Events

Digital & Documentation 2024. Otherness

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On September 16, the 2024 edition of the *Digital & Documentation conference* took place. Now in its 7th edition, the event brings together professors, researchers, and scholars in the field of Representation to discuss the topic related to documentation practices: in this scenario, particular attention is given to digital technologies applied to historical buildings. The aim is to highlight contributions and research experiences that, starting from a critical analysis of documentary sources, exploit digital tools to produce information systems that increasingly prioritize usability and clarity. As is well known, the advantage of digitizing historical heritage, thanks to the interoperability inherent in digital data, allows us to design valorization experiences suitable to various types of audiences. Thus, the same data, when processed and contextualized appropriately, can serve as support tools for industry experts (such as architects, engineers, and administrative officials); at the same time, it can offer innovative storytelling opportunities to communities and cultural heritage users.

This year's edition, titled *Otherness,* was held in the venues of the Società di Mutuo Soccorso Porta Palio in Verona. The conference was opened by Alessandro Luigini, scientific director of D&D for the 2024 edition, Michelangelo Pivetta, president of SMS Porta Palio, Francesca Fatta, president of UID and Sandro Parrinello, representing the Founding Committee of D&D.

The morning program featured three international keynote speakers. In a presentation titled *A South African Perspective on Measuring: Architecture & Design,* Jacques Laubscher and Marinda Bolt (Tshwane University of Technology) and Victoria Ferraris (University of Córdoba) presented three case studies on documenting South African cultural heritage. This research is the result of collaboration between the Department of Civil Engineering at the University of Salerno, the Faculty of Architecture at the University of Córdoba, and the Department of Architecture and Industrial Design at Tshwane University of Technology in Pretoria. Focusing on the importance of measurement accuracy in historical contexts, the speakers illustrated effective photogrammetric acquisition methods ranging from landscape to urban environments.

In the morning panel, Michela Ceracchi (Free University of Bozen-Bolzano) reflected on the opportunities that digital technologies offers in the field of descriptive geometry, particularly in exploring spatial forms. In her presentation, *Il "modello fisico aumentato" per esplorare le forme nello spazio. Nuovi dispositivi per un teatro didattico multimediale di Geometri descrittiva Costruzioni geometriche complesse* [The "Augmented Physical Model" for Exploring Forms in Space. New Devices for a Multimedia Educational Theater of Descriptive Geometry Complex geometric constructions], Dr. Ceracchi proposed a "multimedia educational theater" that uses technologies like augmented reality to enhance physical models and renew the teaching of descriptive geometry.

In *Le radici latine dell'arte stereotomica: metodologie digitali di indagine e ricostruzione per l'analisi dei monumenti antichi* [The Latin Roots of Stereotomic Art: Digital Investigation and Reconstruction Methodologies for Analyzing Ancient Monuments], Giulia Piccini (Università Iuav di Venezia) sought to identify stereotomic parameters in pre-renaissance buildings (the historical period traditionally associated with this technique's origins). By analyzing case studies primarily from classical and pre-classical periods, her research employs digital surveying tools to verify the technologies and construction methods at the time.

The importance of measurement accuracy, as highlighted by Andrea Pasquali (University of Florence) in

Fig. 1.   Flyer of the event.

his presentation *La documentazione di dettaglio nella digitalizzazione del mosaico del battistero di Firenze* [Detailed Documentation in Digitizing the Mosaic of the Florence Baptistery], is essential even in cases of close-range studies. Collaboration between the Opera del Duomo Museum in Florence and the Department of Architecture provided Dr. Pasquali with a suitable case study: the mosaic on the inner dome of the Florence Baptistery. The close-range digital survey of the mosaic surface offered a significant opportunity to experiment with operational proposals aimed at achieving the highest level of detail in three-dimensional restitution.

Focusing on the 3D reconstruction of complex historical buildings, Roberto Barni (Sapienza Università di Roma), in his presentation *Dall'acquisizione dei dati alla segmentazione semantica delle nuvole di punti per la classificazione del patrimonio culturale: i casi delle abbazie di Fossanova e Casamari. Segmentazione di nuvole attraverso intelligenza artificiale* [From Data Acquisition to Semantic Segmentation of Point Clouds for Cultural Heritage Classification: The Cases of Fossanova and Casamari Abbeys. Cloud segmentation through artificial intelligence], explored the opportunities offered by point cloud segmentation practices, aided by Machine Learning and Artificial Intelligence. Historical architectures, such as the case studies of Fossanova and Casamari Abbeys, are characterized by a high variability of elements, making their translation into Digital Twins a time-consuming operation. Semantic segmentation of collected data can thus improve historical heritage documentation processes.

