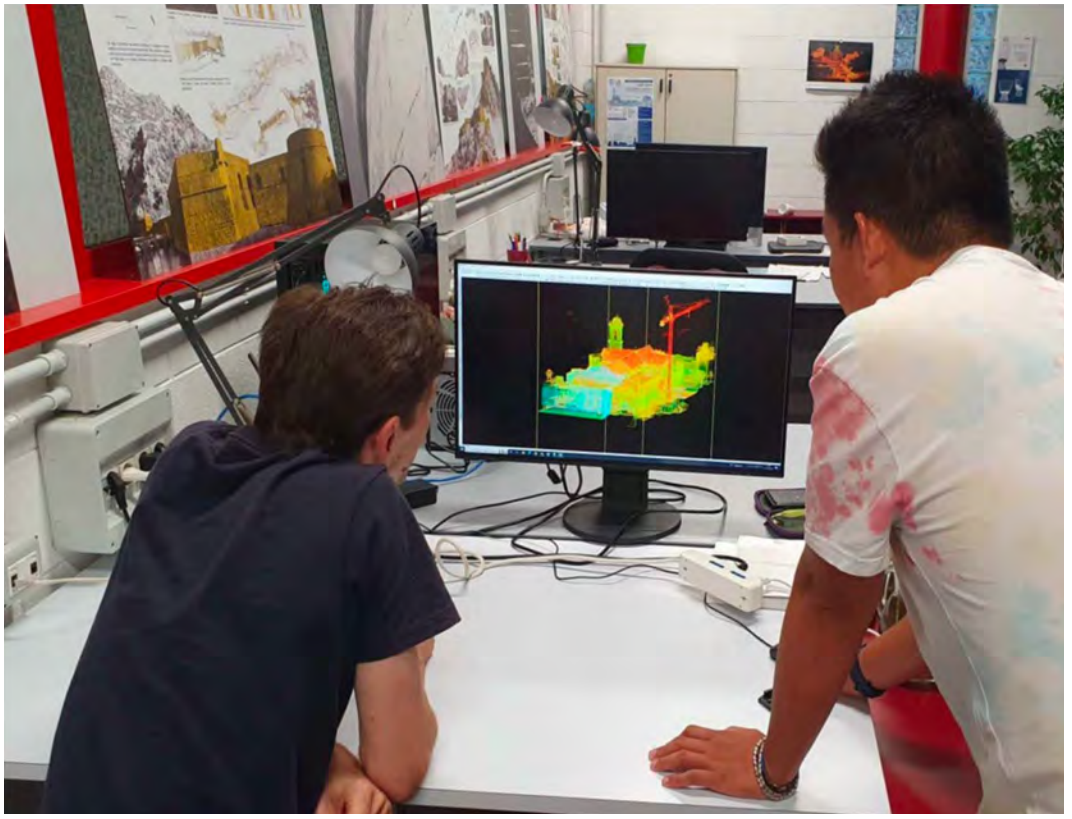
kultury
miejskiej

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ROMETHEUS
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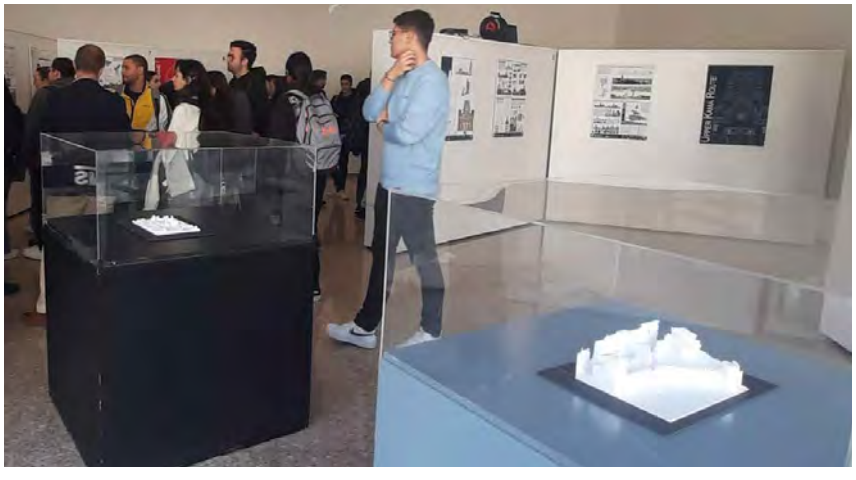
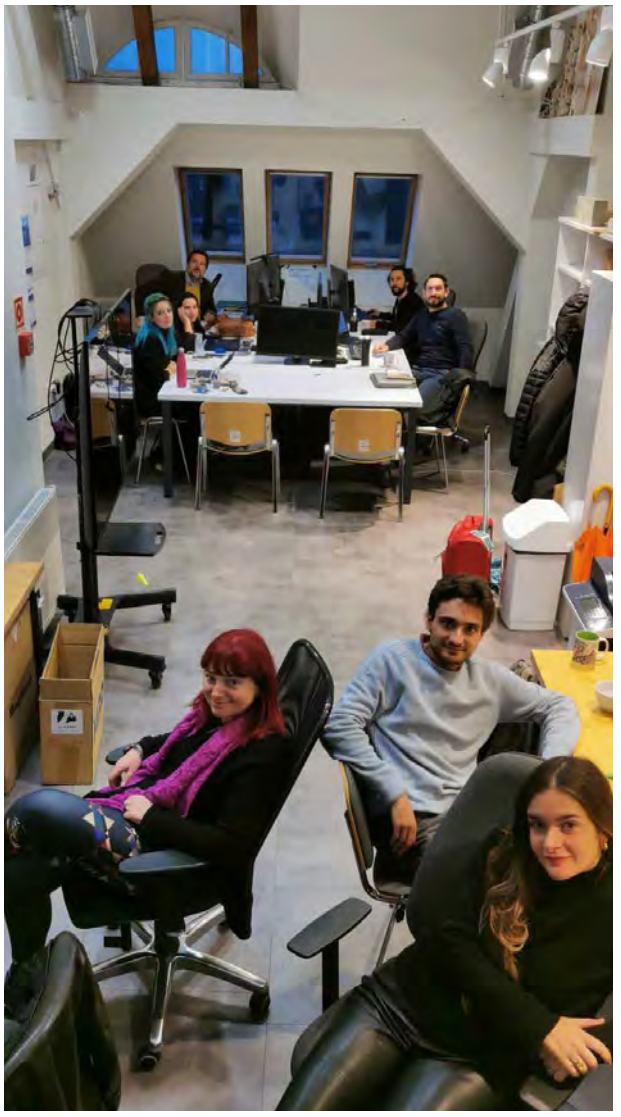
