

ARCHITECTURE HERITAGE and DESIGN

Carmine Gambardella

XVIII INTERNATIONAL FORUM

Le Vie dei  
Mercanti



# World Heritage and Contamination

ARCHITECTURE | CULTURE | ENVIRONMENT | AGRICULTURE | HEALTH | ECONOMY  
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## WORLD HERITAGE and CONTAMINATION

Architecture, Culture, Environment, Agriculture, Health, Economy,  
Landscape, Design, Territorial Governance, Archaeology, e-Learning

Le Vie dei Mercanti  
XVIII International Forum

Editing: Alessandro Ciabrone

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Scholars has been invited to submit researches on theoretical and methodological aspects related to Smart Design, Planning and Technologies, and show real applications and experiences carried out on this themes. Based on blind peer review, abstracts has been accepted, conditionally accepted, or rejected. Authors of accepted and conditionally accepted papers has been invited to submit full papers. These has been again peer-reviewed and selected for the oral session and publication, or only for the publication in the conference proceedings.

**Conference report** 300 abstracts and 650 authors from 44 countries:

Albania, Arizona, Australia, Benin, Belgium, Bosnia and Herzegovina, Brasil, Bulgaria, California, Chile, China, Cipro, Cuba, Egypt, France, Germany, Georgia, Greece, India, Italy, Japan, Jordan, Kosovo, Lebanon, Malaysia, Malta, Massachusetts, Michigan, Montenegro, Montserrat, New Jersey, New York, New Zealand, Poland, Portugal, Russian Federation, Serbia, Slovakia, Spain, Switzerland, Texas, Tunisia, Turkey, United Kingdom.

## Preface

At the state of art, with profound pride I register that the previous editions of the Forum 'Le Vie dei Mercanti' have favored the creation of an international scientific community with over six thousand researchers, distinguished professors, institutional and business sector representatives from more than one hundred Universities and Research Centers from fifty countries in the world. The XVIII edition of the Forum titled 'World Heritage and Contamination' aims to create a cross-critical dialogue, open to cultural contamination and 'without limits', in a logic of integration between competences which extends, and is not limited to, the following disciplines: Architecture, Culture, Environment, Agriculture, Health, Landscape, Design, Territorial Governance, Archeology, Economy, e-Learning. The activities of protection and promotion of World Heritage, understood as a asset shared by all Humanity, are particularly relevant in Italy, responsible towards the world of custody of the largest number of assets protected by the UNESCO. To the World Heritage Properties is added a landscape heritage of enormous variety and beauty to be protected also through the regeneration of degradation and of the 'minor heritage', in line with the provisions of the UNESCO Conventions on material and intangible assets as well as the European Landscape Convention. In this framework the multidisciplinary topics of the Forum represents a 'thing tank' of confrontation, exchange and cultural contamination oriented towards the United Nations Millennium Development Goals. The location of the Forum is of excellence. Campania Region with six World Heritage Properties, two Unesco Man and Biospheres, three assets registered on the Intangible Heritage List is one of the richest Regions in the world for cultural and landscape heritage, particularly 'contaminated' by Mediterranean cultures. No coincidence that the Forum takes place in Naples and Capri, with site visits and presentations of scientific research and operational projects by the Benecon University Consortium, consisting of five Italian Universities, head office of my UNESCO Chair on Landscape, Cultural Heritage and Territorial Governance. The papers, selected by the Forum's Scientific Committee, will be published in the Proceedings of international relevance. Furthermore, the most innovative research and projects will be published in the 'Quaderni' of the A Class international magazine 'Abitare la Terra / Dwelling on Earth'.

*Prof. Carmine Gambardella, General Chair XVIII Forum  
UNESCO Chair on Landscape,  
Cultural Heritage and Territorial Governance*

Con profondo orgoglio, allo stato dell'arte, registro che le precedenti edizioni del Forum 'Le Vie dei Mercanti' hanno favorito la creazione di una comunità scientifica internazionale costituita da oltre sei mila ricercatori, distinguished professors, rappresentanti istituzionali e del settore dell'impresa provenienti da più di cento Università e Centri di Ricerca di cinquanta paesi nel mondo. La XVIII edizione del Forum 'World Heritage and Contamination' si propone di creare un dialogo critico trasversale, aperto alle contaminazioni culturali e 'senza limiti', in una logica di integrazione fra le competenze che si estende, e non si limita, alle seguenti discipline: Architecture, Culture, Environment, Agriculture, Health, Landscape, Design, Territorial Governance, Archeology, Economy, e-Learning. Le attività di tutela e promozione del Patrimonio Mondiale, inteso come bene condiviso da tutta l'Umanità, sono particolarmente rilevanti in Italia, responsabile nei confronti del mondo della custodia del maggior numero di beni tutelati dall'Unesco. Alle Properties del World Heritage si aggiunge un patrimonio paesaggistico di enorme varietà e bellezza da tutelare anche attraverso la rigenerazione del degrado e del 'patrimonio minore', in linea con quanto previsto dalle Convenzioni Unesco sui beni materiali e immateriali e dalla Convenzione Europea del Paesaggio. In questo framework i topics pluridisciplinari del Forum rappresentano un 'thing tank' di confronto, scambio e contaminazione culturale orientati verso gli Obiettivi di Sviluppo del Millennio delle Nazioni Unite. La location del Forum è d'eccezione. La Campania con sei siti iscritti nella lista del Patrimonio Mondiale, due Man and Biospheres Unesco, tre beni iscritti nella Lista del Patrimonio immateriale è una delle regioni più ricche al mondo per beni culturali e paesaggistici, particolarmente 'contaminata' delle culture del Mediterraneo. Non a caso il Forum si svolge a Napoli e Capri, con sopralluoghi e presentazioni di ricerche scientifiche e progetti operativi a cura della Consorzio Universitario Benecon, costituito da cinque Atenei italiani, sede della mia Cattedra Unesco su Paesaggio, Beni Culturali e Governo del Territorio. I paper, selezionati dal Comitato Scientifico del Forum, saranno pubblicati negli Atti di rilevanza internazionale. Inoltre, le ricerche e i progetti più innovativi saranno pubblicati nei 'Quaderni' della Rivista internazionale di Classe A 'Abitare la Terra/Dwelling on Earth'.

*Prof. Carmine Gambardella, General Chair XVIII Forum  
UNESCO Chair on Landscape,  
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### **CARMINE GAMBARDELLA**

UNESCO Chairholder on Landscape, Cultural Heritage, and Territorial Governance; President and CEO of Benecon SCaRL University Consortium - Research Centre on Cultural Heritage, Ecology, Economy (University of Campania “Luigi Vanvitelli”, Pegaso University, University Federico II of Naples, University of Salerno, University of Sannio). Full Professor of Drawing at the Pegaso University and at the University of Campania. President of the International Forum “Le Vie dei Mercanti” since its first edition in 2003 to the XVIII edition in 2020. Editor and Founder of the series “Surveying is/or Project”, “Knowledge Factory” and “Architecture, Heritage and Design”. Component of the Scientific Committee of International Class A Magazine *Abitare la Terra/Dwelling on Earth* (Gangemi Editor International Publishing). He covered various roles for the University of Campania, including the Pro Rector of Institutions, Academic Senator, Director of the Department of Architecture and Industrial Design Luigi Vanvitelli, Dean of the Faculty of Architecture Luigi Vanvitelli, Director of the Department of Culture of Design, Director of Doctoral School in the Discipline of Architecture, Coordinator of the PhD in Protection, Safety and Representation of the Environment and Structures and Territorial Governance, Coordinator of the PhD Program in Surveying and Representation of Architecture and the Environment. He is author of numerous scientific international papers, publications and proceedings on surveying and representation of the built and natural heritage.



