

LABORATORIO DI GEOMATICA PER L'AMBIENTE E LA CONSERVAZIONE DEI BENI CULTURALI



Description of the Laboratory

Geomatics offers its contribution to all disciplines which need to relate measurement and thematic information. The research activity of the Geomatics and Communication for Cultural Heritage Laboratory is applied to the following sectors: architecture, civil engineering, land and environmental engineering and protection, and Cultural Heritage study and preservation.

The **Lab's Mission** is to develop modern methodologies of integrated survey, testing new hardware and software tools in relevant application fields. It is also considered important to transfer the research experiences to the teaching activities, even if opportunely simplified. Theoretical classes are sustained on practical demonstrations and training: direct testing arouses the interest of the students and motivates them to acquire knowledge and proficiency in the Geomatics field.

Lastly, the Lab enhances spillovers within the professional world of the activities which have been conducted in the academic circle: the high request for consulting service by public and private organisms proves the efficiency and competitiveness, also in terms of costs, of the submitted assignments.

Since 2010 the Lab's members have entered the Special Group For Geoinformation (SGFG), which consists of researchers and students undertaking multi-disciplinary scientific and academic studies and projects in different sectors of the Geoinformation sciences.

Expertise

According to the **methodological approach**, developed and optimized through direct testing within study-cases, in every application different measuring techniques are integrated and various kinds of topical information are recorded, when needed.

Following the acquisition phase, the processing workflow is each time adapted to the specific requirements, allowing to deal with high levels of details and considerable amounts of data, depending on the project's finalities, and to generate outputs which combine strict precision and the most suitable contents: therefore, raster images, bi-dimensional drawings, 3D models are delivered on the staging ground of a common data base of necessary information to represent, frame and describe the virtual synthesis of the surveyed objects.

The communicative potentialities of survey source products, which visualize space through high resolution 3D data and which may be explored in real time applications or through videos, should not be neglected.

The case-based research projects are carried out with the most advanced field technologies, mainly involving the following spheres of practical operations:

- multiscale and multi-sensor geometric survey;
- numerical, technical and thematic cartography;
- geographic information systems for land management;
- topographic survey, framework setting and detail recording;
- GPS;
- 3D scanning systems;
- digital photogrammetry;
- optimization of the survey and recording procedures in emergency conditions;
- monitoring and investigation techniques applied to deterioration and instability, isolated and diffused;
- non-destructive and non-intrusive inquiries with infrared thermography to evaluate the materials' state of conservation;
- rapid prototyping techniques for physical reproductions made of stone or synthetic material.

Research projects

A reliable and comprehensive measured representation forms a fundamental part of every Cultural Heritage project meant to understand, preserve and enhance the subject matter: the simulation of space performed through measurements reduces the complexity of reality to a clear-cut model. Particularly,



digital photogrammetry and 3D scanning systems provide for a three-dimensional and high resolution survey not only of volumes described through outlines, but also made of specific materials: a repository of information which is quite different from the aggregate of plans, sections and front profiles which once were believed to be the only components of a survey.

The research projects carried out by GeCo Lab in recent years frequently had a strong **interdisciplinary character**. Areas of expertise the Lab has engaged with are, distinctively, the ones covered by restorers, planning architects, archaeologists, art historians, structural engineers, technologists, chemists. The applications are extensively varied, whether for the investigation scale, or for the dislocation of the interventions. The Lab has committed to **international projects**, in collaboration with European and other universities and institutions (e.g: "Mare Nostrum: A heritage trail along the Phoenician maritime routes and historic port-cities of the Mediterranean Sea", European project which involves Syrian, Lebanese, Greek, Maltese, Tunisian partners; didactic and research collaboration agreement with the Universidad Nacional de La Rioja, Argentina); at the same time, however, the **connection with local institutions** is regarded as essential (Soprintendenza per il Patrimonio Storico, Artistico ed Etnoantropologico (Superintendence of Historical, Artistic and Ethno-anthropological Heritage) for the provinces of Florence, Pistoia e Prato, Opificio delle Pietre Dure, Museo dell'Opera del Duomo, Istituzione Parco Mediceo di Pratolino, Local Governments, etc.).

Scientific instruments available

1. Total Station TCR303 (Leica Geosystems);
2. Total Station TCR705 (Leica Geosystems);
3. Range Scanner HDS6000 (Leica Geosystems);
4. GPS SR530 (Leica Geosystems);
5. GPS SR500 Master and Rover receivers (Leica Geosystems);
6. Digital and stereoscopic photogrammetric station;
7. Stereoscopic sistem Zscreen;
8. Zglif (Menci Software) e Micromap (Microgeo) Photogrammetric Softwares;
9. Zscan Photogrammetric system with slide bar (900 mm);
10. Triangulation 3D Scanner (NextEngine);
11. SLR Digital Camera Nikon D700 with Camera ServicePro II software, and calibrated lens (15, 24, and 50 mm);
12. Least square adjustment softwares (Star*Net, MicroSurvey)
13. Software for topographical data managing (GeoIn);
14. Software for 3D scanning data management (Cyclone, Leica Geosystems);
15. GIS Software;
16. Digital picture editing softwares;
17. 3D modeling softwares;
18. Spherical photogrammetric system (Hardware and Software);
19. 2 Workstations Yashi;
20. Notebook Hp Elitebook 8530W;
21. Netbook Asus EeePC 1005HA Intel Atom N280;
22. Backup system LC 7,5 Tb, 5 Big Network Ethernet.

Agreements and collaborations

In 2008 the *Department of Civil and Environmental Engineering of the Faculty of Engineering* and the *Department of Building and Restoration* (formerly *Department of Restoration and Preservation of Architectural Heritage*) of the *Faculty of Architecture of the University of Florence* have entered in a Collaboration Agreement.

Referring Professors for UNIFI: Prof. Carlo Alberto Garzonio, Prof. Fausto Sacerdote, Prof. Grazia Tucci.



Within the above mentioned agreement, the GeCo Laboratory cooperates with the *Photogrammetry Laboratory of the Department of Civil and Environmental Engineering* for issues concerning cartography and small-scale maps.

Since 2009 the GeCo Laboratory collaborates with the *Universidad Nacional del La Rioja (Argentina)*, hosting docents for specialization stages, and organizing seminars and training workshops in Argentina.

The GeCo Laboratory has entered in a Framework Agreement between the *Department of Building and Restoration* (formerly *Department of Restoration and Preservation of Architectural Heritage*) of the *Faculty of Architecture of the University of Florence* and *Leica Geosystems S.p.A.*

Referring Professor for UNIFI: Prof. Grazia Tucci.

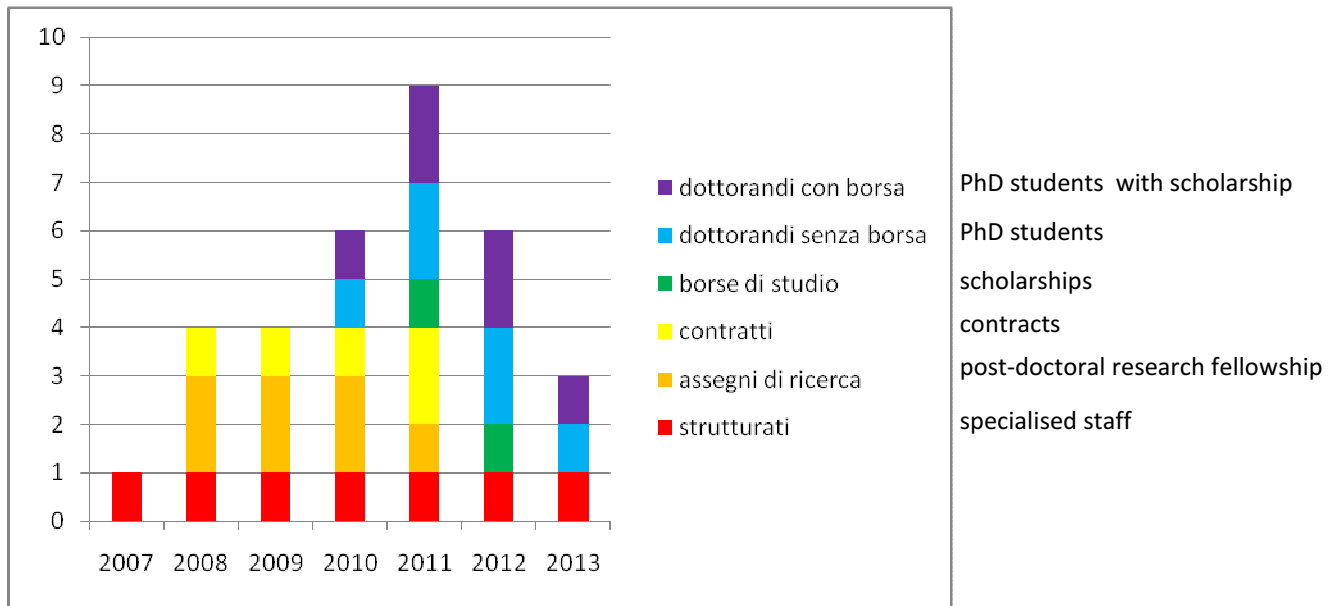
For every research project the Laboratory undertakes, there's a collaboration engagement with other Italian and/or foreign groups, working on similar research themes or involved to bring about and interweave their own specific disciplinary contribution.