Concluding the morning presentations, Martina Suppa addressed the important issue of surveying buildings affected by seismic events, such as the 2012 earthquake in Emilia-Romagna. In her presentation *Optimization of survey procedures and application of integrated digital tools for seismic risk mitigation of cultural heritage: The Emilia-Romagna damaged theatres*, the project outlined a workflow specifically designed for seismic damage to historical theaters. Using a case study on the Teatro Sociale di Novi (Modena), the research focused on the most significant volumetric and spatial aspects of these buildings, integrating these analyses into the digitization workflow. This approach defines three complementary information levels determined by visual surveys, 3D acquisitions, and subsequent implementation into an HBIM model.

The afternoon session began with a keynote speech by Massimiliano Ciammaichella and Barbara Pasa (Università Iuav di Venezia) titled *Diritto all'immagine. Pratiche di progetto e digitalizzazione negli archivi di moda* [Right to Image: Project Practices and Digitization in Fashion Archives]. The themes of documenting and digitizing historical documents and archives were explored in the context of fashion: drawings, photos, sketches, etc., which constitute a valuable partially explored and inaccessible documentary heritage. The archive serves a dual purpose: as a catalog of a brand's historical documentation and as a useful tool to guide and support the creative process. Due attention was also given to the issue of copyright, addressing accessibility from a perspective that ensures consultation while preserving copyright.

Fig. 2. Venue: *Società di Mutuo Soccorso Porta Palio, Verona.*

Andrea Tomalini (Politecnico di Torino) opened the afternoon panel with his presentation *Modellazione geometrico informativa: verso il digital-twin per il patrimonio museale* [Geometric-Informative Modeling: Toward the Digital Twin for Museum Heritage]. Starting from the definition of the museum environment as a stage (container) for interactions between users (visitors) and content (exhibited works), the research highlighted the potential of the digital twin as a tool to support the daily activities of a museum context. The parametric modeling of the container leads to managing complex systems, such as digital collection management or analyzing visitor flows and behaviors.

The valorization of historical-architectural heritage, specifically lighthouses, was the focus of Sonia Mollica's presentation (Università degli Studi Mediterranea di Reggio Calabria) *La conoscenza del patrimonio storico: modellazione parametrica tra semantica e ontologia. La rete dei fari del Maditerraneo* [Knowledge of Historical Heritage: Parametric Modeling Between Semantics and Ontology. The Network of Mediterranean Lighthouses]. The focus was on reconnecting digital data to make it accessible to communities that identify with their heritage values. This action combined HBIM parametric tools with the Web Ontology Language approach: the semantic definition of all elements constituting the investigated objects creates an "Atlas of Italian Lighthouses."

The fortified system of Bergamo was the subject of the presentation by Pietro Azzola (University of Bergamo) *Rilievo 3D, ricostruzione digitale e restauro virtuale: il caso studio della cannoniera di San Michele della Fortezza di Bergamo* [3D Survey, Digital Reconstruction, and Virtual Restoration: The Case Study of the San Michele Cannon Room in the Bergamo Fortress]. The Bergamo fortress is characterized by its bastions and towers, which form its identity. Equally important but less known, due to their specific nature, are the underground spaces, particularly the cannon house defending the city's access points. Starting from an analysis of the current state, the research employed modern 3D surveying techniques to digitize these underground environments. The use of the Unreal Engine rendering engine allowed for a narrative that faithfully restores the original appearance of these underground spaces.

The landscape, no less then cultural heritage, represents a resource to protect and enhance becoming a valid application area for digitization and documentation processes usually employed at architectural or urban scales. Marco Vedoà (University of Barcelona) deals with this topic in his presentation *Qualitative GIS for Decision-Making Processes: From Landscape Digitization and Documentation to Defining Territorial Strategies*. The presentation illustrated three research contexts: a doctoral thesis, a *Horizon* project, and a *PRIN* project.

These contexts employ GIS systems in multiple ways, such as analyzing the digitization processes of cultural landscapes to define territorial development strategies or documenting social and participatory initiatives related to food sharing. The examples confirm that Qualitative GIS can become an integral part of knowledge and decision-making processes.

Also dedicated to GIS was the final presentation of the afternoon panel by Dina Jovanovic (Politecnico di Milano), titled *Methodology of using historical cartography in planning widespread historical center.* The study of territory began with the fascinating perspective provided by historical maps and cadastral archives. Historical maps transcend their role as mere representations of specific territorial configurations at a specific point of time; instead, they document the evolution of the environments they depict, effectively becoming valuable archives. Through a case study in Desio, Lombardy, the research proposed a methodology characterized by two distinctive approaches: the Deconstructive approach, focusing on the detailed analysis of elements within the historical map, and the Constructive approach, aimed at integrating historical documentation with the most recent territorial data. By defining guidelines for the use of historical data, the research results become an integrated part of all territorial planning practices.

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