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Mercanti



Design by Le Corbusier 1931  
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## ADVANCED REPRESENTATION FOR PRESERVATION AND COMMUNICATION OF CULTURAL HERITAGE

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### Abstract

This essay explores the level of practice of the instrumental survey connected to the advanced representation methods aimed at the restoration, fruition and safeguarding of the tangible and intangible cultural heritage.

The research exposes and compares the different typologies and experiences of survey, also by drone, in front of the possibility of fruition of the works with very high resolution digitized images on the following themes: the churchyard of the Certosa in Genoa and the painted facades of the historic center of Genoa (drawing-geometry-historical treatises).

From the Drone survey by low-altitude in a limited environment, for the drawing representation of the historic flooring (mosaic in two-colored pebbles), to the photogrammetric survey, to the digital infographic processing for the drawing representation of the historical façade drawing apparatus, The critical ability to systematize instrumentation and cultural competence on the basis of a vast literary reference case, provides a philological and narrative reading system capable of communicating, at different scales, the value of cultural heritage.

**Keywords:** Cultural Heritage, UAV survey, digital survey, drawing.



Fig. 1: The portico of the Cloister of San Bartolomeo with the pebble mosaic and the Palazzo Grillo Spinola in Genoa.

## 1. Tangible cultural Heritage Survey: aerial and terrestrial intake systems

The research agreement stipulated between the Architecture and Design Department of the University of Genoa and the Monastic Complex of San Bartolomeo of the "Certosa" in Genoa allowed an experimentation of low-altitude aerial photogrammetric survey with drone in a closed environment.

The object of the research is the "risseau" mosaic, in Genoese pebble, a sixteenth-century black and white bichrome.

At the same time the Cts ColorLab color laboratory of which who writes is responsible, is taking care of the survey of the squares of the historic center of Genoa and specifically of the painted façades overlooking the squares.

The research line, file rouge of the integrated survey activities, is the enhancement and use of cultural heritage organized in a sharing network with various foreign partners.

The detection is therefore study, evaluation, synthesis and representation of the real object; takes on interpretative value, since, based on a precise research methodology, it tends to graph the widest range of possible information, to represent the work examined in its geometric, constructive and spatial aspects and to also outline the greater number of ornamental and stylistic aspects, thus becoming an essential tool for the architect, engineer, historian, archaeologist and all those figures who operate with the intention of discretizing all values (constructive, dimensional, formal and spatial), through a work of geometric direct and indirect survey, historical and technological knowledge, but above all an operation of reading and graphic transcription of the formal and architectural quality.

Survey also means identifying, in an increasingly complex architectural work, the significant elements, indispensable for the characterization of that precise organism and its recognition, albeit in the simplification that must necessarily be given, also through the infographical data elaboration, capturing the building, not the contingent, episodic or external aspects, most subject to subjective interpretation, but those that distinguish a particular work from many other similar ones, arriving at the critical knowledge, as detailed as possible, of an architectural organism and allowing, through a detailed and significant drawing representation also the individuation of the original parts, the transformations and the state of fact.

The research focuses on:

- Comparison of the methodologies with respect to the desired results and the object to be detected of Aero-photogrammetry and terrestrial photogrammetry for the digitalization and archiving of selected cultural heritage objects both in terms of point clouds and subsequently of compact parametric surfaces,
- Digital 3D archiving of selected cultural for preservation, restoration, monitoring of condition, computer-aided visualization, and analysis;
- Consolidation of imperfect shape data and repairs of virtual models
- Shape-related analysis and synthesis, also combining different sources of shape specification with the digitization of shape using stereo-photogrammetry and triangulation based on high-accuracy which results in sizable 3D data point clouds.

In this step the UAV (Drone) Photogrammetric survey has been used, through the experimentation of different categories that can be considered the fundamental operations of the survey of tangible heritage:

- Software for territorial mapping
- Software for territorial modeling
- Photogrammetry software
- Organic modeling software

To this end, real geometric-spatial values of architecture are thus translated into a series of numerical-graphic elements, useful to underline every single part taken into consideration, which binds to the entire building organism.

If the drone was necessary for the survey of the pebble mosaic of the Certosa of San Bartolomeo in Genoa, consider the variables relating to the horizontal layer being studied and the possibility of use in a private and therefore safe environment, for the survey of the facades overlooking the squares of the historic center of Genoa, the choice of terrestrial fotogrammetry was assessed as more pertinent, with various photo taking and restitution by means of straightening software following very few measurements taken on the spot, while the colour survey was carried out with direct and indirect method with digital spectrophotometer.

In this context, the world of software really provides us with a wide range or additional features: just think of the Archifacade plugin by ArchiCAD or various software such as On site photo by Nemetschek, Digidcad 3d and Orto 3.04. However, for their characteristics and easy application, RDF (Digital Photogrammetric Straightening) was chosen as an open source program that allows with a few operations the straightening of an image on the basis of detected geometric coordinates and Perspective Rectifier which, unlike the first, sets the photo straightening also on the guide of perspective



lines. The survey of Palazzo Grillo-Spinola Façade has been elaborated through Perspective Rectifier, a program that allows you to use digital images identifying the escape lines and specifying the due measures, the program straightens and scales the photographs.

## **2. The pebble mosaic of Saint Bartolomeo Charterhouse**

The pebble mosaic of the Charterhouse is the largest and oldest traditional mosaic called "risseau" (in Genoese "pebble" and therefore by extension "pebble mosaic ") of Liguria, and covers a total area of at least 760 m<sup>2</sup> built between 1572 and 1671.

If the motivation that started this practice was that of covering the ground with stones and pebbles to consolidate it and to avoid the formation of mud, we are in Mycenaean times when we can speak of "technique" with the mosaic dated around 1400 BC found in Tiryns in Greece, where, for the first time, the decorative intention is evident in the laying of the pebbles in rows in a layer of compressed clay.

The most significant findings refer to the pebble mosaic dated towards the end of the eighth century BC, and discovered in the city of Gordion in 1956, a square courtyard (10x10 meters) in Turkey. The arrangement of the decorations appears random, without a geometric reference grid, but with various stylistic elements circles, wheels, hooked crosses, squares, unlike the rest of the Phrygian art which, while using the same elements, is strictly orderly and symmetrical.

The Certosa mosaic also concerns the relations of the Genoese Republic within the Mediterranean basin, and thanks to Andrea Doria also of relations with the Greek and Spanish way, the Certosa had strong interests and intellectual exchanges with Spain of Charles V and Philip II, which connects us to the oldest mosaic of pebbles in Granada in the 1679 Charterhouse.

The Certosa mosaic in Genoa covers the trampling of the cloister with 36 quadrants, 8 on the short sides and 10 on the long sides, respecting the scan of the center distances between the 32 Ionic columns.

The purpose of the survey, aimed at punctual high-definition documentation of the individual quadrants and of the mosaic as a whole for a conservative restoration, has allowed the experimentation of the use of the drone for low-altitude surveys in a protected-closed area. This technique put in place some problems related to manual flight without GPS, the flight plan design and all the variables related to light and material to be detected.