**Summary of didactic and research activities
(2007 - April 2011)**



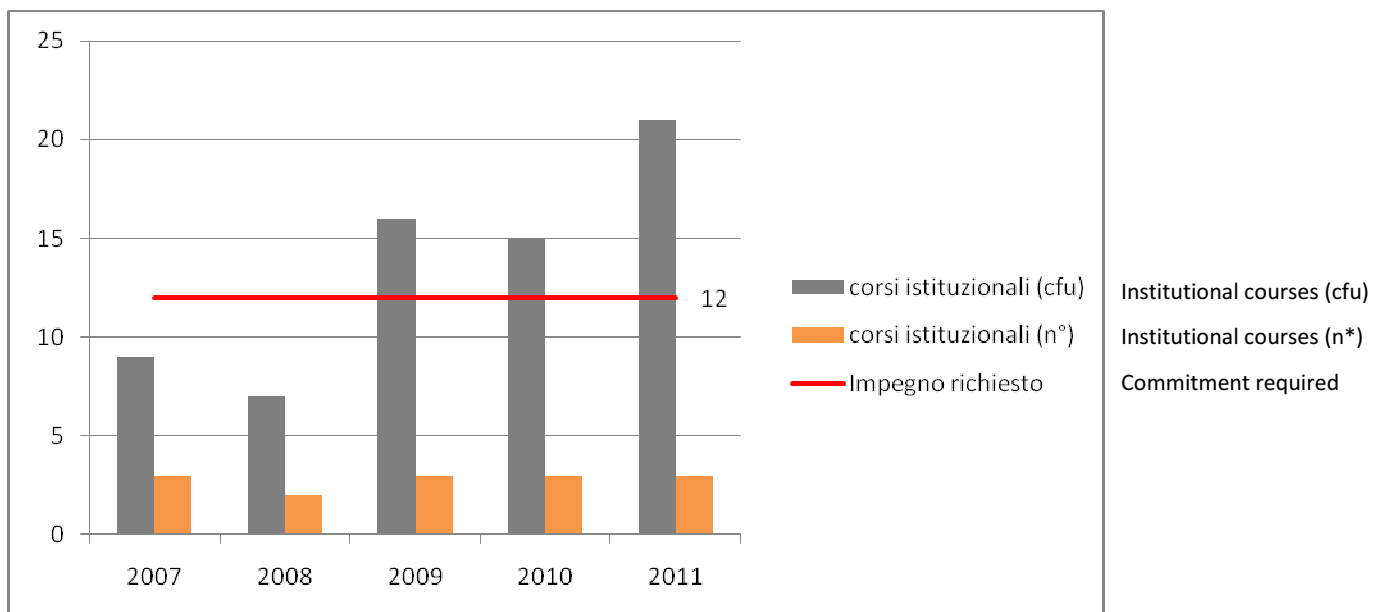
Who we are



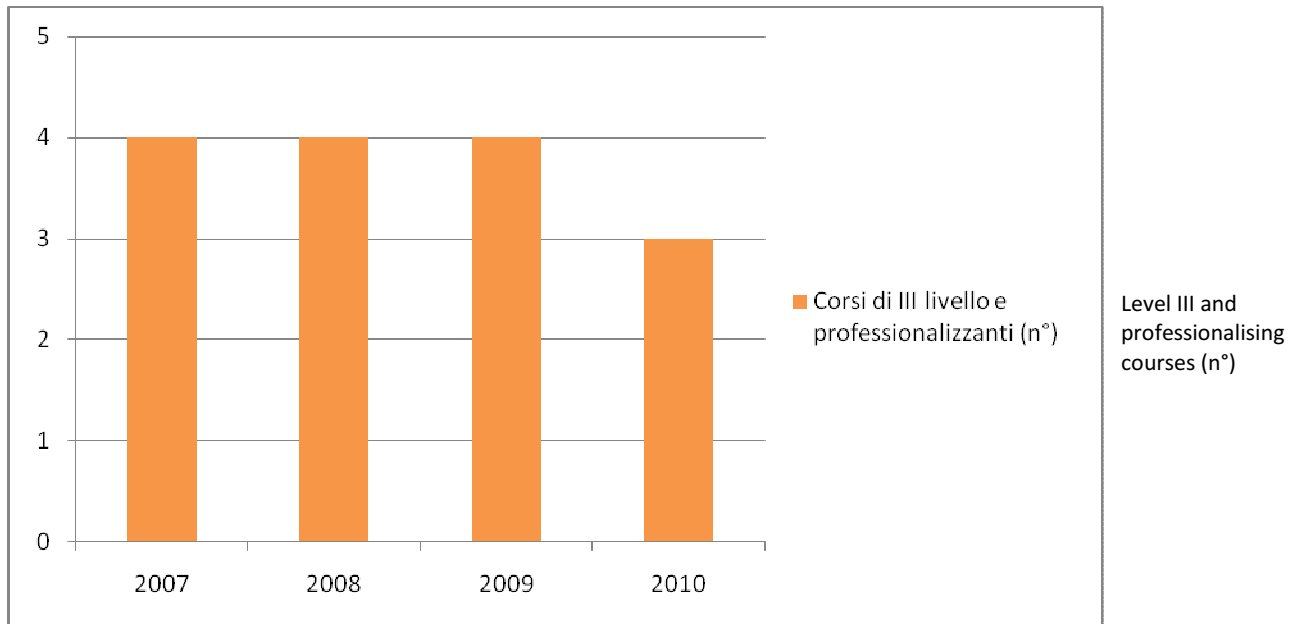
The group started its activity in 2007, together with the introduction of ICAR-06 teaching programmes (Topography and Cartography) within the Faculty of Architecture. In the whole University of Florence, the department is represented only by two specialised professors: a Full Professor at DiCEA (prof. F. Sacerdote) and an Associate Professor at DiCR (prof. G. Tucci). That is why huge efforts (both as far as money and energies are concerned) are made to “maintain” PhDs, research fellows and contract workers. Some initial difficulties have further worsen by the fact that this discipline was new for the University, so Florentine postgraduates had no basic knowledge. Recently, the organisation of workshops, seminars and collaborations with colleagues dealing with similar subjects has helped improve the situation and involve an increasing number of suitably trained people possessing into the laboratory activities.

What we do

1. Didactics

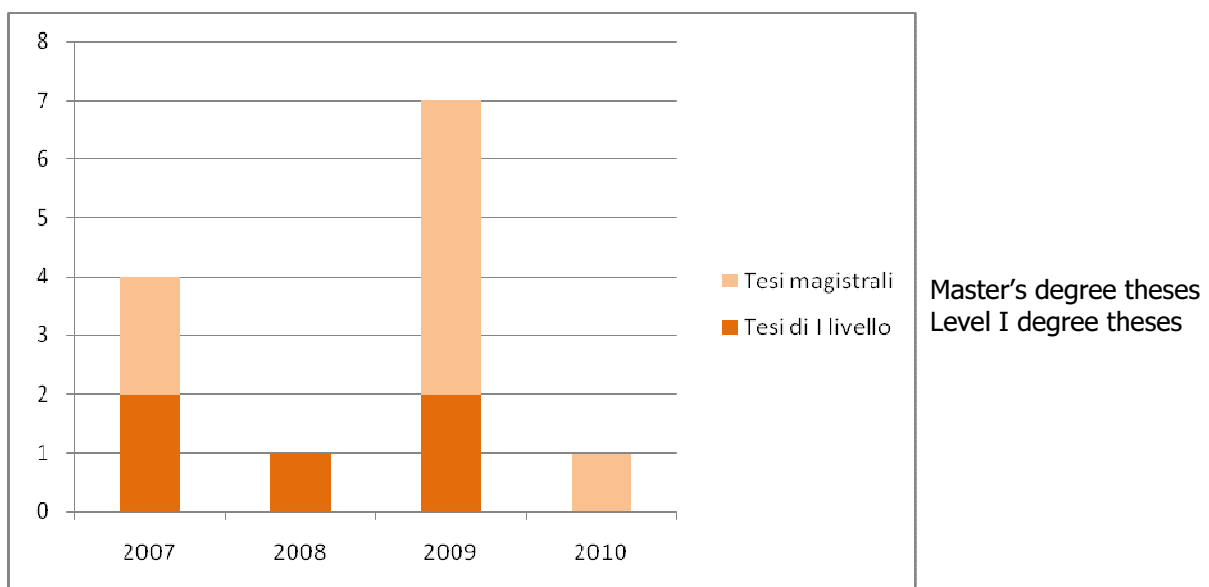


The didactic activity is offered by the degree courses of the Faculty of Architecture (Architectural Sciences, Master's degree in Architecture, Urban, spatial and landscape planning) and the Faculty of Engineering (Civil Engineering). Since 2009 the number of total cfu (university credits) is higher than the one required for Associate Professors. Theoretical lessons will always be followed by one or more practical training sessions. In fact, the direct use of tools, from the most common (rules, plumb lines, levels) for direct survey to the most advanced ones (digital cameras, total stations, 3D scanners), is essential to better understand the theoretical content of the courses.

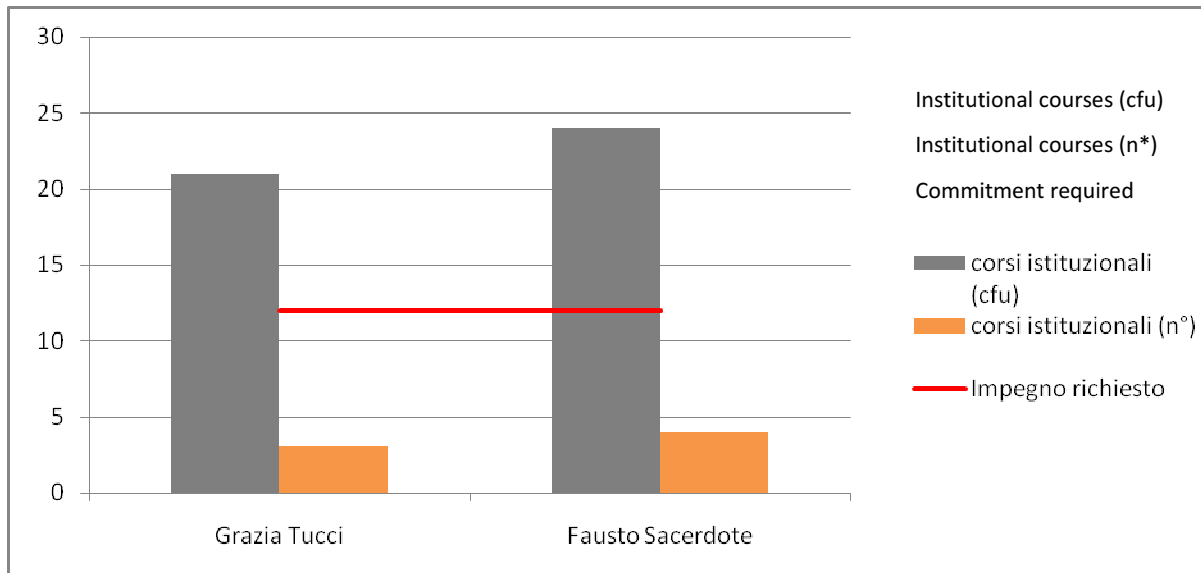


The Level III didactic activity includes the following courses and contributions:

- Level I and II master's degree
- Postgraduate Courses
- International Workshops
- Training and vocational courses
- Postgraduate Centre