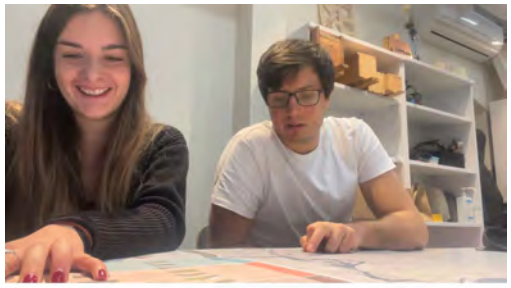
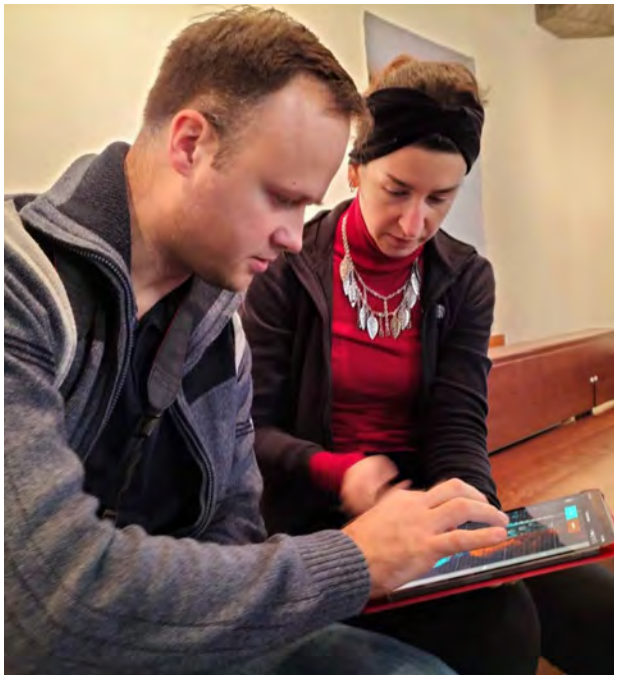
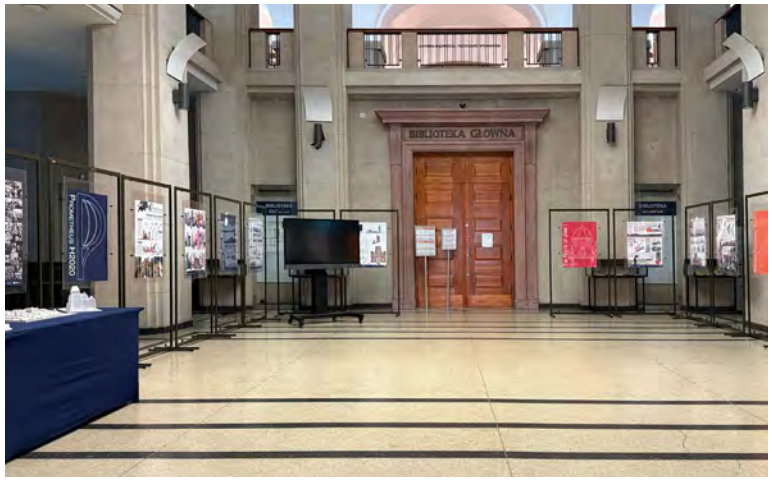
UPPER KAMA ROUTE


UPPER KAMA ROUTE








BIBLIOTEKA GŁÓWNA


BIBLIOTEKA GŁÓWN


UPPER KAMA ROUTE


IRON MAIDEN


POLITECHNIKA GDAŃSKA
Gdańsk...