### **2.1 The survey with drone in manual mode at low altitudes**

The survey of an architectural artefact, which can be carried out using different methods, techniques and instruments and whose choice is an integral part of the preliminary and founding operation or the survey project. In this phase all those factors that contribute to the achievement of the final objectives of the whole operation are analyzed. The incipit, the purpose of the survey from which the definition of the scale and the type of final representation derives, is based on the degree of accuracy of the images taken during the acquisition phase. From the characteristics of the architectural object: morphological, geometric, state of consistency, location in context and its accessibility, we will define the most suitable tools and methods for a correct approach to the object. In this first phase the inspections and the reconnaissance of the area to be surveyed allow the operator to have a complete and synthetic picture that highlights all the formal qualities of the work and, in particular, wanting to work with the aerial photogrammetry, specific techniques can be developed to match the given bed, according to the degree of brightness, brightness, chromaticity and roughness of the material of the object detected.

In the specific case proposed, the photogrammetric survey of the proximity of the pavement of the external portico of the monastery complex San Bartolomeo della Certosa di Rivarolo in Genoa, with a remote-controlled unmanned aerial vehicle (UAV), provides for the consideration of multiple factors that contribute, due to the peculiarities/criticality of the site, to the success of the survey itself.

The use of a UAV requires the verification of the feasibility of the flight with particular regard to the Enac regulation (Italian Civil Aviation Authority. Enac Regulation "Aircraft with remote control" Edition n.3 of 11 November 2019, Resolution of the Board of Directors 23/2019 according to the latest directives issued with the ATM-09 Circular), type of scenario, any risk analysis and mitigations and any permits/authorisations.

The identification of the site on the georeferenced maps, with geographical areas and flight limitations provided, (D-flight portal dedicated to SAPR operators for the provision of registration services, geo-awareness, distance identification and publication of information on geographical areas) ascertained that the area under study, although falling within the urban area and therefore subject to a request for overflight authorization, fell within the indoor scenario, being porticoed. Moreover, since the pavement under study was limited to a cloister, it allowed the closure of the structure to the public, limiting access only to operators, allowing to comply with regulations and to have a risk analysis equal to 0.

The cognitive investigation has highlighted in particular all those critical factors specifically related to the flight with the drone such as weather conditions, material and visual obstacles, lighting, speed of movement, stability, gps, essential for subsequent flight planning.

The photogrammetric proximity survey should have been carried out in a restricted area, limited horizontally by the walls of the Complex and vertically by the porch roof, in manual mode because in the absence of GPS signal and on a day in the absence of wind and rain.

Generally the methodology, for an absolute accuracy of the detected data, requires the georeferencing of some known G.C.P. (Ground Control Point) points, whose coordinates have been detected by a GPS for the subsequent alignment operations of the single frames and the reconstruction of the final georeferenced model. In our case, being in an indoor situation, this was not possible, considering only the relative accuracy of the points detected according to their position between them and some known measurements taken directly on site on the pavement itself.

The application of a now proven detection methodology such as that of remote proximity photogrammetry, which assumes the opportunity to take advantage of waypoint technology in flight planning, has been tested by its use in manual mode ATTI (the barometer runs automatically and this allows you to maintain a predetermined flight altitude) and therefore in the absence of GPS and in a very restricted environment. In order to guarantee post-flight data processing, which is able to satisfy an excellent correspondence of the real geometric metric data translated into a scale of representation consonant with the required detail, a careful flight planning and an excellent quality of image acquisition is essential. There is a very close relationship between the degree of detail that you want to return in the final representation and the design parameters of a photogrammetric survey: camera, sensor, flight height or the Ground Sampling Distance. The GSD in the photogrammetric environment represents the distance between the centers of adjacent pixels measured on the object. In our case the portion expressed in millimeters, of real pavement detected contained in a pixel of the fingerprint of the digital image generated on the ground with the consequent definition of the image returned. For the purposes of the survey and the accuracy of the data to be returned, the value of the GSD less than or equal to 0.3 mm/pixel has been set.

The drone used for the survey is a DJI Mavic 2 PRO (DJI Mavic 2 Pro – Hasselblad cameras: Sensor: 1"CMOS, effective pixels 20MP; Lens: FOV approx. 77°, 35 mm format equivalent 28mm; Aperture: f/2.8-f/11; Max image size: 5472x3648; Photo: JPEG, DNG -RAW) equipped with a 4K camera, with 1" CMOS (Sensor dimension 1" : true diagonal 15,86 mm, width 13,20 mm, height 8,8 mm), photo sensor, 20 mega pixel resolution, 5472/3648 pixel image size and a focal length of 28 mm. Having fixed the value of the GSD and being known the characteristics of the technology integrated to the drone was obtained the flight height Above Ground Level (AGL). Moreover, when defining the height, it was necessary to take into account not only the maximum height allowed by the structure but also the chains present between one time and another at a height of about 5 meters.

The design phase of the flight planning is typically managed with dedicated software, which through the mapping of the area and the georeferenced link allows to program the grid of the flight and to calculate the ground impressions of the images taken.

Traditionally the typology of photogrammetric survey foresees for a complete coverage of the image matching an overlap of consecutive images along a direct line of 60-80% and an overlap of two adjacent lateral images of 70%; this operation is fundamental for the subsequent processing of the images as 3 homologous points belonging to the same object must be visible on three different photographic shots. In our case study to plan the swipes and the photographic shots, we have previously obtained the measurements of the footprint of the images to be taken, obtained from the values already known.

$L_s$  = long side camera sensor (mm) -  $f$ : camera focal length -  $H$ : flight height -  $AB$ : swath width -  $AB/H = L_s/f$  da cui  $AB = H \cdot (L_s/f)$  The following flight parameters were calculated: distance between swaths, system speed and trip frequency, considering the 80% overlap percentage.

$L_s$  = short side of the camera sensor - Advancement =  $(1-0,8) \cdot AB$  - Progressive advancement =  $0,2 \cdot (L_s/f) \cdot H$

Being in manual mode, the drone's forward speed and shooting mode have been calibrated and directly in the survey phase. The area was then graphically mapped according to the flight grid and the footprint of the photographic shots necessary for the total coverage of the pavement.

The digital image resulting from a shot at a height of 4 meters in a central position with respect to the span, has obtained the horizontal coverage of the entire span of the porch; it was therefore considered procedural with the acquisition of the swaths only in the longitudinal direction.