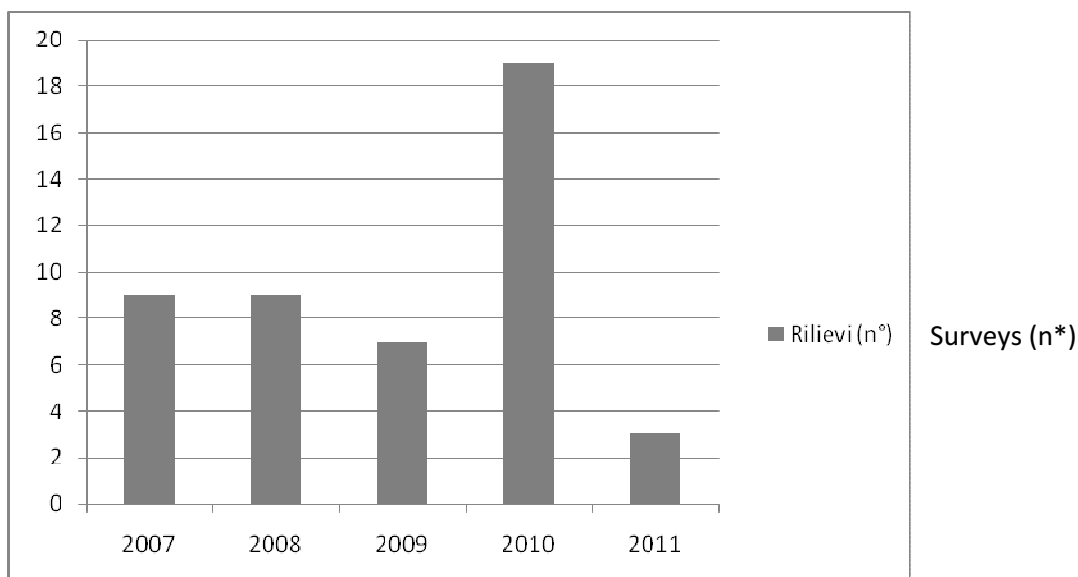


Most of the theses discussed with the contribution of the Laboratory are the result of interdisciplinary collaborations, especially with restorers. In fact, it is impossible to plan a preservation or valorisation intervention without deep (even metric) knowledge of the actual condition. We strongly believe that this concept must not remain only a theory, it must be applied to the most in-depth didactic simulations, such as Level I and master's degree theses.



The didactic activity programmed for the academic year 2011-2012 includes 3 courses at the Faculty of Architecture (corresponding to 21 CFUs in total), held by Mrs. Grazia Tucci (Associate Professor) and 4 courses at the Faculty of Engineering (corresponding to 24 CFUs in total), held by Mr. Fausto Sacerdote (Full Professor).

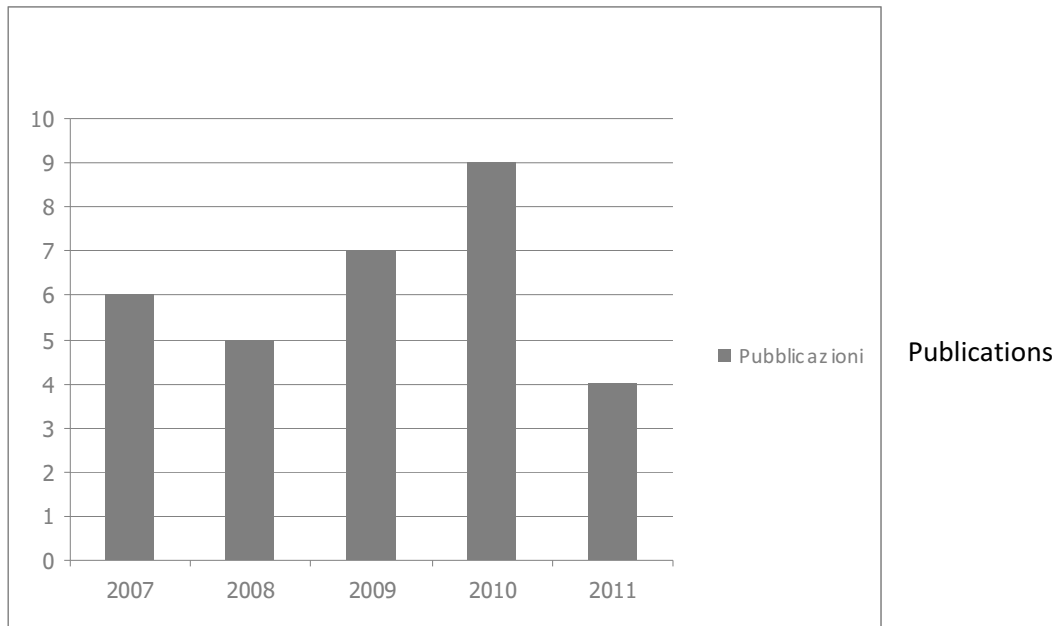
2. Studies and surveys



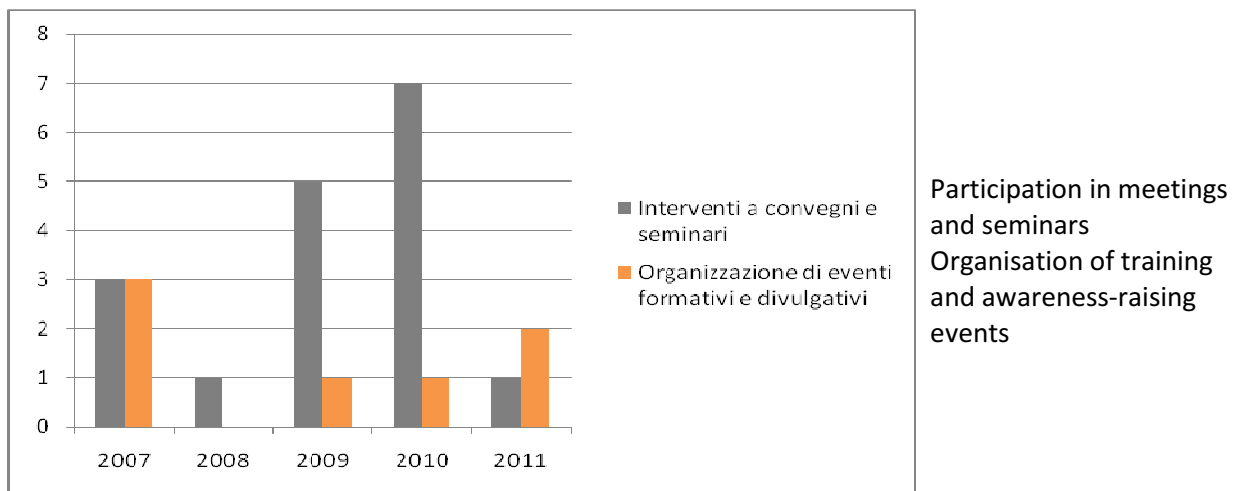
The research activity of the Laboratory focuses mainly on the study and test of innovative solutions for metric documentation and monitoring of Cultural and Territorial Heritage. Quality measurement (and the relative indicators) represents the essential element for all the studies carried out. However, we always focus our attention on the object to survey and on the purposes at the basis of the survey itself. The transposition to the architectural scale of measurement techniques that have originally been developed to



be applied to territorial scale analyses, as well as the use in the Cultural Heritage field of instruments born to be applied to the industrial sector arise specific problems, deserving consideration and study. The activity of the Laboratory dealt with the survey of some huge monuments in Italy and abroad (The Church of the Holy Sepulchre in Jerusalem, the Basilica della Madonna dell'Umiltà in Pistoia, the Medici Fortress (Fortezza medicea) in Arezzo, etc.), as well as the metric documentation of many buildings, environmental contexts, and small- and medium-sized objects. The techniques adopted are those of land and satellite topography, digital photogrammetry, and 3D scanning; in general, many measurement systems are applied contextually, in order to carry out an "integrated metric survey". The surveys performed have often been the object of research agreements or contributions made by public or private bodies.



The number of publications issued by the research group is obviously related to the number of people collaborating with the Laboratory (with different assignments) and consequently to the number of works done.



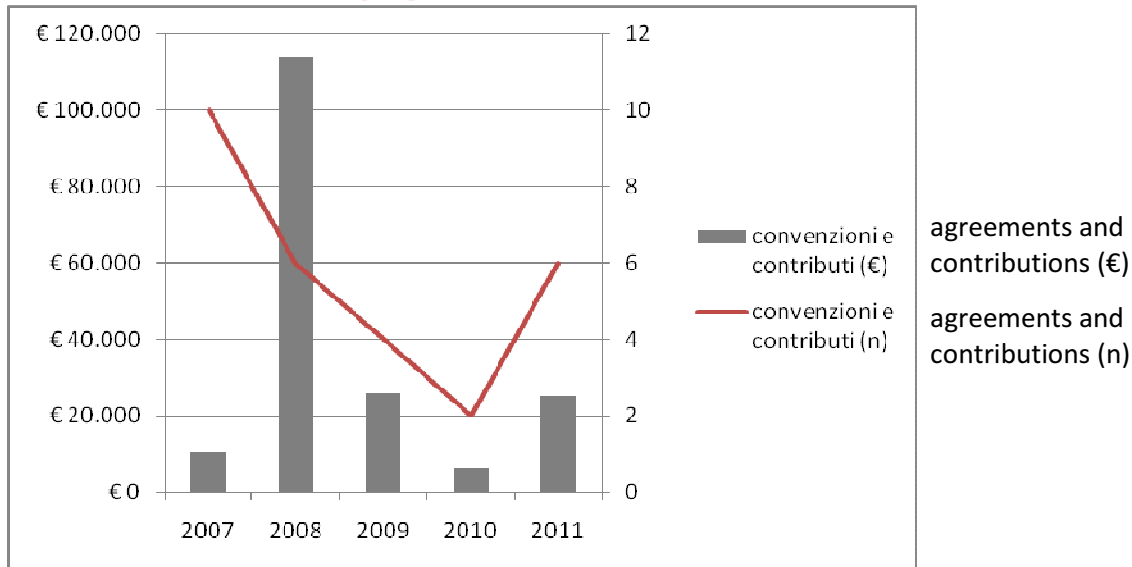
The results of the studies carried out are presented during national and international meetings. The dissemination of the "continuing training" concept and the need for professional updating in rapidly evolving sectors (such as geomatics), promote the organisation of training and awareness-raising activities and events. Among these, a Seminar on 3D scanning systems in 2006 saw the contribution of professors



from other universities and the participation of a fair number of students, researchers and professionals from Florence.