PAVIADIGIWEEK


Cipa Heritage Documentation 27th International Symposium,1-5 September, 2019 Avila
CIPA 2019 VILA
27th International Symposium
14 SEPTEMBER 2019
AVILA, SPAIN


II Symposium UID
Matera, 22 October 2019


IMEKO TC-4, International Conference METRO ARCHAEO, 5 December 2019, Florence


Landscape analysis for digital description of urban morphology of Upper Kama region towns.
5th ISUFItaly 2020 International Conference Rome, 19-22 February 2020.
PROCEEDINGS
URBAN SUBSTRATA & CITY REGENERATION


3D, BIM e semantica per la documentazione digitale del patrimonio archeologico e architettonico. Lo stato dell'arte in Italia: iniziative, progetti e risultati.
03rd April 2020, ONLINE MEETING


Attendance to scientific conferences:
RUINS. Sustainable reuse, conservation and modern management of historical ruins in Central Europe - elaboration of an integrated model and guidelines based on the synthesis of the best European experiences".
14-15 September 2020, Lublin (Poland).
interreg
CENTRAL EUROPE
RUINS


3rd International Seminar Architectures of the Soul (Arquitecturas da Alma)
25 September 2020.
ARCHITECTURES OF THE SOUL


International Conference "Architettura Eremitica Sistemi Progettuali e Paesaggi culturali", Florence, Italy
30 September 2021 - 1 October 2021
ARCHITETTURA EREMITICA
sistemi progettuali e paesaggi culturali
PROMETHEUS PROJECT
Architettura Eremitica V


Seminario Internacional
Levantamiento y Representación de la Arquitectura
PROYECTO AVANZADO DE LEVANTAMIENTO DEL PATRIMONIO ARQUITECTÓNICO


International Conference " 3D-ARCH 2022", Mantua, Italy
2-4 March 2022
3D-ARCH 2022
MANTOVA, ITALY 2-4 MARCH 2022


International Telematic Conference "Mondialcult 2022: Resiliart Debate"
23 February 2022
RESILIART DEBATE

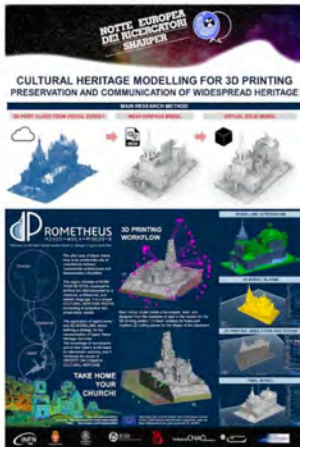

International Conference "CIPA 2023 ", Florence, Italy
25-30 June 2023
FROM ARCHIVES SOURCES TO VIRTUAL 3D RECONSTRUCTION OF MILITARY HERITAGE – THE CASE STUDY OF PORT BATTERY, GDAŃSK
CIPA 2023 Florence
June 25-30
Documenting, Understanding, Preserving Cultural Heritage: Humanities and Digital Technologies for Shaping the Future


International Conference "UID 2023 - 44th International Conference of Representation Disciplines Teachers", Palermo, Italy
14-16 September 2023


International Conference "APEGA 2023 - XVI Congreso Internacional de Expresión Gráfica Aplicada a la Edificación", Cuenca
30 September 2023
APEGA 2023
CUENCA
XVI Congreso Internacional
Jorge García- Valdecabres


International Conference "REAACH - Representation Advances And CHallenges association", Online Symposium
10-11 October 2023
REAACH
TOWARDS VIRTUAL CULTURAL HERITAGE ROUTES
Development of digital models for extended accessibility of the H2020 Prometheus project
Youtube Session