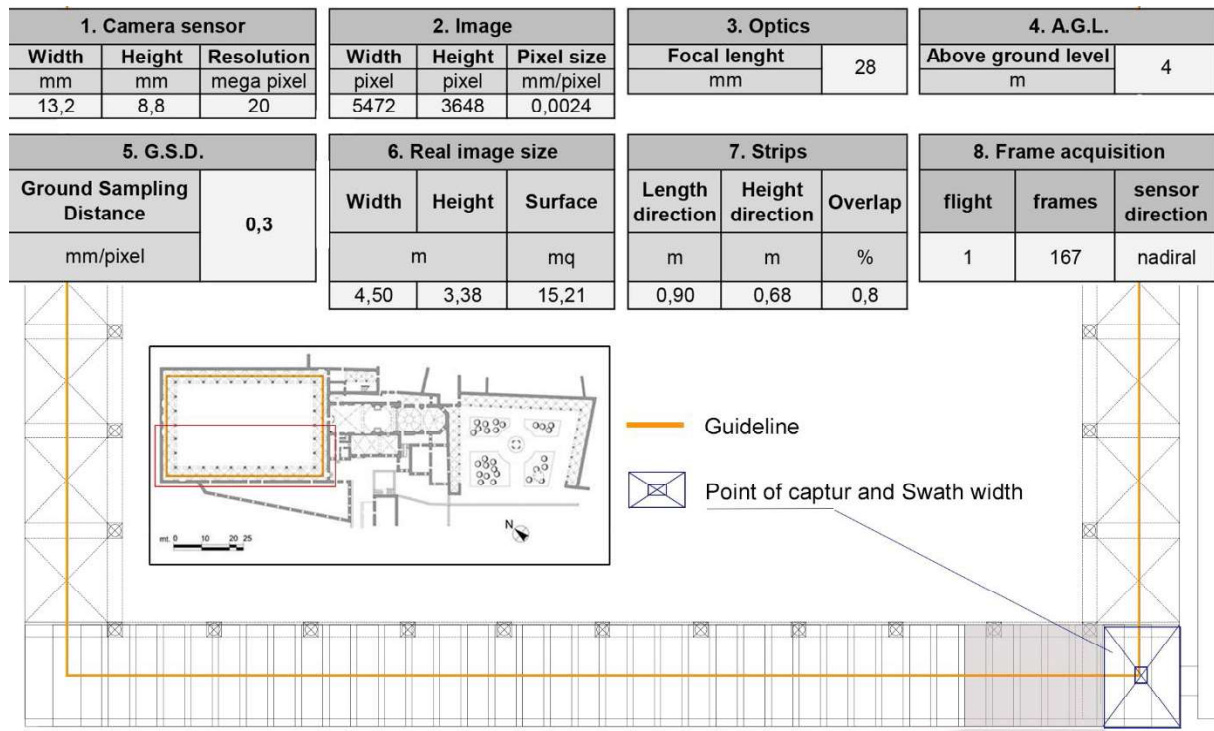
The flight planning also provided to carry out the operations at a given time of day and with diffused lighting avoiding the reflection given by direct lighting on the polished stone and the creation of shadow zones that could hide portions and details of the surface to eliminate possible consequent distortions and to support the operation of subsequent features extraction. It is essential to detect, describe and record the complete characteristics of the study object in images that can be superimposed in a correct and reliable way, in particular that they can be extracted even with minimum changes in height and different lighting, especially in manual mode.

Once the planning and the flight mode were completed, the camera settings incorporated in the flight were verified. In particular, in the proposed case study where a chromatically faithful texturization of the digital image is required, the images were saved in the double format Jpg 8 bit and Raw 16 bit.

The flight, which was carried out on sight in VLOS (Visual Line of Sight), required a high level of preparation on the part of the pilots and an excellent critical ability to evaluate and predict the possible difficulties of manoeuvring the aircraft given the proximity to the walls of the building, the possible yawing of the aircraft in case of wind and the disturbances generated by the continuous search by the aircraft to dock with the satellites with the consequent request for landing.

The maneuvers were carried out maintaining a height from the ground of about 4 meters according to a horizontal flight, given by the drone's instrumentation and in a central position for the total coverage of the pavement. The photographic shots were taken in manual mode ATTI, proceeding along a linear and central direction with a frequency varying from two to five seconds from one frame to another to allow the framing in sequence and the overlapping of the same with a percentage of about 80%.

The photographic mapping of the entire portico was generated by 167 nadiral photographic shots at the ground according to four straight lines broken along the central axis of the entire portico.



Cloister plan



**Fig. 2:** data related to the technical characteristics of the drone DJI Mavic 2 Pro and the flight plan data set on the Cloister; Reference Planimetry of the flight plan; detail of the photographic sockets.

### 2.2 3D reconstruction through the use of 3DF Zephyr software and mosaic drawing

The drone images sequence was processed using the 3d Zephyr software, that allows you to use the processing of images of different formats (JPG, PNG, RAW, such as NEF, CR2, ARW2).

167 RAW photographs were inserted and processed in a first phase of 3D reconstruction, called Structure from Motion, that treats all the images initially loaded, orients them and defines a first restitution of the photographed scene or subject called the scattered point cloud.

Taking into account the need for the required high definition, the four general values (fast - default - deep analysis - exhaustive) that gradually increase the potential of the Samantha algorithm that manages this first phase, the deep analysis mode has been set and defined the advanced parameters.

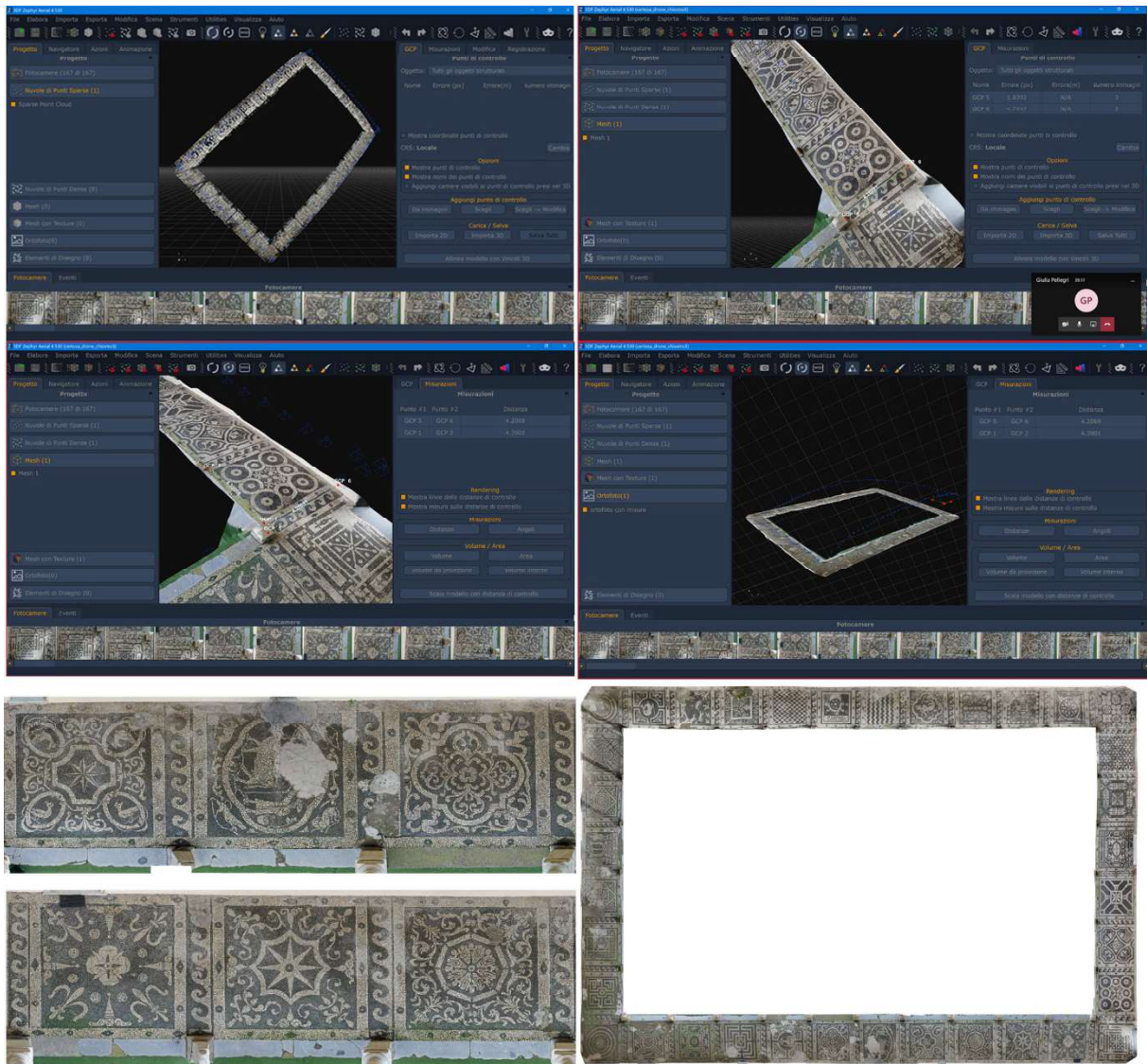
The control points were identified and defined, also on the basis of the flight plan project, the dense point cloud was defined which allowed the extraction of the image in .dxf to be imported directly into autocad and the image of the orthophoto generated in .jpg to be processed in vectors thanks to Adobe Illustrator and CorelDraw.