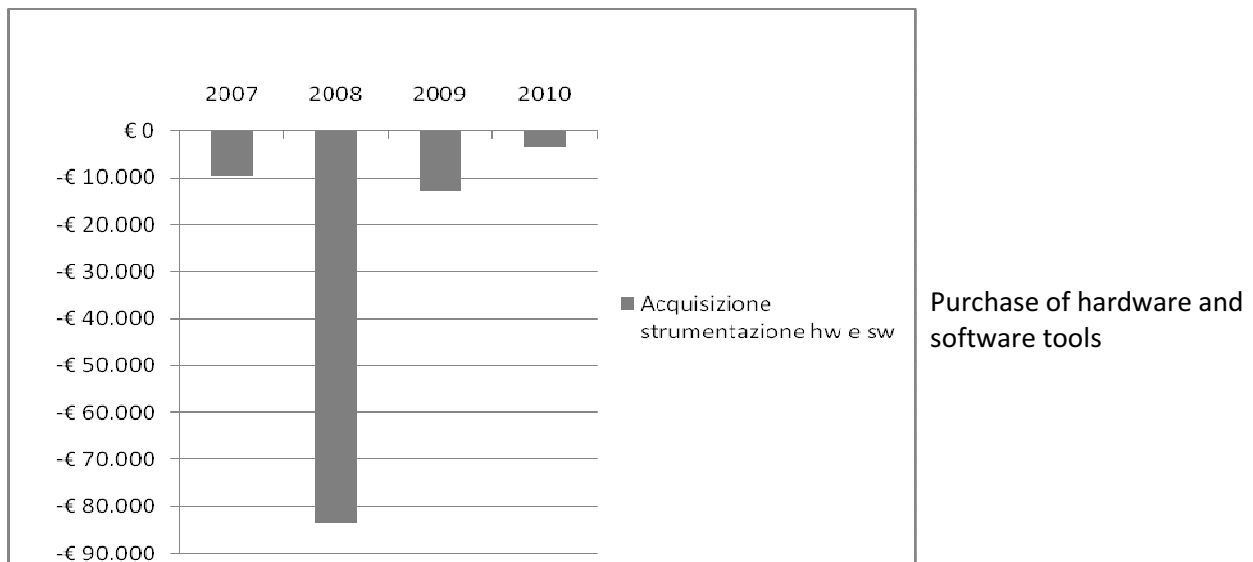
In 2009 we launched the Postgraduate Course in "Geomatics for Cultural Heritage preservation"; 8 people took part in it.

Which resources are employed



Research agreements and contributions offered by public and private bodies are the only source of financing for the Laboratory activities. Their amount varies considerably, according to the workload required from time to time. Up to now the maximum amount reached was 68,000 Euro, against many contributions with a sharply lower amount (from 40,000 to 1,500 Euro).

Which tools are employed



In the first operating years of the Laboratory, the majority of the financings received has been invested in the purchase of tools, such as a distance laser scanner in 2008 (approx. 90,000 Euro). The updating of the measurement tools as well as their maintenance (maintenance and gauging) are essential for the researches performed in the Laboratory. Some studies are carried out not only with proprietary tools, but also thanks to collaboration agreements signed with manufacturers and other universities.



Relations with Bodies and Institutions



Bodies and Institutions

Local Government of Gravina di Puglia (BA)

Local Government of Perugia

Local Government of Vibo Valentia

Local Government of Arezzo

Local Government of Asciano

Local Government of Prato

Soprintendenza per il Patrimonio Storico Artistico ed Etnoantropologico (Superintendence of Historical, Artistic and Ethno-anthropological Heritage) for the provinces of Florence, Pistoia and Prato

Soprintendenza per i Beni Architettonici e per il Paesaggio (Superintendence of Architectural and Landscape Heritage) for the Provinces of Siena and Grosseto

Soprintendenza per il Patrimonio Storico Artistico ed Etnoantropologico (Superintendence of Historical, Artistic and Ethno-anthropological Heritage) for the provinces of Siena and Grosseto

Soprintendenza per i Beni Archeologici (Superintendence of Archaeological Heritage) of Tuscany

Consorzio di Bonifica per la difesa del suolo e la tutela dell'ambiente della Toscana Centrale (Land-improvement Consortium for soil protection and environmental protection in Central Tuscany)

Opera del Duomo of Florence

Istituzione Parco Mediceo di Pratolino

Religious community of Sant'Antimo

Franciscan Custody of the Holy Land

Museum of Planetary Sciences of Prato

Sociedad Civil "Patrimonio, Comunidad y Medio Ambiente"

Firms and companies

Leica Geosystems

C. G. F. Costruzioni (Rome)

Studio SPIRA s.r.l. (Florence)



Interdisciplinary relations



Design – Representation – Restoration – Technology – History of art



Geomatics – Geology – Building science – Electronics – Archaeology

Departments and Universities involved in research projects

Departments of the University of Florence:

Department of Civil and Environmental Engineering

Department of Design and Technology

Department of Ancient, Medieval and Renaissance Studies and Linguistics

Department of History of Art and Spectacle

Department of Design

Department of Electronics and Telecommunications

Department of Chemistry



Centres of the University of Florence:

CABEC – Centro di Ateneo per i beni Culturali (University Centre for Cultural Heritage) - University of Florence, scientific coordination: Prof. P. Malesani

INN-Link, research centre for the innovation of local knowledge systems

Other Universities:

Polytechnic university of Milan – Department of Architectural Design (Prof. S. Bortolotto and Prof. L. Toniolo; Mr. N. Lombardini, architect)

University of Siena - Faculty of Arts and Philosophy (Prof. R. Parenti)

Polytechnic university of Turin - Centro per la Qualità (Centre for Quality) (Prof. G. Barbato)

Azerbaijan Architecture and Construction University (AzUAC)

Universidad Nacional del La Rioja (Argentina)

Universidad Central del Este de San Pedro de Macorís (República Dominicana)

Sociedad Civil "Patrimonio, Comunidad y Medio Ambiente Universidad Técnica Particular de Loja – UTPL (Ecuador)

Sabancı University of Turkey

Damascus University (Syria)



International relations



Training and research abroad

- Formazione Training
- Rilievi Surveys



International relations in progress

Acuerdo de colaboración cultural y científica entre la Universidad de Florencia (Italia) y la Universidad Nacional de La Rioja (Argentina)

Universidad de Florencia, Escuela de Arquitectura

Universidad Nacional de La Rioja, Departamento Académico de Ciencias y Tecnologías Aplicadas a la Producción, al Ambiente y al Urbanismo, Escuela de Arquitectura

Acuerdo de colaboración académica y científica entre Universidad Central del Este de San Pedro de Macorís (República Dominicana) y la Universidad de Florencia (Italia).

Universidad Central del Este, Instituto de Investigación, Area de Arquitectura e Urbanismo

Universidad de Florencia, Escuela de Arquitectura

Acuerdo de colaboración cultural y científica entre la Universidad de Florencia (Italia) y la Universidad Técnica Particular de Loja – UTPL (Ecuador)

Universidad de Florencia, Escuela de Arquitectura

Universidad Técnica Particular de Loja, Escuela de Arquitectura

Research project TEMPUS IV "ISAACON - International High School of Archaeological and Architectural Heritage Conservation and Management"

University of Florence (Italy)

Polytechnic university of Turin (Turin – Italy)

Universidad Politécnica de Valencia (Valencia – Spain)

Aristotele University of Thessaloniki (Thessaloniki – Greece)

Elleniki Eteria (Thessaloniki – Greece)

Ittihad Private University (Aleppo - Syria)

University of Aleppo (Aleppo – Syria)

Tishreen University (Lattakia – Syria)

Directorate General of Antiquities and Museums (Damascus – Syria)

Agreement of Cultural and Academic Cooperation between the University of Florence (Italy) and Damascus University (Syria)

University of Florence (Italy), Faculty of Architecture

Damascus University (Syria), Faculty of Architecture

Salvaguarda de los valores patrimoniales y culturales que atesora el Centro Histórico de Ciudad de La Habana (Cuba)

Sociedad Civil Patrimonio, Comunidad y Medio Ambiente

Universidad de Florencia/Facultad de Arquitectura/ Departamento de Construcción/ Restauración y Conservación de Bienes Arquitectónicos

Instituto Inter-Universitario de Conservación y Restauración de Obras de Arte de la Academia Bellas Artes, Varsovia. Polonia

The Laboratory hosts foreign students, final year students, graduates and PhD students. In 2009 we hosted:

Mariana Romanazzi and Esteban Ariaudo (Argentina)

Escuela de Arquitectura, Universidad Nacional de La Rioja

It currently hosts:

Ahmad Badreddin Mokrash (Syria)

Research Doctorate in Architectural Materials and Structures at the University of Florence

Armağan Güleç Korumaz e Mustafa Korumaz (Turkey)

Faculty of Arts and Social Sciences, Sabanci University of Turkey.

In 2010 the members of the research group joined the *Special Group For Geoinformation - SGFG* – made up of researchers and students involved in scientific, academic and multidisciplinary researches in the different sectors of geographical information.



**National and international researches in progress
(2010 - 2011)**



Monitoring of the historical, artistic and architectural heritage through radar and laser remote sensors: Torre del Mangia in Siena

Subject

New remote surveying tools for structural dynamic characterisation enable the conservative monitoring of architectural heritage, allowing rapid interventions to prevent its deterioration. "Radar interferometry," an innovative technique introduced by the 'Technologies for Cultural Heritage' Laboratory of the University of Florence, allows measuring the vibration amplitude and frequency of big architectural structures; it works even at long distances (up to hundreds of metres) and avoids positioning contact sensors (whose use is difficult), usually employed for such a survey. Microwave interferometry can be used together with 3D laser scanning to obtain an integrated image of the structural movement. Careful remote dynamic measuring has been carried out on the Giotto's Campanile and the Torre di Arnolfo in Florence, as well as on the Leaning Tower of Pisa. The results, published on several important scientific reviews, are particularly interesting. The University of Florence put together the Departments of the Faculties of Engineering and Architecture and proposed a measurement campaign able to acquire the dynamic parameters of the famous Torre del Mangia, which overlooks Piazza del Campo in Siena. The elegant Torre del Mangia, 102 metres high, is an architectural element extremely sensitive to the vibrations that can be caused by different external effects. This research aims at detecting the dynamic characteristics of the monument through the abovementioned techniques and identifying a numerical model according to the finite element method (FEM), allowing the analysis of the mechanical behaviour of the monument. The research also aims at putting the Torre del Mangia inside a wider "database" with the dynamic characteristics of regional monuments.

Year

2011

Financing

Fondazione Monte dei Paschi di Siena

Institutions involved

University of Florence, Faculty of Engineering, Department of Civil and Environmental Engineering

University of Florence, Faculty of Engineering, Department of Electronics and Telecommunications

University of Florence, Faculty of Architecture, Department of Building and Restoration

Referring Professors for UNIFI

prof. G. Bartoli



Interactive museum design: the virtual museum of Aegean and Cypriot antiques in Tuscany (MUS. INT.)