European Research night




dalabpg
można skorzystać ze sprzętu do VR
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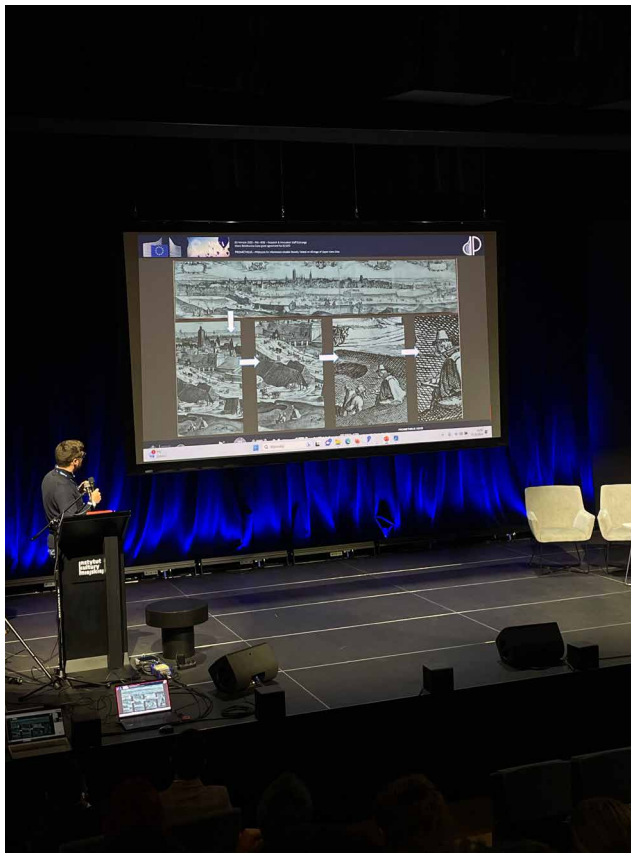
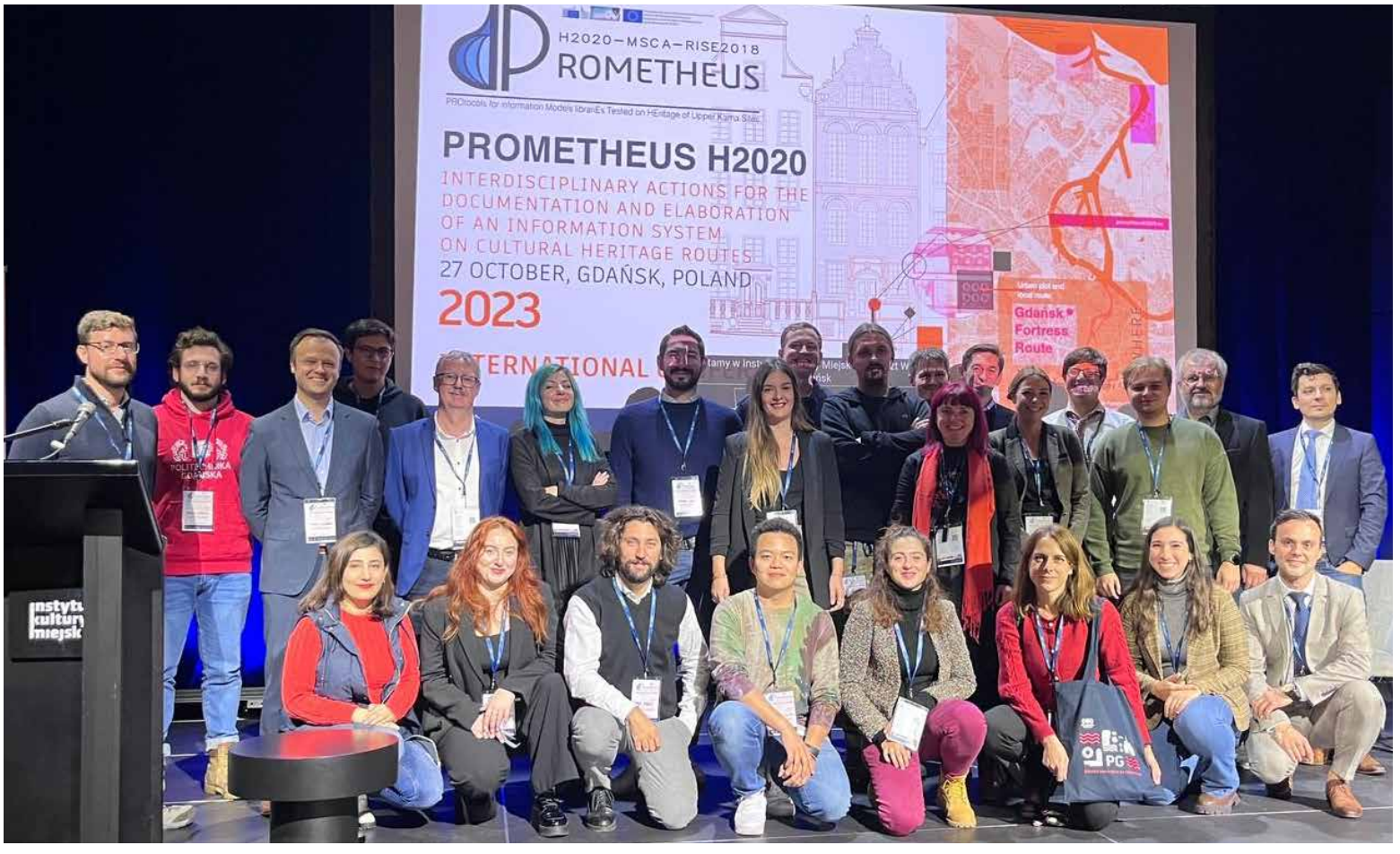
Informative 3D systems
Cultural Heritage Routes
Upper Kama Route
Jaime I Route
Gdańsk Fortress Route
BIM Collaborative Protocols




H2020–MSCA–RISE2018
PROMETHEUS
PROtocols for information Models libraries Tested on HEritage of Upper Kama Stac
PROMETHEUS H2020
INTERDISCIPLINARY ACTIONS FOR THE DOCUMENTATION AND ELABORATION OF AN INFORMATION SYSTEM ON CULTURAL HERITAGE ROUTES
27 OCTOBER, GDAŃSK, POLAND
2023
Gdańsk Fortress Route

Project Credits

Research Project

PROMETHEUS – *PROtocols for information Models librariEs Tested on Heritage of Upper Kama Sites* – is funded by the European programme Horizon 2020-R&I-RISE – Research & Innovation Staff Exchange Marie Skłodowska-Curie, Proposal Number: 821870.

The scientific coordinator of the project is Prof. Sandro Parrinello.

The project involved collaboration among academic and non academic partners.

List of the academic partners:
University of Pavia (Italy)
Polytechnic University of Valencia (Spain)
Perm National Research Polytechnic University - until 2022 (Russia)
Gdańsk University of Technology - since 2022 (Poland)
University of Florence - since 2023 (Italy)

List of the non academic partners:
SISMA srl (Italy)
Ebime srl (Spain)
MetaHeritage srl - since 2022 (Italy)
Blesarq - since 2022 (Spain)
CTA srl - since 2022 (Poland)

Project Coordinators

Sandro Parrinello *(from January 2019 to May 2023)*
Francesca Picchio *(since May 2023)*

Academic Research Unit

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Alberto Pettineo
Giulia Porcheddu
Anna Sanseverino

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Fernando Cos-Gayón López
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Jorge G. Valldecabres

FUP Best Practice in Scholarly Publishing (DOI 10.36253/fup_best_practice)
Sandro Parrinello, Francesca Picchio Francesca Picchio (edited by), *MSCA H2020 PROMETHEUS Project Report*, © 2026 Author(s), CC BY-NC-SA 4.0, published by Firenze University Press, ISBN 979-12-215-1015-7, DOI 10.36253/979-12-215-1015-7