The 2d restitution in .dwg format was made using the scaled image because with the 3D processing of a horizontal plane was not possible to process the sections of the point cloud.

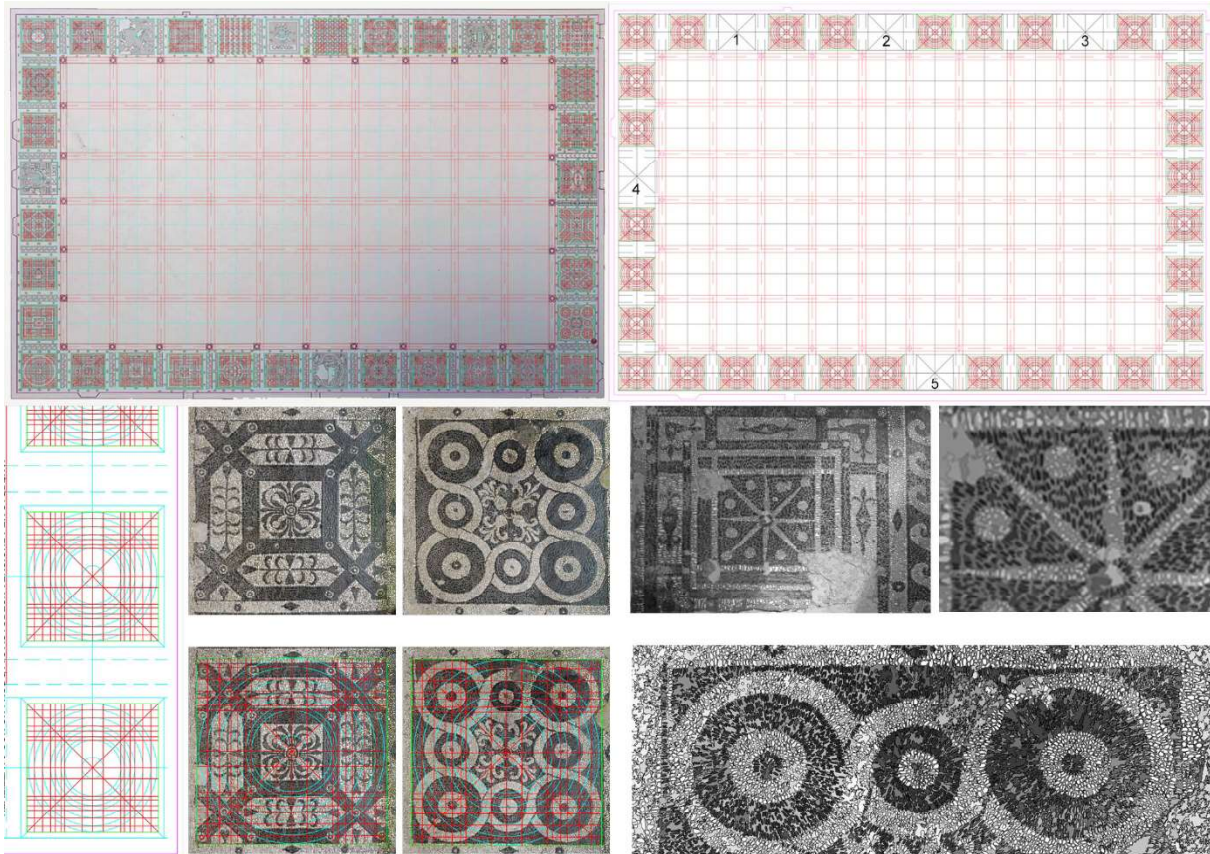
The 2d drawing in .dwg format highlighted the design peculiarities of the mosaic.

Of the 36 quadrants 31 respond to a basic geometric pattern of 4 meters per side, where the geometric designs are shown, which respond to the logic of the pattern with white drawing on a black background. The choice of the shape and size of the pebbles also imposes the type of pose that creates suggestive movements in the background.

The five squares that do not respond to the geometric rules of the concentric scheme, represent symbolic images, scenes of everyday life and animals.



**Fig. 3:** 3D Zehyr image processing with advanced settings and scalar definition via the control points (S. Eliche elaboration); Photomerging and dense point cloud with texture by G.Pellegrini.



**Fig. 4:** 2d rendering of the mosaic with identification of the basic geometric patterns; photomerging of drone images and overlapping of metric-geometric schemes; vectorization of the images through infographics with the integration of Photoshop - Adobe Illustrator by G.Pellegrini. Image processing of the circle mosaic with Corel draw by S.Eriche.

### 3. Grillo-Spinola Palace's Façade

Palazzo Grillo Spinola is located in the historic center of Genoa where the medieval urban fabric has been largely preserved, together with the series of surrounding alleys. Among these Vico delle Vigne stands out and leads up to the small Piazza delle Vigne which overlooks the palace.

The façade is staggered on two levels and articulated on six floors, with four windows axes. The series of interventions that have followed over time have involved both the decorative apparatus and the organization of the internal spaces of the building. So the prospect on Piazza delle Vigne presents different stages of the decoration, only partially integrated together. On the ground floor there is a trace of the promontory stone portico in regular ashlars, from the Middle Ages, which was the subject of a subsequent rear-end transformation. The pointed arch that belongs to it, facing the square, is interrupted due to the insertion of two windows.

Two portals open onto the facade: one in marble, which gives access to the current atrium directly from the square and a Mannerist portal overlooking the alley of the Bell tower of the Vineyards in Finale stone and Carrara marble, crowned with a mask.

The current building is the result of a slow evolutionary process that has continued over the centuries, as often happens with the buildings in the historic center. The first phase, still legible in some parts, dates back to medieval times. The structure was presumably based on four distinct bays, probably dating back to the period between the 12th and 14th centuries, combined in pairs and separated by an interspace. In the 16th century the medieval portico was buffered and, with the opening of new windows, the spaces of the first noble floor were obtained, frescoed in the second half of the 16th century by the young Luca Cambiaso. The painter was also commissioned to carry out fresco decorations on the facade. In 1780, the whole building belongs to the Spinola family, but there is no news of the transfer of ownership. Giuseppe Ratti reports that the building is owned by Spinola and with the transfer of ownership to the Spinola family, the building was radically transformed: the two bodies of factory were assembled and raised to the current eaves.