Subject

The project focuses on the creation of an interactive museum, whose structure can be used for different exhibition purposes. The first stage of this research proposal will focus on Aegean and Cypriot collections in Tuscany; the virtual museum will then host other kinds of exhibitions and artefacts according to an exhibition layout that could be changed every time by using the tools made available by virtual design.

To perform this task the project sees the collaboration of researchers and technicians having different training and expertise, in order to create a team capable of dealing with broader perspectives. Therefore, the virtual museum is designed and created by a team of archaeologists, historians and museologists, computer scientists and communication experts.

The project aims at creating a cultural centre that can communicate many scientific issues, exploiting the web in the service of the most up-to-date museum practices. Through the creation of an interactive environment, the museum will be able to show what is inside its archives and publish their content without worrying about space, enabling its access to people with scientific or even informative purposes. It will be therefore possible to improve the heritage visibility and define didactic paths, according to which interpretation of the acquired knowledge that has not been sufficiently highlighted you want to focus on.

Such a centre will play an important role for the institutions on the territory willing to increase their offer, acquire higher visibility and conquer new 'audiences'; for the citizens of Tuscany, who will have more tools for their training and precious information to know their territory; and for the scientific community, who will be able to count on an interactive environment offering useful resources for the research, such as for example databanks to directly measure the archaeological find.

It will be therefore possible to measure the impact of this project on more targets and will have direct effects on Tuscany Region, also thanks to the Internet worldwideness, which will help draw flows of visitors on the territory and bring clear socio-economic benefits.

Year

2010

Financing

POR FESR 2007 – 2013

Istitutions involved

University of Florence, Faculty of Arts and Philosophy, Department of Ancient, Medieval and Renaissance Studies and Linguistics
University of Florence, Faculty of Architecture, Department of Building and Restoration

Referring Professors for UNIFI

prof. A. M. Jasink



Mare Nostrum: A heritage trail along the Phoenician maritime routes and historic port-cities of the Mediterranean Sea

Subject

The Mediterranean port-cities and their correspondent archaeological sites within the Mediterranean Phoenician routes share a lack of awareness by the local population towards the value of their heritage and the importance of their preservation and a lack of valorisation by the local authorities of the tangible and intangible heritage of their areas of competence.

MARE NOSTRUM intends to contribute to the promotion and awareness-raising of the heritage value of historic port cities of the Mediterranean Sea, scattered along the Phoenician maritime routes.

MARE NOSTRUM aims at providing a sustainable mechanism for the protection and management of cultural heritage resources in the targeted countries, leading to an awareness of cultural heritage in the public conscience. In order to enhance cultural heritage as part of the sustainable development of Mediterranean cultural heritage, the action will adopt a holistic approach which satisfies economic and social objectives as well as high quality cultural tourism needs.

The action, whose main result will be the revitalization of the targeted areas, turning them into places of life for the local people (which is the main target group of the action), enhancing synergies between past and present, will be implemented by a team of project partners

The Mediterranean Phoenician routes are rooted in a lack of awareness by the local population of the value of their heritage and the importance of its preservation and a lack of valorisation by the local authorities of the tangible and intangible heritage of their areas of competence.

From the one side, the port-cities of the Phoenician area of influence involved in the action share a common past of cultural and maritime important centres and/or trading empire covering most of the Mediterranean basin, but with different historical developments. Low emphasis is given to valorisation and sensitization towards issues related to the tangible and intangible heritage, with consequent low impact to the public interest and pride for their own cultural identity: this is mainly due to a lack of acknowledgement by the public authorities of the importance and potentiality of the built heritage and historic urban fabrics while their attention is focused on archaeological sites.

From the other side, the analysis showed weaknesses in the current physical-urban aspect: modern waterfronts are more and more separate from the cities and their collective heritage. More attention is given to the current growth of urban areas than to the preservation of old ones, with a consequent marginalization of traditional architecture and archaeological sites into clusters.

At an economical level an absence of proper, integrated itineraries to guide the tourists in-between the water-city elements and port-archaeological sites causes a wrong vision of the areas.

Waterfronts are not physically and visually accessible for locals and tourists, and internal archaeological sites are plagued by stereotyped holiday packages with a quick off visit to the well-known sites, with a low quality souvenirs.

The specific problems mentioned above and that "MARE NOSTRUM" intends to tackle by the achievement of the specific objectives in the action are strictly linked to the needs and constraints declared by the identified target groups (decision makers within the Public administrations and Port Cities authorities, experts, researches, professors in cultural and architectural heritage, experts and contemporary creators from institutes and NGOs operating in the cultural and handicraft sector, guides and tour operators operating in the local and international tourism sector, teachers and students).

Year

2009

Financing

European Union, Euromed Heritage, ENPI 2008/150-825

Institutions involved

University of Florence, Faculty of Architecture, Department of Building and Restoration

Medieval City Of Rhodes, Greek Partner

City Of Tyre Lebanon Partner

Majal Academic Observatory Lebanon Partner

University Of Balamand & Usj-Université Saint Joseph Lebanon Partner

Referring Professors for UNIFI

prof. C. A. Garzonio



Experimental application of the Directive of the Prime Minister dated 12th October 2007 to assess and reduce cultural heritage seismic risk in the Museo dell'Accademia, Florence

Subject

The Directive of the Prime Minister to assess and reduce the cultural heritage seismic risk dated 12th October 2007 is now the basic methodology in force to carry out seismic controls on architectural artefact belonging to Cultural Heritage.

The Museo dell'Accademia of Florence hosts one of the most important masterpieces of the 16th century sculpture: Michelangelo's David; that is why carrying out the controls planned in this regulation became a priority.

It is an architectural structure dating back to different building periods, which underwent different kinds of additions and transformations that altered its original characteristics, identifying an urban aggregate with a structural behaviour characterised by mutual complexity and integration among its different parts.

In such situations, the identification of the building and its delimitation are particularly important, as well as the identification of the area subjected to verifications, which are possible only on the basis of a suitable cognitive campaign of the building evolution and of what is necessary to detect structural elements and materials and to carry out point definition of structural geometry.

At the moment, there are no data on geological surveys and geomechanical trials, which could be carried out afterwards. We have started a first assessment procedure of the seismic safety of the unit around the David statue.

The convergence of the results coming from the assessment allows formulating a preliminary positive judgement on the total capacity the unit around the Tribuna del David has to resist the seismic action expected on the site. Even though the results on local mechanisms arise some concerns, they are definitely influenced by underestimation of the resistance capacity. They could be re-evaluated after any necessary cognitive integration already highlighted during the periodical meetings on research progress, which took place in the headquarters of the Ministry.

It is essential to extend the study to the entire unit of the Museo dell'Accademia and take into consideration also the interactions with the other three units linked to it, i.e. the Opificio delle Pietre Dure, the Academy of Music Cherubini and the Academy of Fine Arts.

Year

2011

Financing

Soprintendenza Speciale per il Patrimonio Storico, Artistico ed Etnoantropologico (Special Superintendence of Historical, Artistic and Ethno-anthropological Heritage) and the Polo Museale of Florence

Istitutions involved

University of Florence, Faculty of Architecture, Department of Building and Restoration

Referring Professors for UNIFI

prof. M. De Stefano



Tuscan Laboratory of Planetary Sciences – Structural and morphological characterisation of minerals and meteorites covered by planetary sciences and creation of databanks and multimedia tools

Subject

The research project is midway between two (apparently distant) disciplines included in the call for tenders "Public call for tenders for the financing of research contracts within the Regional Operating Programme (P.O.R.) Regional Competitiveness and Employment in Tuscany 2007-2013", i.e.:

a) Knowledge of the universe, space exploration...

b) ...studies on arts and technologies for the protection and valorisation of cultural heritage.

The opportunity offered by this peculiar proposal dealing with multi-disciplinary research is based on to the convergence of interests and scientific expertise of three research institutes present on the territory: University of Florence with the Department of Chemistry of the University of Florence and with the Department of Building and Restoration of Architectural Heritage, the Fondazione Prato Ricerche - Museo di Scienze Planetarie (Museum of Planetary Sciences) of Prato.

The structural analyses will be matched with morphologic analyses carried out through geomatic tools. The construction of 3D models is an essential element for the classification of the materials surveyed, even when it is carried out through the integration of photographic information projected on the surface. The techniques proposed can be applied to the documentation of small objects and offer useful contribution to many disciplines, depending on whether you take into consideration meteorites, samples of materials collected to carry out chemical/physical analyses, objects or fragments of cultural heritage artefacts (fragments of stone facing, frescoed surfaces or paintings made on different supports, pottery, and so on). An important field of application could be the study of contact areas of fragments, aiming at carrying out restoration projects, reassembly of parts, anastylosis. As far as dissemination is concerned, the most innovative web-sharing systems, as well as display and communication systems, can successfully avail themselves of the metric data collected, through processing highlighting their digital and 3D potentialities. The digitisation of the material available (possibly integrated with materials coming from other institutions) will be applied not only as a research and scientific tool – as already said - but it will contribute to the creation of content exploitation systems through multimedia technologies. To that end, we should assess the most suitable formats for material transmission (3D models, photos, documents, etc.) and for "online" or "in situ" use. Virtual reinterpretation of museums and exhibitions can avail itself of the most innovative communication and dissemination tools at the same time, as a means to transmit information and as an interaction tool between users and contents. Therefore, we should plan easy-to-use paths with levels of interactivity that can be adapted every time to the main purposes: didactics, exhibitions, scientific inquiry, and so on. Chronological relationships, geographical criteria or other types of connections could be highlighted. Such a "virtual museum" improves information accessibility, renouncing to the "expropriation" principle, which takes finds away (temporarily or permanently) from their exhibition centres, allowing the reunification of missing pieces. Finally, we will be able to make physical reproductions of some samples with rapid prototyping techniques. We should assess surfacing techniques and the possibility of comparing the weight to the original to reach the highest level of similarity.

Year

2011

Financing

POR FSE 2007-2013

Institutions involved

University of Florence, Faculty of Chemistry, Department of Chemistry

University of Florence, Faculty of Architecture, Department of Building and Restoration

Museum of Planetary Sciences of Prato

Referring Professors for UNIFI

prof. G. Cardini



THE INTERMODAL BIKE - Multi-modal integration of cycling mobility through product and process innovations in bicycle design

Subject

Goals Object of this work is to provide -by means of product and process innovations- an advanced compactable bicycle, making it practical to carry along a bicycle aboard public transportation, easily, safely and for a large number of passengers.

The ultimate goal is a synergic, intermodal integration of public transport and cycling, expanding the share of both modalities in the urban mobility. Drivers Bicycling, very efficient in the short range, but not so on longer distances, could be re-introduced into daily travel to handle the trip s end portions, enhancing the effectiveness of other modalities through an additive effect, re-balancing in a cost-effective way the modal mix in favour of micro-mobility and public transport.