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CTA.AI
Aleksandra Wojciechowska - Research Unit Coordinator
Gracjan Puch
Marek Trojanowicz

MetaHeritage srl
Daniele Bursich - Research Unit Coordinator
Pietro Raimondo Giardini
Alberto Pettineo

PROMETHEUS H2020 - INTERNATIONAL CONFERENCE
Cultural Heritage preservation strategies - KICK off Meeting
(27 February 2019), Perm, Russia
Scientific Responsible: Svetlana Maksimova, Sandro Parrinello

Methodological Research on Digital Model Development - Mid Term Meeting
(29 September 2020), Online Meeting
Scientific Responsible: Sandro Parrinello

Documenting Cultural Heritage Routes through Digital Technologies
(31 March 2023), Florence, Italy
Scientific Responsible: Sandro Parrinello

Documentation and Elaboration of an Information System on Cultural Heritage Routes
(27 October 2023), Gdańsk, Poland
Scientific Responsible: Sandro Parrinello, Justyna Borucka, Francesca Picchio

Information Models and Digital Documentation for Cultural Heritage Routes
(29 November 2023), Valencia, Spain
Scientific Responsible: Sandro Parrinello, Luis Palmero, Francesca Picchio

PROMETHEUS H2020 - INTERNATIONAL Event

Pavia DIGI WEEK 2022
(19-23 September 2022), Pavia, Italy
Scientific Responsible: Sandro Parrinello
Organizing Committee: Carlo Berizzi, Daniela Besana, Vittorio Casella, Tiziano Cattaneo, Roberto De Lotto, Ioanni Delsante, Marica Franzini, Alessandro Greco, Marco Morandotti, Olimpia Niglio, Francesca Picchio, Massimiliano Savorra, Elisabetta Maria Venco
Organizing Secretariat: Anna Dell'Amico, Silvia La Placa, Francesca Picchio, Giulia Porcheddu, Chiara Rivellino, Anna Sanseverino

Pavia DIGI WEEK 2023
(25-29 September 2023), Pavia, Italy
Scientific Responsible: Francesca Picchio
Organizing Committee: Carlo Berizzi, Daniela Besana, Vittorio Casella, Tiziano Cattaneo, Roberto De Lotto, Ioanni Delsante, Marica Franzini, Alessandro Greco, Marco Morandotti, Olimpia Niglio, Sandro Parrinello, Massimiliano Savorra, Elisabetta Maria Venco
Organizing Secretariat: Raffaella De Marco, Anna Dell'Amico, Elisabetta Doria, Hangjun Fu, Francesca Galasso, Silvia La Placa, Francesca Picchio, Giulia Porcheddu, Anna Sanseverino, Madalina Elena Cantea, Dante Certomà, Martina Frazzica, Alberto Pettineo

European Research Night Sharper event
The research team took part in several editions of the European Researchers' Night – SHARPER in Pavia, Italy.
The team participated in the events held on
27 September 2019;
22 November 2020 (online);
24 September 2021;
30 September 2022;
29 September 2023.

PROMETHEUS INTERNATIONAL SUMMERSCHOOL
PROtocols for information Models librariEs Tested on HEritage of Upper Kama Sites
(22 July - 4 August 2019), Upper Kama, Russia
Scientific Responsible: Sandro Parrinello, Svetlana Maksimova

Survey and analysis of the Jaime I Route in Valencia
(16-26 July 2022), Valencia, Spain
Scientific Responsible: Sandro Parrinello, Luis Cortés Meseguer

Survey and analysis of the Jaime I Route in Valencia: Documentation of Morella Castle
(24-31 July 2023), Valencia, Spain
Scientific Responsible: Francesca Picchio, Luis Palmero

Documentation of the Gdańsk fortress Route
(02–10 July 2023), Gdańsk, Poland
Scientific Responsible: Sandro Parrinello, Justyna Borucka, Francesca Picchio

PROMETHEUS EXHIBITION

H2020 European project RISE PROMETHEUS
(December 2019), UPV Valencia, Spain

European Project PROMETHEUS: a challenge of documentation, intervention and architecture conservation for cultural Heritage routes
(February 2020), EXCO'20, UPV Valencia, Spain

Invisible Geographies, Information Models and Digital Documentation for Cultural Heritage Routes
(September 2023), University of Pavia, Pavia, Italy

3D Systems, Digital Model and Narrative of Cultural Heritage Routes
(October 2023), Gdańsk, Poland

PROMETHEUS International Final Exhibition
(November - December, 2023), UPV Valencia, Spain

PROMETHEUS, Digital Infrastructure for the Representation of the Cultural Heritage Routes
(June, 2024), Faculty of Architecture at Gdańsk University of Technology Gdańsk, Poland

PROCESSING MODELS FOR 3D PRINTING
Prototyping and processing of 3D printing models: Dante Certomà, Hangjun Fu, Szymon Kowalski
3D printing models were produced at:
DAda-LAB, University of Pavia;
Dab Lab, Gdańsk University of Technology;
Be More 3D, Polytechnic University of Valencia.

List of Publications

The present project bibliography is necessarily partial and includes only a selection of the publications made over the years within the framework of the research activities carried out. As is often the case in research, the themes explored in the project have intersected with numerous other investigations and funded initiatives, developed or ongoing in different geographical contexts, generating a broad network of studies and scientific contributions that is difficult to comprehensively encompass in a single list.