In the survey project phase, aimed at the best practice of taking measurements, it was decided not to proceed with the drone survey since the location and the reasons for the survey, the study of the façade decorative apparatus, have required a method of expeditious surveys that guaranteed a good approximation to the real dimensions of the object and above all to the identification of the decorative scheme. We then proceeded following two fundamental phases: the direct survey of a few measures

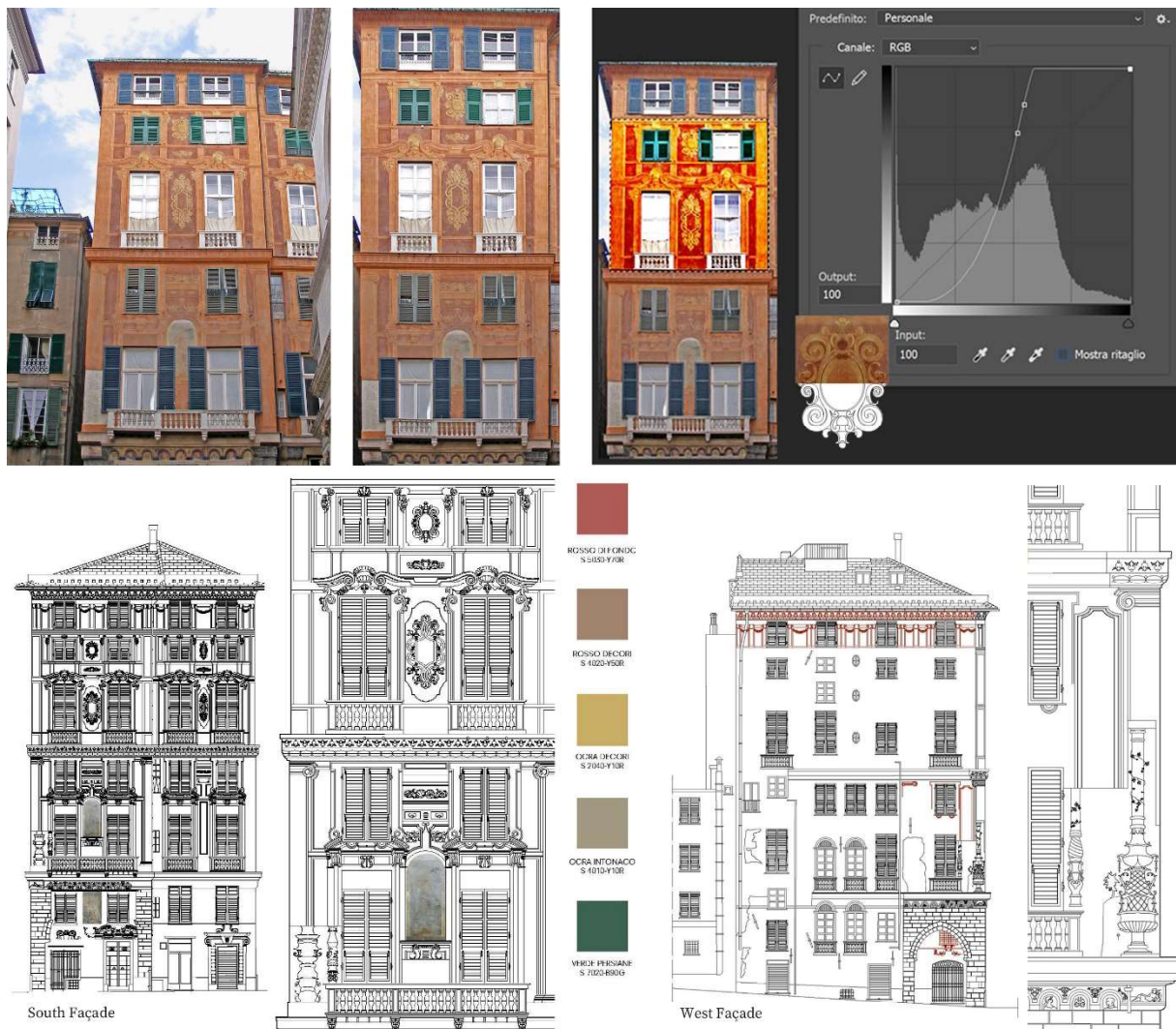
that can be reworked with the Perspective rectifier photo-straightening software and the digital processing of high-definition images of the facade through the chromatic contrast processed according to algorithms.

With point straightening, a few reference points are enough, which can be read directly by the Topographic Instrument or entered manually, to straighten and scale the photograph allowing you to make measurements of distances, area and perimeter directly on the images. If it is not possible to take a single photograph of the entire building to be surveyed, the mosaic option allows you to combine multiple images in a single straightening and the time needed for the survey is drastically reduced.

Main features that allowed the use of the program are:

- Geometric straightening
- Straightening for two-dimensional or three-dimensional points
- Mosaic of images
- Importing images in the most common formats: Jpeg (. Jpg), Bitmap (.Bmp), Tiff (. Tif), Portable Bitmap (. PBM), Kodak PhotoCD (. Pcd), Paintbrush (. PCX), Portable Network Graphics (. PNG), Portable pixmap (. ppm), JPEG2000 (. jp2).

The final 2d restitution was carried out by importing the .dxf files into autocad and reworking of the lost decorations and the development of the chromatic recovery project.



**Fig. 5:** Project of photographic sockets and photo-straightening elaboration through Perspective Rectifier; chromatic elaborations with contrasting shielding through algorithms aimed at highlighting the traces of the painted decorations by Giulia Pellegri. 2d drawing of the façades and details by Calcagno and Carratino .(2020)

## 4. Conclusion

The comparison of several relevant methodologies and subsequent graphic restitution highlights the need for the critical ability to systematize instrumentation and cultural competence on the basis of a vast literary reference case, that provides a philological and narrative reading system capable of communicating, at different scales, the value of cultural heritage.

The outcome of the ongoing research is not the product of the use of software, which would simply be a technical act, but a cognitive process. The integrated models, conceived as the result of a process and not as a product of a particular software, therefore allow organize and manage the "project" and its execution, as well as assessing all the competing aspects of its implementation.

The scenario that emerged from the analysis of the scientific literature shows that it is not possible to attribute this value of all-inclusive information gatherers to the current technologies: on the contrary, this research approach constitutes the principle of integrated / advanced modeling, conceived within this research as a process of representation of architectural knowledge, which is configured as a critical procedure and not as a computer software.

While sharing the result of this research, 1. Tangible cultural Heritage Survey: aerial and terrestrial intake systems, 2. The pebble mosaic of Saint Bartolomeo Charterhouse; 2.2 3D reconstruction through the use of 3DF Zephyr software and mosaic drawing; 3. Grillo-Spinola Palace's Façade and 4. Conclusion are attributed to Giulia Pellegrini.

2.1 The survey with drone in manual mode at low altitudes is attributed to Francesca Salvetti.

## Bibliographical References

[1] OGGIERO Giuseppe, *Cenni sulla vita dell'apostolo S. Bartolomeo con aggiunta di notizie storiche sulla Certosa di Rivarolo*, Genova, 1872, pp. 169 – 197.

[2] C.G. RATTI, *Istruzione di quanto può vedersi di più bello in Genova in pittura, scultura ed architettura*, Genova 1780, pp.244.

[3] GALBIATI Giuseppe, *La Val Polcevera e la Certosa di Rivarolo (dal 1297 al 1801)*, Genova Certosa, 1927.

[4] SALZMANN Dieter, *Untersuchungen zu den antiken Kieselmosaiken*, Berlino 1982.

[5] BONORA S., BOJ S., *Palazzo Grillo Spinola*, Genova, 2004, in Arkos, supplemento al numero 7/2004, Il restauro dei Palazzi dei Rolli, pp.130-133.

[6] Papers or presentations in the proceedings of a conference are cited as part of a monograph. SURNAME(S), Name. Paper title. In AA.VV. *Proceedings of*. City: Publisher, 2010, p. 100-108.

[7] PELLEGRINI Giulia, *New applications of integrated survey on UAV platform for architecture and environment.*, In AA.VV. *Proceedings of VII Convencion de Agrimensura*, La Habana, 23/26 Septiembre 2015. p. 1-8, La Habana:La Habana Editorial Obras, ISBN: 9789592471368.