The state of the art does not allow a collective, pervasive use of the folding bikes in intermodal duty, because of excessive weight and volume when collapsed -often exceeding the baggage limits of city bus and metros- discouraging their use out of practicality and safety on board.

The proposed research aims at providing a solution developing a fully engineered, production-ready, new bike typology, based on an innovative concept for a bike frame already tested on mock-ups and working models. The advantage over the state of the art is an unprecedented compactness (factor 6 over common folders) and low weight (factor 3) obtained combining a collapsible, pre-tensioned space-frame with a modern industrial process centered on the use of contemporary engineering plastics. The process innovation will also allow low cost, quality control, opening-closing automation, electric power assistance and last, but not least in a design-conscious world, aesthetic value. The work program will develop a new supply-chain, assembling several application-specific know-how modules of mature and well known technologies, all commonly and economically available. Both direct, project-specific, and extended, broadly applicable results are expected.

Year

2011

Financing

European Union

Istitutions involved

University of Florence, Faculty of Architecture, Department of Architecture and Design Technologies

University of Florence, Faculty of Architecture, Department of Building and Restoration

Referring Professors for UNIFI

prof. F. Tosi



Digital technologies for documentation, management and dissemination of Cultural Heritage

Subject

The project is part of the delicate refurbishment plan of the stately home in its capacity as a museum, which started at the end of the nineties following the preservative and interpretative concept oriented to "allowing visitors to easily understand a complex system of signs, chosen among the infinite possibilities offered by the place, its objects and links". [Coppellotti 2001, page 13].

Besides guided tours by appointment and the traditional web page within the official site of the Polo Museale Fiorentino, there is not a concrete way to communicate with the interested or expected users, in order to transmit the specificity of this particular example of house museum that the Superintendence wants to emphasise. In the last 20 years, huge projects dealing with historical, documentary and archival research, critical survey, interpretation and rendering of the knowledge acquired through many publications have been carried out.

The communication intervention will be structured as follows:

- creation of a didactic tool to use in situ, on a stand-alone station along the visitor path, to deepen the knowledge of the history of the collection, i.e. the surviving core – made of a series of pictures wanted by Senator Niccolò (1715-1782) and his son Marco (1740-1813) and the works historically belonging (in space and time) to the family and their houses starting from 1440s with Roberto Martelli.
- introduction of a virtual tour of the Casa Martelli State Museum inside a dedicated website. This virtual tour should represent a preparatory tool for the real one or a way to describe the place and the story of the family and its collection.

Year

2011

Istitutions involved

Special Superintendence of Historical, Artistic and Ethno-anthropological Heritage and of the Polo Museale of Florence
University of Florence, Faculty of Architecture, Department of Building and Restoration

Referring Professors for UNIFI

prof. G. Tucci



**Details of the didactic and research activities
(2007 - April 2011)**



Post-doctoral research fellowships and contracts

2011

Comparative assessment to assign no. **1** Collaboration contract dealing with the "*Contributo alla elaborazione dei dati rilevati tramite scansioni 3D e fotografia digitale di una porzione delle mura di Pisa*" (*Contribution to the processing of data surveyed with 3D scanning and digital photography of part of the walls of Pisa*), to be carried out at the DiCR – Department of Building and Restoration (Restoration Section). Call for tenders issued through Decree of the Head of the Department no. 20 dated 7.04.2011.

Scientific coordinator: Prof. Grazia Tucci

Assignment of no. **1** contract for a professional/continuative and coordinated collaboration to Mrs. Valentina Bonora, architect, for the programme *Messa a punto di una procedura speditiva per il rilievo metrico di oggetti tridimensionali a grandissima scala* (*Implementation of a running procedure for the metric survey of high-scale 3D objects*), to be carried out at the TAD - Department of Architecture and Design Technologies "Pierluigi Spadolini" (Faculty of Architecture, University of Florence). Call for tenders issued through Decree of the Head of the Department no. 8 dated 07.02.2011.

Scientific coordinator: Prof. Grazia Tucci

2010

Assignment of no. **1** Post-doctoral Research Fellowship, lasting **1** year, to Mr. Francesco Algostino, architect, for the programme "*Studio e sperimentazione di soluzioni innovative per la documentazione metrica tridimensionale di reperti archeologici per la creazione di un museo virtuale (Progetto MUS.INT)*" (*Studies and trials on innovative solutions for 3D metric documentation of archaeological finds to create a virtual museum (Project MUS.INT)*) to be carried out at the DiCR - Department of Building and Restoration (Restoration Section). Call for tenders issued through Decree of the Head of the Department no. 49 dated 22.12.2010.

Scientific coordinator: Prof. Grazia Tucci

Financed by the Tuscany Region

Assignment of no. **1** Collaboration contract, lasting approx. **6** months, to Mrs. Laura Bucalossi, architect, for the following programme: "*Acquisizione e trattamento dati per un rilievo tridimensionale di strutture architettoniche e archeologiche a Tartous in Siria finalizzato alla preparazione di un tour virtuale e di elaborati necessari alla predisposizione di un concorso di progettazione previsto nel Progetto Mare Nostrum*" (*Data acquisition and processing for 3D surveying of architectural and archaeological structures in Tartous – Syria – aiming at preparing a virtual tour and the documents necessary to organise a design course included in the Project Mare Nostrum*)

Scientific coordinator: Prof. Grazia Tucci

Financed by the project Mare Nostrum

Renewal of no. **1** Post-doctoral Research Fellowship, lasting **1** year, to Mrs. Alessia Nobile, architect, for the following programme: *Acquisizione e trattamento dati per un rilievo tridimensionale di strutture architettoniche a doppia calotta: il caso della Basilica dell'Umiltà di Pistoia* (*Data acquisition and processing for 3D surveying of double-domed architectural structures: the case of the Basilica dell'Umiltà in Pistoia*).

Scientific coordinator: Prof. Grazia Tucci

Financed by the University of Florence

2009

Renewal of no. **1** Post-doctoral Research Fellowship, lasting **1** year, to Mrs. Valentina Bonora, architect, for the following programme: *Studio e sperimentazione di soluzioni innovative per la documentazione metrica tridimensionale ed il monitoraggio dei Beni Culturali e del Territorio* (*Studies and trials on innovative solutions for 3D metric documentation and monitoring of Cultural and Territorial Heritage*).

Scientific coordinator: Prof. Grazia Tucci

Co-financed by the University of Florence and the Centro di Ateneo per i Beni Culturali (University Centre for Cultural Heritage)

Renewal of no. **1** Post-doctoral Research Fellowship, lasting **1** year, to Mrs. Alessia Nobile, architect, for the following programme: *Acquisizione e trattamento dati per un rilievo tridimensionale di strutture*



architettoniche a doppia calotta: il caso della Basilica dell'Umiltà di Pistoia (Data acquisition and processing for 3D surveying of double-domed architectural structures: the case of the Basilica dell'Umiltà in Pistoia).

Scientific coordinator: Prof. Grazia Tucci

Financed by the University of Florence

Assignment of no. **1** Collaboration contract, lasting **1** month, to Mrs. Laura Bucalossi, architect, for the following programme: *Predisposizione degli elaborati grafici e del materiale richiesto per la presentazione del progetto "Indagini diagnostiche finalizzate al restauro della copertura lignea della Basilica della Natività a Betlemme" (Preparation of the drawings and material required to present the project "Diagnostic surveys aiming at restoring the wooden cover of the Church of the Nativity in Bethlehem")*.

Scientific coordinator: Prof. Grazia Tucci

2008

Assignment of no. **1** Post-doctoral Research Fellowship, lasting **1** year, to Mrs. Valentina Bonora, architect, for the following programme: *Studio e sperimentazione di soluzioni innovative per la documentazione metrica tridimensionale ed il monitoraggio dei Beni Culturali e del Territorio (Studies and trials on innovative solutions for 3D metric documentation and monitoring of Cultural and Territorial Heritage).*

Scientific coordinator: Prof. Grazia Tucci

Financed by Leica Geosystems

Assignment of no. **1** Post-doctoral Research Fellowship, lasting **1** year, to Mrs. Alessia Nobile, architect, for the following programme: *Acquisizione e trattamento dati per un rilievo tridimensionale di strutture architettoniche a doppia calotta: il caso della Basilica dell'Umiltà di Pistoia (Data acquisition and processing for 3D surveying of double-domed architectural structures: the case of the Basilica dell'Umiltà in Pistoia).*

Scientific coordinator: Prof. Grazia Tucci

Co-financed by the University of Florence and the Superintendence

Assignment of no. **1** Collaboration contract, lasting approx. **7** months, to Mr. Luca Carosso, engineer, for the following programme: *Elaborazione dati da laser scanner per progetto di acquisizione superfici basilica dell'Umiltà a Pistoia, con registrazione delle mesh acquisite e triangolarizzazione (Processing of laser scanning data for surface acquisition in the Basilica dell'Umiltà in Pistoia, with mesh registration and triangulation).*

Scientific coordinator: Prof. Grazia Tucci

Doctoral candidates present in the Laboratory

Alessia Nobile – Research Doctorate in Electronic System Engineering, 25th cycle

Daniela Cini – Research Doctorate in Electronic System Engineering, 25th cycle

Nadia Guardini - Research Doctorate in Materials and Structures for Architecture, 26th cycle



Meetings, Seminars and Workshops

Organisation of the Seminar "*Digital Photogrammetry and 3D Modelling*". 16th March 2011, Sala degli Americani, via Micheli 2, Florence

Organisation of the Study day "*Laser scanner 3D per il rilevamento dei Beni Culturali e del Paesaggio*" (*3D laser scanner for survey in Cultural and Landscape Heritage*). 25th May 2010, Rondò di Bacco, Palazzo Pitti, Florence.

G. Tucci

Geomatica: acquisizione ed elaborazione di modelli 3D per i Beni Culturali (Geomatics: 3D modelling acquisition and processing for Cultural Heritage)

International Week of Cultural and Environmental Heritage, at Salone dei Dugento di Palazzo Vecchio. Florence, 14th November 2010.

G. Tucci, V. Bonora

Il rilievo della Basilica del Santo Sepolcro a Gerusalemme (The survey of the Church of the Holy Sepulchre in Jerusalem)

International Week of Cultural and Environmental Heritage, at Salone dei Dugento in Palazzo Vecchio. Florence, 14th November 2010.

G. Tucci

Nuove tecnologie nella formazione specialistica dei restauratori: il ruolo della geomatica (New technologies in the specialised training of restorers: the role of geomatics)

Salone dell'Arte e del Restauro of Florence, at Stazione Leopolda. Florence, 12th November 2010.