2026

Borucka J., Picchio F. 2026, *Transforming urban experience through virtual tours: a digital storytelling of Gdańsk and its heritage*, in *npj Heritage Science*, 14, 129.

2025

Dell'Amico A., Borucka J. 2025, *From Narrative to Digital ModelTwo-Level Representation in Heritage Reconstruction: Mariacka Street, Gdańsk Poland, in* L. Carlevaris et al. (eds.), *èkphrasis. Descrizioni nello spazio della rappresentazione/èkphrasis. Descriptions in the space of representation. Proceedings of the 46th International Conference of Representation Disciplines Teachers*, FrancoAngeli, Milano, pp. 851-862.

Galasso F., Picchio F. 2025, *Multi-scalar digital approaches for heritage knowledge. Integrated documentation strategies of the Morella fortifications in the cultural route of Jaime I*, in *Defensive Architecture of the Mediterranean*, edUPV - Universitat Politècnica de València, Valencia, pp. 1059-1066.

Parrinello S., Pettineo A. 2025, *Databases and information models for semantic and evolutionary analysis in fortified cultural heritage*, in *Heritage*, 8(1), 29.

2024

Bursich D., Parrinello S. 2024, *The "PROMETHEUS" European Project: Gdańsk Fortress Route (Poland)*, in *MDPI Proceedings*, 96, pp. 1-9.

Kowalski S., Lebiedź J., Parrinello S., Picchio F. 2024, *New skills for architects: 3D scanning for an immersive experience in architectural education*, in *Global Journal of Engineering Education*, 26, pp. 115-121.

Picchio F., Cortés Meseguer L., López González M. C., García Valldecabres J., Pettineo A., Dell'Amico A., Galasso F. 2024, *Repositorio 3D para la puesta en valor de la Ruta Cultural de Jaime I en Valencia*, in *Pensar dibujando*, APEGA, edUPV - Universitat Politècnica de València, Valencia, pp. 299-309.

Pettineo A., Dell'Amico A., Picchio F., Parrinello S. 2024, *H-BIM e GIS per l'analisi e la ricostruzione filologica del castello di Almonecir in Spagna*, in *DN*, 14, pp. 6-16.

Życzkowska K., Doria E., Borucka J. 2024, *Virtual tour as an innovative tool for architectural education - from understanding heritage to creativity stimulation*, in *World Transactions on Engineering and Technology Education*, 22, pp. 96-102.

2023

Picchio F., Parrinello S., Borucka J., Szczepański J. 2023, *Persistences: analysis of the image of Gdańsk and its cultural identity through survey processes and digital architectural representation*, in *img journal*, 8, pp. 258-283.

Shamarina A., Pavlyuk A. 2023, *Integrating engineering methods for obtaining three-dimensional data in architectural BIM and HBIM modeling*, in *E3S Web of Conferences*, 410, 04011, EDP Sciences.

Borucka J., Parrinello S., Picchio F., Szczepański J. 2024, *Use of innovative digital laboratories to train a new generation of architects: integration of education, practice and research for digital cultural heritage*, in *Global Journal of Engineering Education*, 26, pp. 88-94.

Borucka J., Parrinello S., Picchio F. 2023, *Digital data and tools in transformative education to preserve architecture and cultural heritage: case studies from Italy and Poland*, in *Global Journal of Engineering Education*, 25, pp. 129-134.

Parrinello S., Picchio F. 2023, *Digital strategies to enhance cultural heritage routes: from integrated survey to digital twins of different European architectural scenarios*, in *Drones*, 7(9), 576.

Cortés Meseguer L., García Valldecabres J. 2023, *Digital twins. HBIM information repositories to centralize knowledge and interdisciplinary management of architectural heritage*, in *Vitruvio: International Journal of Architectural Technology and Sustainability*, 8(2), pp. 64-75.

Pettineo A., La Placa S., Kowalski S. 2023, *From archive sources to virtual 3D reconstruction of military heritage – the case study of Port Battery, Gdańsk*, in *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, XLVIII-M-2-2023.

Parrinello S. 2023, *Documentare una rotta culturale tra procedure di rappresentazione e di materializzazione del paesaggio*, in Cannella M., Garozzo A., Morena S. (eds.), *Transizioni. Atti del 44° Convegno Internazionale dei Docenti delle Discipline della Rappresentazione/Transitions. Proceedings of the 44th International Conference of Representation Disciplines Teachers*. FrancoAngeli, Milano, pp.1806-1823.

Picchio F., Cortés Meseguer L., Porcheddu G. 2023, *Disegnare un sistema informativo 3D per la promozione della rotta culturale di Jaime I a Valencia*, in Cannella M., Garozzo A., Morena S. (eds.). *Transizioni. Atti del 44° Convegno Internazionale dei Docenti delle Discipline della Rappresentazione/Transitions. Proceedings of the 44th International Conference of Representation Disciplines Teachers*. FrancoAngeli, Milano, pp.1832-1857.

2022

Dell'Amico A. 2022, Memoria e modello digitale. La costruzione di un sistema informativo per la salvaguardia del patrimonio architettonico diffuso dell'Upper Kama, in *Restauro Archeologico*, 30(1).

De Marco R., Pettineo A. 2022, *The recognition of heritage qualities from feature-based digital procedures in the analysis of historical urban contexts*, in *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, XLVI-2-W1-2022.

2021

Parrinello S., De Marco R. 2021, *Digital surveying and 3D modelling structural shape pipelines for instability monitoring in historical buildings: a strategy of versatile mesh models for ruined and endangered heritage*, in Acta IMEKO, 10(1).