[8] PELLEGRINI Giulia, (2016) Chromatic and decorative planning choices: geometry, knowledge and survey., *Color Culture and Science Journal*, , vol. 06, 2016, p. 61-69, ISSN: 2384-9568, doi: 10.23738/ccsj.i62016.00

[9] Referring Web Pages Web: <https://www.d-flight.it/>

[10] Referring Web Pages Web: <https://www.enac.gov.it/>

[11] Referring Web Pages Web: <http://www.diocesi.genova.it>

[12] Referring Web Pages Web: <http://www.liguria.beniculturali.it/index.php?it/136/percorsitematici/3/5/3>

## Table of content

- 15 ID 002. *Structures and infrastructures of the central Adriatic. Topics for new environmental policies*  
Ottavia ARISTONE, Lucia SERAFINI
- 25 ID 005. *Çilehane as A Place for Thinking*  
Melih KURNALI, Duygu KOCA
- 34 ID 006. *Processes behind regional planning in Lebanon's Hinterland: The Cases of the Unions of Municipalities of Jezzine and Tyr*  
Balsam MADI
- 42 ID 007. *The "Terzo Paradiso": the meeting point between Man, Art, Agriculture*  
Francesca MUZZILLO, Fosca TORTORELLI
- 47 ID 008. *The role of art for the regeneration of the public city. The experiences of the Metropolitan Cities of Palermo and Naples*  
Chiara AMATO, Giulia BEVILACQUA
- 57 ID 009. *Abandoned for good? Peenemünde as an example for dealing with a cultural landscape facing multifaceted contamination issues*  
Peter I. SCHNEIDER, Constanze RÖHL
- 65 ID 013. *Preliminary approach to conservative actions on artefacts of historical and monumental value. Application to 4 old bridges crossing the Savuto river in Calabria*  
Caterina GATTUSO, Domenico GATTUSO
- 75 ID 014. *Urban regeneration policies to enhance touristic mobility and economy*  
Domenico GATTUSO, GianCarla CASSONE, Margherita MALARA
- 85 ID 015. *Advanced knowledge techniques and proposals for a compatible reuse and enhancement of a disjointed urban area: Villa Bossi in Busto Arsizio and its surroundings*  
Daniela ORENI, Gianfranco PERTOT
- 95 ID 016. *Structure/external envelope relationship in the Monte dei Paschi di Siena headquarters in Colle Val d'Elsa (SI) by Giovanni Michelucci*  
Frida BAZZOCCHI, Cecilia CIACCI, Vincenzo DI NASO
- 104 ID 018. *Landscape aesthetic contamination, from weak point to urban redemption element: case Eleusis, Greece*  
Costantino PATESTOS, Neratzia TZORTZI
- 115 ID 019. *Management Plans for cultural heritage sites, as tools for inclusive approach in the developing countries: Case study of Prizren Historic Center Management Plan*  
Nora ARAPI KRASNIQI
- 123 ID 020. *The eighteenth-century lucanian landscape from 'drawings of travellers' and notebooks of land surveyors*  
Enza TOLLA, Giuseppe DAMONE
- 132 ID 021. *Elena Mendia and women's professionalism in Neapolitan post-war architecture*  
Chiara INGROSSO
- 142 ID 022. *Intermodal digital experiences for the documentation and storage of historical-critical data aimed at the enhancement and use of the historical-urban landscape*  
Asia BARNOCCHI, Luca MENEGATTI



- 150 ID 023. *The Role of Evaluation and Participation in developing Cultural Heritage Enhancement Projects. A Participatory Multicriteria Analysis applied to the "Certosa di Pisa" in Calci (Tuscany, IT) case study*  
Agnese AMATO, Massimo ROVAI, Maria ANDREOLI
- 160 ID 025. *Numerical evaluation of environmental performance of a renaissance building to address a comprehensive retrofit strategy: the case of Palazzo Tassoni Estense in Ferrara (Italy)*  
Marta CALZOLARI, Barbara GHERRI, Victor MARANHAO, Davide POLETTI
- 170 ID 026. *Alternative museum in Rome. Industrial architecture heritage colonized by XXI century's art*  
Miriam CONFETTO
- 180 ID 027. *The Experience of Parametric modeling design GIS: An Abruzzo hamlet case study*  
Domenico D'UVA, Federico EUGENI
- 185 ID 028. *The representation for the knowledge and development of the city and its territory*  
Massimo MALAGUGINI
- 195 ID 029. *Seismic aspects on architectural design*  
Marsida TUXHARI, Markel BABALLËKU
- 204 ID 030. *Water as architecture*  
Enrica PIERAGOSTINI, Salvatore SANTUCCIO
- 214 ID 031. *Notes on the material communication of design intentions: a case study in Molise of particular collective value*  
Piero BARLOZZINI
- 223 ID 032. *Enhancing the Defensive System of the City of Sagunto*  
Giulia PETTOELLO
- 231 ID 033. *Conserving the Chromatic Value of Plaza Doctor Collado in Valencia*  
Giulia PETTOELLO
- 239 ID 034. *A perfect example of a Vitruvian atrium: the main atrium of the Casa del Centenario in Pompeii*  
Alberto CUSTODI
- 249 ID 035. *The UN2030 Sustainable Development Goals and the Parrhasian Heritage Park*  
Giuseppe BIAGINI
- 257 ID 040. *A Study on Distribution Planning for Citizens' Hydrants with the User Experimental Drill of Extra Connectable Hoses in Kiyomizu WCH Zone, Kyoto JAPAN*  
Takeyuki OKUBO, Dowon KIM, Tomohiko OWADA, Michiko HAYASHI
- 267 ID 041. *The overseas contamination of Enlightenment legal thought. The correspondence between Gaetano Filangieri and Benjamin Franklin (1781-1787)*  
Maria NATALE
- 276 ID 042. *Drawings and Utopias: A Never Built House by the Sea; A Project by Noronha da Costa to Magoito, Sintra, Portugal, 1971-∞*  
Pedro António JANEIRO, José FERREIRA CRESPO
- 286 ID 043. *The Drawing and the Painting as a Possible or an "Impossible"(?) Architectural Project(s) or Hypothetical House(s) in Luís Noronha da Costa*  
José FERREIRA CRESPO, Pedro António JANEIRO

- 295 ID 044. *The risks and dangers of planning and building on the universal values of the UNESCO heritage of the Natural and Cultural-Historical area of Kotor*  
Goran RADOVIĆ, David RADOVIC
- 305 ID 045. *Small construction sites for the regeneration of public space*  
Fernanda CANTONE, Francesca CASTAGNETO
- 315 ID 046. *Fès and its Medina: a key-case study of architectural contamination*  
Elena DE SANTIS, Tiziano INNOCENZI
- 325 ID 048. *Revitalization the integrated values of the Darius I the Great inscription, as the cultural property belonging to humanity. Bisitun, Iran*  
Sara POURYOUSEFZADEH
- 336 ID 050. *A network of slow routes between Italian UNESCO sites. A territorial strategy to enhance the in-between territories and the inner areas*  
Andrea ROLANDO, Alessandro SCANDIFFIO
- 345 ID 051. *Interventions on Cultural Heritage: Architecture and Neuroscience for Mindful Projects*  
Valeria MINUCCIANI, Nilufer SAGLAR ONAY
- 353 ID 052. *From Dawn to Dusk. Space and Contamination in Markets.*  
Salvatore SANTUCCIO, Marta MAGAGNINI
- 363 ID 054. *From Italy to Montenegro: cultural contaminations and disciplines exchanges for the enhancement of the Roman town of Doclea*  
Lucia ALBERTI, Bruna DI PALMA
- 373 ID 055. *A new Renaissance for the ancient villages: between field valorisation and guidelines*  
Gigliola AUSIELLO, Manuela COMPAGNONE, Francesco SOMMESE
- 383 ID 057. *Discovering, conserving and communicating the past. Synergies and antagonies between archaeology, restoration and museography in order to make accessible the past legacy*  
Michela BENENTE, Valeria MINUCCIANI, Melania SEMERARO
- 391 ID 059. *Without Borders. I don't see any enemies in my neighborhood*  
Efisio PITZALIS, Caterina BELARDO, Barbara BONANNO
- 399 ID 060. *Drawing as a Legacy: the drawn landscapes of the city and its reading in the thickness of the present*  
Pedro António JANEIRO
- 408 ID 061. *For an intercultural approach to knowledge of cultural heritage*  
Rossana GABAGLIO
- 414 ID 063. *Industrial heritage regeneration in Beijing: a sustainable case study*  
Marichela SEPE
- 424 ID 066. *Art and public space. Between history and nature*  
Laura RICCI, Francesco CRUPI
- 434 ID 067. *Famous architectures in urban contexts: the impact of colours and materials*  
Gigliola D'ANGELO, Marina FUMO, Claudia LOMBARDI, Pia LOPEZ IZQUIERDO BOTÍN
- 444 ID 068. *Survey, Modeling, and Documentation for Preservation: Digitization Challenges towards Cultural Heritage Enhancement and Conservation*  
Federica MAIETTI, Federico FERRARI, Marco MEDICI, Marinos IOANNIDES