V. Tesi, G. Tucci

Il rilievo 3D per il progetto di restauro della Basilica dell'Umiltà a Pistoia (3D survey for the restoration project of the Basilica dell'Umiltà in Pistoia)

Study Day *Laser scanner 3D per il rilevamento dei Beni Culturali e del Paesaggio (3D laser scanner for survey in Cultural and Landscape Heritage)*, organised by the University of Florence, the Federazione Italiana delle Associazioni Scientifiche per le Informazioni Territoriali e Ambientali and the Soprintendenza per i Beni Architettonici, Paesaggistici, Artistici ed Etnoantropologici for the province of Florence, at Teatro Rondò di Bacco in Palazzo Pitti. Florence, 25th May 2010.

Organisation of the *1° Workshop International de Arquitectura y Urbanismo*

Escuela de Arquitectura de La Rioja - Argentina - Ciudad Universitaria de la Ciencia y de la Técnica
University of Florence, 2009

G. Tucci, V. Bonora, A. Nobile

Geomatic Survey

Scientific seminar *Earthen Domes and Habitats. Villages of Northern Syria: An architectural tradition shared by East and West*, at the National Museum. Aleppo, 26th November 2009.

G. Tucci, A. Nobile

Rilievo 3D di grandi strutture architettoniche (3D survey of big architectural structures)

Focus seminar *Acquisizione 3D: un importante strumento per l'industria, il design e i beni culturali (3D acquisition: an important tool for industry, design and cultural heritage)*, organised by the Information Commission of the Association of Engineers of the province of Pistoia, at the Seminario Vescovile. Pistoia, 20th June 2009.

G. Tucci, V. Bonora, A. Nobile

Nuove tecniche di rilievo per lo studio e il progetto di conservazione della Fortezza di Arezzo (New survey techniques for the study and preservation project of the Fortress of Arezzo).

Meeting *Arezzo e le sue fortificazioni: il recupero della Fortezza e il sistema delle mura urbane (Arezzo and its fortresses: the recovery of the Fortress and the urban wall system)*, organised by the Local government



of Arezzo together with the University of Florence, at the Municipal Theatre Pietro Aretino. Arezzo, 24th April 2009.

G. Tucci, V. Bonora, A. Nobile

Misurare l'irregolare: habitat rupestri e culture costruttive locali nel bacino del Mediterraneo (Measuring irregularities: cliff habitats and local building cultures of the Mediterranean Basin).

Salone dell'Arte e del Restauro e della Conservazione dei Beni Culturali e Ambientali, 16th Edition, FerraraFiere. Ferrara, 25th - 28th March 2009.

Organisation of the Exhibition "*Ipotesi di restauro delle mura di Asciano*" ("*Possible restoration of the Asciano walls*). 27th September 2007, Sala della Mediateca, Asciano (Siena)

Organisation of the Workshop "*Habitat rupestri in area mediterranea: applicazioni di tecniche geomatiche alla tutela e al recupero*" ("*Cliff habitats in the Mediterranean area: application of geomatic techniques to preservation and recovery*). 15th - 20th July 2007, Gravina di Puglia (Bari).

Organisation of the Workshop "*Metodi di rilievo integrati per l'inquadramento e il geo-riferimento di rilievi urbani*" ("*Methods of integrated survey for the classification and geo-referencing of urban surveys*). 30th March - 01st April 2007, Asciano (Siena)

G. Tucci, B. Villa

La presenza ICAR/06 nelle Facoltà di Architettura. (The presence of ICAR/06 in the Faculties of Architecture).

4th National Seminar "Geomatica. La didattica all'inseguimento dell'evoluzione scientifica e tecnologica.

Cosa insegnare, come insegnare" (Geomatics. The didactics chasing scientific and technological evolution.

What to teach, how to teach it), organised by the Associazione Universitari di Topografia e Cartografia.

Pavia, 10th - 11th May 2007.

G. Tucci, L. Bianchini, V. Bonora, S. Nicolodi, A. Nobile

Metodi di rilievo integrati per l'inquadramento e il geo-riferimento di rilievi urbani (Methods of integrated survey for the classification and geo-referencing of urban surveys)

SIFET National Meeting "Dal rilevamento fotogrammetrico ai database topografici" (From photogrammetric survey to topographic databases), Arezzo, 27th - 29th June 2007.



Agreements and research activities

2011

Research project "*Monitoraggio del patrimonio architettonico storico-artistico mediante sensori remoti radar e laser: la Torre del Mangia a Siena*" (*Monitoring of the historical, artistic and architectural heritage through radar and laser remote sensors: Torre del Mangia in Siena*) financed by Fondazione Monte dei Paschi di Siena.

University of Florence

Scientific coordinator: Prof. G. Bartoli

Research project "*Rilievo laser scanner e restituzione grafica della Fontana di Giove del Parco Mediceo di Pratolino*" (*Laser scanning survey and graphic rendering of the Fontana di Giove in the Medici Park in Pratolino*). Contribution given by Istituzione Parco Mediceo di Pratolino.

University of Florence

Istituzione Parco Mediceo di Pratolino

Scientific coordinator: Prof. G. Tucci

Research agreement "*Rilievo laser scanner e restituzione grafica del Gigante dell'Appennino del Parco Mediceo di Pratolino*" (*Laser scanning survey and graphic rendering of the Gigante dell'Appennino in the Medici Park in Pratolino*) drawn up with Istituzione Parco Mediceo di Pratolino.

University of Florence

Istituzione Parco Mediceo di Pratolino

Scientific coordinator: Prof. G. Tucci

Preliminary morphometric study (acquisition and processing of data surveyed through 3D scanning) of a restoration and valorisation project for the fortified system and the architectural promenade in Pisa.

University of Florence

Scientific coordinator: Prof. G. Tucci

Contribution given by C. G. F. Costruzioni di Roma

Research project "*THE INTERMODAL BIKE - Multi-modal integration of cycling mobility through product and process innovations in bicycle design*".

University of Florence

Scientific coordinator: Prof. F. Tosi

Scientific Coordinator of the Geomatics Section: Prof. G. Tucci

University research project (formerly 60% share) "*Sperimentazione di tecniche fotogrammetriche per la caratterizzazione metrica di biciclette*" (*Tests on photogrammetric techniques for metric characterisation of bicycles*).

University of Florence

Scientific coordinator: Prof. G. Tucci

2010

Architectural survey of the Council Chamber for the workshop "*Salone Consiliare di Prato: trasformazione di uno spazio pubblico dal Medioevo alla contemporaneità*" (Council Chamber of Prato: the transformation of a public space from the Middle Ages to modern times)

University of Florence

Scientific coordinator: Prof. G. Tucci

Local government of Prato

POR FESR 2007 – 2013 research project (2008 Regional call for tenders to support joint research projects between groups of companies and research institutes as regards socio-economic and human sciences) - "*Progettazione museologica interattiva: il museo virtuale delle antichità egee e cipriote in Toscana (MUS.INT.)*" (Interactive museum design: the virtual museum of Aegean and Cypriot antiques in Tuscany (MUS.INT.)).

University of Florence

Scientific coordinator: Prof. A. M. Jasink

Scientific Coordinator of the Geomatics Section: Prof. G. Tucci



2009

Research project *"Mare Nostrum: A heritage trail along the Phoenician maritime routes and historic port-cities of the Mediterranean Sea"*

University of Florence

Scientific coordinator: Prof. C. A. Garzonio

Scientific Coordinator of the Geomatics Section: Prof. G. Tucci

Research agreement on *"Rilievo topografico plano-altimetrico e restituzione grafica della rupe del borgo di Pianiano"* (Plano-altimetric topographic survey and graphic rendering of the rock of Pianiano).

University of Florence

Scientific coordinator: Prof. G. Tucci

University research project (formerly 60% share) *"Rilievo topografico, fotogrammetrico e laser scanner della rupe del borgo di Pianiano (VT) a supporto del progetto di consolidamento e conservazione"* (Topographic, photogrammetric and laser scanning survey of the rock of Pianiano (VT) for the consolidation and preservation project).

University of Florence.

Scientific coordinator: Prof. G. Tucci.

"Studi e rilievi del complesso di Sant'Antimo (SI)" (Studies and surveys on the Sant'Antimo complex (SI))

Religious community of Sant'Antimo

University of Florence

Scientific coordinator: Prof. A. Peroni

Scientific Coordinator of the Geomatics Section: Prof. G. Tucci

2008

Research agreement *"Studi e ricerche sulla Fortezza Medicea di Arezzo"* (Studies and researches on the Medici Fortress in Arezzo)

University of Florence

Local government of Arezzo

Scientific coordinator: Prof. G. Tucci, Prof. M. De Vita

Research agreement *"Rilievo strumentale e restituzione grafica della Basilica di Santa Maria dell'Umiltà a Pistoia"* (Instrumental survey and graphic rendering of the Basilica di Santa Maria dell'Umiltà in Pistoia)

University of Florence

Soprintendenza per il Patrimonio Storico Artistico ed Etnoantropologico for the provinces of Florence, Pistoia and Prato

Scientific coordinator: Prof. G. Tucci

European Union Research project *"Culture 2007 - Coupoles et Habitats. Une tradition constructive entre Orient et Occident: les villages de Syrie du Nord"*.

University of Florence (UNIFI and INN-Link, research centre for the innovation of local knowledge systems)

Scientific coordinator: Prof. S. Mecca

Scientific Coordinator of the Geomatics Section: Prof. G. Tucci

International project on scientific research and training activity *"Patrimonio culturale e architettonico nel centro storico Icheri Sheher di Baku"* (Cultural and architectural heritage in the city centre Icheri Sheher in Baku).

University of Florence (UNIFI and INN-Link, research centre for the innovation of local knowledge systems)

Azerbaijan Architecture and Construction University (AzUAC)

Italian Ministry of University and Research (MIUR) on cultural and natural world heritage

Scientific coordinator: Prof. S. Mecca

Scientific Coordinator of the Geomatics Section: Prof. G. Tucci

University research project (formerly 60% share) *"Rilievi e documentazione di superfici musive a supporto del progetto di conservazione: il caso del Mausoleo del Sultano al-Zahir Baybars in Damascus"* (Surveys and documentation on mosaic surfaces for the preservation project: the case of the Mausoleum of the Sultan al-Zahir Baybars in Damascus).