Maksimova S., Semina A., Shamarina A., Balandina A. 2021, *The digital model as a key tool for preserving architectural heritage in strategic master planning*, in *E3S Web of Conferences*, 263, 05014.

2020

Picchio F., De Marco R., Dell'Amico A., Doria E., Galasso F., La Placa S., Miceli A., Parrinello S. 2020, *Procedure di analisi e modellazione urbana per la gestione dei centri storici. Betlemme, Solikamsk, Cattaro e Santo Domingo*, in *Paesaggio Urbano*, 2-2020.

De Marco R., Dell'Amico A. 2020, *Connettere il territorio tra patrimonio e informazione: banche dati e modelli per le cultural heritage routes / connecting the territory between heritage and information: databases and models* for the *cultural heritage routes*,In: Arena A. Arena M. Brandolino R.G. Colistra D. Ginex G. Mediati D. Nucifora S. Raffa (eds), Connettere. Un disegno per annodare e tessere. Atti del 42° Convegno Internazionale dei Docenti delle Discipline della Rappresentazione/Connecting. Drawing for weaving relationships. Proceedings of the 42th International Conference of Representation Disciplines Teachers, Franco Angeli Editore, Milano, pp. 2058-2077.

Maksimova S. V., Semina A. E. 2020, *Landscape analysis for digital description of urban morphology of Upper Kama region towns*, in *5th ISUFItaly 2020 International Conference*, Rome.

Parrinello S. 2020, *La solitudine delle chiese russe nella regione dell'Upper Kama. Un immenso eremo e un paesaggio culturale al confine dell'Europa*, in *Architettura Eremitica. Sistemi progettuali e paesaggi culturali. Atti del V Convegno Internazionale di Studi*, Edifir, Firenze.

Picchio F. 2020, *Acquisition protocols for UAV photogrammetric data. Comparison in methodological SfM procedures from architectural till urban scale*, in Salvatore Barba, Sandro Parrinello, Marco Limongiello, Anna Dell'Amico (eds), *D-SITE Drones – Systems of Information on Cultural Heritage for a spatial and social investigation*, Pavia Univeristy press, Pavia, pp. 70-79.

Semina A. E., Maksimova S. V., Bushmakova J. V. 2020, *UAVs for strategic master planning, i* in Salvatore Barba, Sandro Parrinello, Marco Limongiello, Anna Dell'Amico (eds), *D-SITE Drones – Systems of Information on Cultural Heritage for a spatial and social investigation*, Pavia Univeristy press, Pavia, pp.324-329.

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Parrinello S., Dell'Amico A. 2019, *Experience of documentation for the accessibility of widespread cultural heritage*, in *Heritage*, 2(1).

Parrinello S., De Marco R. 2019, *Integration and modelling of 3D data as strategy for structural diagnosis in endangered sites*, in 2019 *IMEKO TC-4 International Conference on Metrology for Archaeology and Cultural Heritage*.

Parrinello S., Cioli F. 2019, *Establishment of a complex database for the study of cultural heritage through the reading and analysis of the traditional architecture of Upper Kama*, in Digital Cultural Heritage, Cham Springer, pp. 51-61.

Parrinello S., Picchio F., De Marco R., Dell'Amico A. 2019, *PROMETHEUS. Protocols for information models libraries tested on heritage of Upper Kama sites*, in Stefano Bertocci, Antonio Conte (eds), *II Simposio UID di internazionalizzazione della ricerca. Patrimoni culturali, Architettura, Paesaggio e Design tra ricerca e sperimentazione didattica*, DidaPRESS, Firenze, pp. 168-173.