- 453 ID 070. *Italy and China, between History and Nature. A network of networks for urban regeneration and territorial rebalancing*  
Laura RICCI, Yezheng TANG, Chiara RAVAGNAN
- 463 ID 071. *Early medieval Benedictine settlements and monastic landscape in Italy. A shared path and a case study*  
Ruggero LONGO, Enrico MONCALVO
- 475 ID 072. *Digital Technologies for preservation and promotion of Cultural Heritage: Tivoli and the Sanctuary of Hercules Victor.*  
Giorgia CECCONI, Giulia LOPES FERREIRA
- 484 ID 078. *Strada Nuova: as an example of a resilient cultural landscape*  
Patrizia BURLANDO, Sara GRILLO
- 494 ID 079. *Contaminated Architecture*  
Luca ZECCHIN
- 504 ID 082. *Aversa towards a new instrument of territorial governance: a proposal*  
Claudia DE BIASE, Irene D'AGOSTINO
- 515 ID 083. *Capri and modern architecture in Plinio Marconi's drawings*  
Simona TALENTI
- 523 ID 085. *Surveying the material and immaterial qualities of a shared urban landscape. Flows of users in transit in a contemporary Adriatic city*  
Antonella SALUCCI, Giovanni MATALONI, Francesca LIBERATORE
- 532 ID 087. *Rethinking the building envelope. Rehabilitation project and maintenance strategies for the RAI Auditorium in Naples*  
Pasquale MIANO, Maria Rita PINTO, Stefania DE MEDICI
- 542 ID 088. *Ancient Noto. Reading the "absence" as a strategy in the conservation and enhancement of the archaeological ruins*  
Sofia TONELLO, Emanuela SORBO
- 552 ID 091. *From historical railways to cycleways. Re-functioning the heritage of linear monuments*  
Andrea Alberto DUTTO, Stefano DIGHERO, Erika FRANCO GONZALEZ
- 562 ID 092. *From the project drawing to the survey model: the Enrico Fermi school in Celano 1932-1934*  
Alessandra TATA
- 570 ID 093. *The power of collective imagination: A methodological opportunity for reading the presence of architecture's hidden explanatory potential*  
Francesca SIBILIO
- 575 ID 094. *Crisis and Conflict resolution in Periurban Agriculture*  
Maria Gabriella ERRICO, Anna ATTADEMO
- 585 ID 095. *Cultural and Agri-Cultural Heritage "contamination" at the Milan south periphery*  
Nerantzia TZORTZI, Laura GUAITA, Aspasia KOUZOUPI
- 596 ID 096. *Coast-amination. Regeneration paths between water and land along the Lazio southern coast*  
Francesca ROSSI, Antonella CANTARO

- 606 ID 097. *Towards Eco-Planning principles. Torre-Cancello decommissioned railway in Campania Region a regeneration masterplan proposal*  
Salvatore LOSCO, Claudia de BIASE
- 616 ID 099. *Surveying and Actioning the Tangible and Intangible dimensions of Rural Heritage in RURITAGE H2020 Project*  
Rosa TAMBORRINO
- 624 ID 100. *3D data modeling toward social innovation. The documentation of the minor cultural heritage damaged by the earthquake*  
Fabiana RACO
- 632 ID 101. *KHAN EL ECHLE, SAIDA: a case study for the building stratigraphic analysis supporting the structural strengthening and conservation design*  
Laura NICOLINI
- 642 ID 102. *Built heritage contamination: the case of João Pessoa, Paraíba, Brazil*  
Ivan CAVALCANTI FILHO, Jessica SOARES DE ARAÚJO RABELLO, Emanuel Vítor PATRÍCIO DE LUCENA
- 652 ID 104. *Liberty winter gardens in Palermo: contamination from solar design*  
Simona COLAJANNI, Calogero VINCI, Marco BELOMO
- 660 ID 106. *Acireale Living Lab Culture and Technology. Small towns, internal areas and new landscapes: strategies to protect heritage*  
Mariagrazia LEONARDI
- 669 ID 107. *Under modernity sky. Pierre Bossan's industriousness in 19<sup>th</sup> century European sacred architecture*  
Maria Carolina CAMPONE
- 679 ID 109. *Locus Umbria. The project as a recomposition of the tradition/innovation antinomy*  
Paolo BELARDI
- 689 ID 111. *History and project. Reuse of historical tracks*  
Efisio PITZALIS, Marco RUSSO, Annarita ZARRILLO
- 699 ID 112. *The creation of values through Art and Design thinking*  
Mariacarla PANARIELLO
- 705 ID 115. *Waterfront regeneration in front of heritage protection: challenges and opportunities in Catania waterfront*  
Daniele RONSIVALLE
- 713 ID 116. *Contamination Through a Second Skin on Contemporaneity Architectonics*  
Alexandra AI QUINTAS, Mário SALEIRO FILHO
- 723 ID 117. *Fortress town of Palmanova. Actions on the driver of cultural values: designing contemporary borders enhancing overall landscape quality and identity*  
Claudia BATTAINO
- 732 ID 119. *The analyses of the settlement strategies of the minor historic centres. The case study of Piedicastello in Trento*  
Valerio DA CANAL
- 740 ID 120. *Intimate, etymological design contamination-confines Mediterranean*  
Maria Dolores MORELLI
- 750 ID 121. *Urban Revitalization: "Domus in via degli Orti" Area, in Santa Maria Capua Vetere*  
Francesco Pio ARCELLA

- 760 ID 124. *Intangible heritage between landscape protection and territory development. A plan for the Island of Pantelleria*  
Giorgia DE PASQUALE, Serena SAVELLI
- 766 ID 126. *Historical Vessels as Cultural Heritage. An Italian heritage nowadays underrated by law and community*  
Maria Carola MOROZZO DELLA ROCCA, Giulia ZAPPIA
- 776 ID 128. *Abstract Architectural Design for the Contamination by Cultural Ideas*  
Dominik LENGYEL, Catherine TOULOUSE
- 786 ID 129. *Risks and Landscapes: exploring relationships and opportunities in the Campania Region*  
Adriana GALDERISI, Giuseppe GUIDA
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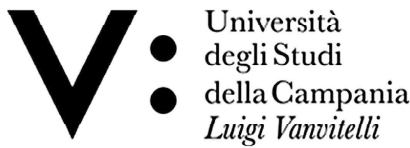
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