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1. Alessandro Brodini, *Lo Iuav ai Tolentini: Carlo Scarpa e gli altri. Storia e documenti*, 2020
2. Letizia Dipasquale, *Understanding Chefchaouen. Traditional knowledge for a sustainable habitat*, 2020
3. Vito Getuli, *Ontologies for Knowledge modeling in construction planning. Theory and Application*, 2020
4. Lamia Hadda, *Médina. Espace de la Méditerranée*, 2021
5. Letizia Dipasquale, Saverio Mecca, Mariana Correia (eds.), *From Vernacular to World Heritage*, 2020
6. Sarah Robinson, Juhani Pallasmaa (a cura di), traduzione e cura dell'edizione italiana di Matteo Zambelli, *La mente in architettura. Neuroscienze, incarnazione e il futuro del design*, 2021
7. Magda Minguzzi, *The Spirit of Water. Practices of cultural reappropriation. Indigenous heritage sites along the coast of the Eastern Cape-South Africa*, 2021
8. Rita Panattoni, *I mercati coperti di Giuseppe Mengoni. Architettura, ingegneria e urbanistica per Firenze Capitale*, 2021
9. Stefano Follesa, *Il progetto memore. La rielaborazione dell'identità dall'oggetto allo spazio*, 2021
10. Monica Bietti, Emanuela Ferretti (a cura di), *Il granduca Cosimo I de' Medici e il programma politico dinastico nel complesso di San Lorenzo a Firenze*, 2021
11. Giovanni Minutoli, *Rocca San Silvestro. Restauro per l'archeologia*, 2021
12. Juhani Pallasmaa (a cura di), traduzione e cura dell'edizione italiana di Matteo Zambelli, *L'architettura degli animali*, 2021
13. Giada Cerri, *Shaking Heritage. Museum Collections between Seismic Vulnerability and Museum Design*, 2021
14. Margherita Tufarelli, *Design, Heritage e cultura digitale. Scenari per il progetto nell'archivio diffuso*, 2022
15. Lamia Hadda, Saverio Mecca, Giovanni Pancani, Massimo Carta, Fabio Fratini, Stefano Galassi, Daniela Pittaluga (eds), *Villages et quartiers à risque d'abandon. Stratégies pour la connaissance, la valorisation et la restauration*, 2022
16. Flavia Giallorenzo, Maddalena Rossi, Camilla Perrone (a cura di), *Social and Institutional Innovation in Self-Organising Cities*, 2022
17. Eleonora Trivellin (edited by), *Design driven strategies. Visioni a confronto*, 2022
18. David Fanfani, Giuseppe Alberto Centauro, *La Fattoria Medicea di Cascine di Tavola a Prato. Un Progetto Integrato di Territorio per la rigenerazione patrimoniale di un paesaggio vivente*, 2022
19. Matteo Zambelli, *La conoscenza per il progetto. Il case-based reasoning nell'architettura e nel design*, 2022
20. Massimo Carta, Maria Rita Gisotti, *Six projets pour l'urbanisme euroméditerranéen. Sei progetti per l'urbanistica euromediterranea*, 2022
21. Giuseppina Forte, Kuan Hwa (eds), *Embodying Peripheries*, 2022
22. Susanna Caccia Gherardini, *Il palazzo in mezzo a una selva millenaria. Villa Borbone a Viareggio: progetto di conoscenza / The palace in the middle of a thousand-year old forest. Bourbon Villa in Viareggio: knowledge and conservation project*, 2022
23. Gianluca Belli, Fabio Lucchesi, Paola Raggi, *Firenze nella prima metà dell'Ottocento. La città nei documenti del Catasto Generale Toscano*, 2022
24. Sofia Nannini, *Icelandic Farmhouses. Identity, landscape and construction (1790–1945)*, 2023
25. Rosa De Marco, Monique Poulot (sous la direction de), *Dessin, Design, Projet. Représenter et reconfigurer les espaces ouverts*, 2023

26. Francesca Giusti, *Restauri e musei. Il paesaggio culturale dei lungarni di Pisa dal secondo dopoguerra a oggi*, 2023
27. Mario Biggeri, Giuseppe De Luca, Andrea Ferrannini, Carlo Pisano (a cura di), *Mondeggi. Rigenerazione sociale, culturale e agricola per una Città Metropolitana sostenibile*, 2023
28. Lamia Hadda, *Architettura islamica nel Mediterraneo fatimide (X-XII secolo)*, 2023
29. Bryan Lawson, traduzione e cura dell'edizione italiana di Matteo Zambelli, *Il viaggio degli studenti di progettazione. Capire come pensano i progettisti*, 2023
30. Gabriele Paolinelli, Nicoletta Cristiani, Giacomo Dallatorre (a cura di), *Careggi Campus. Studi progettuali per la rigenerazione degli spazi aperti dei complessi ospedalieri*, 2023
31. Susanna Cerri, Fabio Lucchesi, Vanessa Staccioli, *Rappresentazioni per la pianificazione spaziale. Un modello visivo per la Città Metropolitana di Roma Capitale*, 2023
32. Roberto Bologna, Claudio Piferi (a cura di), *La residenza per studenti universitari tra norma, progetto e realizzazione. I programmi pluriennali di attuazione della legge 338/2000*, 2024
33. Alberto Campo Baeza, Juhani Pallasmaa, traduzione e cura dell'edizione italiana di Matteo Zambelli, *Otto meditazioni di architettura*, 2024
34. Pietro Matracchi, *Palazzo Pitti fra Sette e Ottocento/Pitti Palace between the 18th and 19th centuries*, 2024
35. Giacomo Tempesta, Jacopo Giuseppe Vitale (a cura di), *Convento di Santa Clara de Asis, L'Avana - Cuba. Indicazioni per il recupero e la riqualificazione funzionale / Convento de Santa Clara de Asís, La Habana - Cuba. Indicaciones para la recuperación funcional y el redesarrollo*, 2024
36. Gabriele Paolinelli, Giacomo Dallatorre, *C'è campo. Il futuro della città visto dal suolo*, 2025
37. Maria Adriana Giusti, *Restauro dei giardini europei. Storia e teorie*, 2025
38. Claudio Saragosa (a cura di), *La piccola città. Per una rigenerazione urbana tra Caletta e Lillatro*, 2025
39. Alberto Campo Baeza, *Tredici trucchi per fare un'architettura migliore*, traduzione e cura dell'edizione italiana di Matteo Zambelli, 2025
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The volume introduces the theoretical, methodological and operational framework of the EU-funded project PROMETHEUS – PROtocols for information Models librariEs Tested on HEritage of Upper Kama Sites (H2020 MSCA-RISE-2018 GA 821870). It presents the strategies developed to integrate digital survey, 3D modelling, HBIM systems and information platforms for the documentation, interpretation and enhancement of European cultural heritage. PROMETHEUS tested digital and cognitive protocols addressing the challenges of applying BIM processes to historical and architectural heritage, where complexity, stratification and irregularity require specific tools for representation and knowledge management.
Within this perspective, the volume provides the general framework for the following studies on the cultural routes investigated by the project: the fortified system of Gdańsk at the urban scale, the architectures and symbolic places associated with Jaime I in the Valencian territory, and the religious heritage of the Upper Kama at the territorial-regional scale.

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