University of Florence

Scientific coordinator: Prof. G. Tucci



Research agreement "*Rilievi degli scavi archeologici presso la chiesa di Sant'Antimo*" (*Surveys on the archaeological excavations in the Church of Sant'Antimo*)

Religious community of Sant'Antimo

Soprintendenza per i Beni Architettonici e per il Paesaggio for the Provinces of Siena e Grosseto

Soprintendenza per il Patrimonio Storico Artistico ed Etnoantropologico for the provinces of Siena and Grosseto

Soprintendenza per i Beni Archeologici of Tuscany

University of Florence

Scientific coordinator: Arch. R. Sabelli

Scientific Coordinator of the Geomatics Section: Prof. G. Tucci

2007

Research project "*Monitoraggio del rischio sismico presso la Basilica del Santo Sepolcro a Gerusalemme*" (*Monitoring of the seismic risk in the Church of the Holy Sepulchre in Jerusalem*).

CABEC – Centro di Ateneo per i Beni Culturali (University Centre for Cultural Heritage) - University of Florence, scientific coordinator:

Prof. P. Malesani

Franciscan Custody of the Holy Land

University of Florence

Scientific coordinator: Prof. P. Malsani (Centro di Ateneo per i Beni Culturali - University Centre for Cultural Heritage)

Scientific Coordinator of the Geomatics Section: Prof. G. Tucci

3D survey of the Grotto of Annunciation in Nazareth within the investigations aiming at restoration.

University of Florence

Scientific coordinator: Prof. P. Malsani (Centro di Ateneo per i Beni Culturali - University Centre for Cultural Heritage)

Scientific Coordinator of the Geomatics Section: Prof. G. Tucci

University research project (formerly 60% share) "*Metodi integrati per il rilievo e il georiferimento di aree urbane: il centro storico di Asciano (Siena)*" (*Integrated methods for the survey and geo-referencing of urban areas: the city centre of Asciano (Siena)*)

Local government of Asciano

University of Florence

Scientific coordinator: Prof. G. Tucci

Research project "*Scansioni laser e ortofoto di precisione per il controllo e la manutenzione del rivestimento lapideo delle facciate del Campanile di Giotto (Firenze)*" (*Laser scanning and precision orthophotos to control and maintain the stone covering the façades of Giotto's Campanile (Florence)*).

Opera del Duomo of Florence

University of Florence

Scientific coordinator: Prof. G. Tucci

In charge of the research project on the construction of reduced-scale and full-scale prototypes of a statue of the Prophet in the Museo dell'Opera del Duomo of Florence

Opera del Duomo of Firenze

University of Florence

Scientific coordinator: Prof. G. Tucci

Framework agreement between DiCR (formerly DIRES) and Leica Geosystems

Leica Geosystems S.p.A.

University of Florence

Representative and coordinator: Prof. G. Tucci

Research agreement "*Rilievo e documentazione della cinta muraria e del centro storico di Asciano*" (*Survey and documentation of the walls of the city centre of Asciano*)

Local government of Asciano

University of Florence

Scientific coordinator: Prof. G. Tucci

Research agreement "*Realizzazione di uno stage nell'ambito dei corsi di topografia e fotogrammetria urbana sul rilevamento di insediamenti rupestri*" (*Organisation of an internship on cliff dwellings within the courses in topography and urban photogrammetry*)

Local government of Gravina di Puglia (BA)

University of Florence



Scientific coordinator: Prof. G. Tucci

Research agreement "*Perugia da vedere e da toccare*" (*Perugia: a city to see and touch*)

Local government of Perugia

University of Florence

Scientific coordinator: Prof. C. A. Grazonio

Scientific Coordinator of the Geomatics Section: Prof. G. Tucci

Research agreement "*Habitat rupestri in area mediterranea*" (*Cliff habitats in the Mediterranean area*)

Local government of Gravina di Puglia (BA)

University of Florence.

Scientific coordinator: Prof. G. Tucci



Studies and surveys

2011

Corso Vittorio Emanuele in Piombino (Livorno): gps, topographic, photogrammetric and laser scanning survey

Within the module Elements of photogrammetry and remote sensing of the Land and Environmental Planning Laboratory, Degree Course in Town, land and landscape Planning.
University of Florence – Interfaculty of Architecture and Agricultural Science

Magi Chapel in Florence: photogrammetric and laser scanning survey

University of Florence
Research carried out in collaboration with Prof. G. Centauro

Dome of the Basilica of San Vitale in Ravenna: topographic, gps and laser scanning survey

University of Florence
Research carried out in collaboration with Mrs. N. Lombardini, architect - Polytechnic University of Milan – Faculty of Civil Architecture

2010

Medici bridge on the river Sieve in Pontassieve (Florence): topographic, laser scanning and photogrammetric survey

University of Florence
Research carried out in collaboration with Prof. M. De Vita

Fountain in Piazza IV Novembre, Perugia: laser scanning survey

University of Florence
Local government of Perugia

Chiostro della Badessa in S. Apollonia, Florence: topographic and laser scanning survey

Within the courses on Laboratory for Architectural Survey (Degree course in Architectural Sciences) and Geomatics for Cultural Heritage preservation (Degree course in Architecture)
University of Florence - Faculty of Architecture

Part of the wall between Porta San Zeno and Bastione del Parlascio, Pisa: topographic, photogrammetric and laser scanning survey

Within the call for tenders issued by Rete Civica Pisana: Restoration and valorisation works of the Fortified system and the architectural promenade (app. 24/10)
University of Florence
C. G. F. Costruzioni of Rome

Cathedral of San Nicola of Bari in La Rioja (Argentina), topographic and laser scanning survey

Within the Primer Curso Internacional de Postgrado de "Geomática para la Conservación Edilizia de Bienes Culturales"
University of Florence
Departamento Académico de Ciencias y Tecnologías Aplicadas a la Producción, al Ambiente y al Urbanismo
Escuela de Arquitectura de la Universidad Nacional de La Rioja

Church of Santo Domingo in La Rioja (Argentina), photogrammetric and laser scanning survey

Within the Primer Curso Internacional de Postgrado de "Geomática para la Conservación Edilizia de Bienes Culturales"
University of Florence
Departamento Académico de Ciencias y Tecnologías Aplicadas a la Producción, al Ambiente y al Urbanismo
Escuela de Arquitectura de la Universidad Nacional de La Rioja

Promenade overlooking an archaeological area in Tyre (Lebanon): topographic, photogrammetric and laser scanning survey of external prospects

For the project Euromed Heritage IV "Mare Nostrum - A Heritage Trail along the Phoenician maritime routes and historic port-cities of the Mediterranean Sea"
University of Florence

Traversa Capitani on the Torrent Pesa in Montelupo Fiorentino (Florence): laser scanning survey

For the Consorzio di Bonifica per la difesa del suolo e la tutela dell'ambiente della Toscana Centrale (Land-improvement Consortium for soil protection and environmental protection in Central Tuscany).

Central courtyard or "Cortile del Richini" at Cà Granda, Milan: topographic and laser scanning survey



Research carried out in collaboration with Prof. S. Bortolotto and L. Toniolo – Polytechnic University of Milan - Faculty of Civil Architecture

Archaeological excavation in Erimi-Laonin tou Porakou (Limassol - Cyprus): laser scanning survey

Project carried out in collaboration with Prof. A. M. Jasink - University of Florence – Faculty of Arts and Philosophy

Etruscan walls of Torricella in Volterra (Pisa): second campaign - topographic, photogrammetric and laser scanning survey

Research carried out in collaboration with Prof. R. Sabelli - University of Florence - Faculty of Architecture

Archaeological finds of Aegean and Cypriot antiques in Tuscany (Archaeological Museum of Florence, Archaeological Museum of Cortona and Archaeological Museum of Montelupo): survey carried out with an optical triangulation scanner

Research carried out in collaboration with Prof. A. M. Jasink - University of Florence - Faculty of Arts and Philosophy

Church of S. Andrea in Stiffe (L'Aquila): topographic, photogrammetric and laser scanning survey

For the 2nd level master's degree in "Restoration, Maintenance, Safety of Historical and Monumental Buildings" – Authorisation pursuant to Leg. Decree 81/08 – Academic Year 2009 – 2010

Head of the course: Prof. G. Centauro - University of Florence - Faculty of Architecture

Citadel in Tartous (Syria): part of the city wall, urban fabric, tunnels and the Crusader's Chapel: topographic, photogrammetric and laser scanning survey

Euromed Heritage IV Project "Mare Nostrum - A Heritage Trail along the Phoenician maritime routes and historic port-cities of the Mediterranean Sea".

Buontalenti Chapel and Paggeria (page's residence) of the Medici Park in Pratolino (Vaglia – Florence): topographic, gps and laser scanning survey

Within the 1st Postgraduate Course in "Geomatics for Cultural Heritage Preservation – Digital photogrammetry, 3D scanning and thermography" (10 CFU)

University of Florence - Faculty of Architecture

Council Chamber in Prato: laser scanning survey

Research carried out in collaboration with Prof. G. A. Centauro - University of Florence - Faculty of Architecture

Local government of Prato

Borgo S. Lorenzo and S. Piero a Sieve (Florence): gps survey of the points of support for aerial photogram orientation

Research carried out in collaboration with Prof. I. Chiaverini and Mr. P. Aminti (engineer) - University of Florence – Faculty of Engineering

Waldensian Church in Florence: topographic, photogrammetric and laser scanning survey of the outside

Within the course in Geomatics for Cultural Heritage Preservation

University of Florence - Faculty of Architecture

Part of a block of houses next to Piazza S. Marco and Piazza SS. Annunziata in Florence: topographic and photogrammetric survey of external prospects

Within the course in Laboratory for Architectural Survey, Degree Course in Architectural Sciences

University of Florence - Faculty of Architecture

2009

Palazzo Gondi in Florence: laser scanning survey of the main façade

Research carried out in collaboration with Prof. M. Scalzo - University of Florence - Faculty of Architecture

Rock of Pianiano (Viterbo): topographic, gps and laser scanning survey

Within the research agreement "Rilievo topografico plano-altimetrico e restituzione grafica della rupe del borgo di Pianiano" (Plano-altimetric topographic survey and graphic rendering of the rock of Pianiano)

Hypogeum of S. Maria in Stelle in Valpantena (Verona): laser scanning survey.

Research carried out in collaboration with Prof. L. Marino - University of Florence - Faculty of Architecture

Rocca Silvana in Castell'Azzara (Grosseto): topographic and laser scanning survey.

Research carried out in collaboration with Prof. C. A. Garzonio - University of Florence - Faculty of Architecture

Etruscan walls of Torricella in Volterra (Pisa): first campaign - topographic and laser scanning survey.



Research carried out in collaboration with Mr. R. Sabelli, architect - University of Florence - Faculty of Architecture

Church of S. Egidio in Florence: laser scanning survey of the choir vault.

Research carried out in collaboration with Mr. P. Matracchi, architect - University of Florence - Faculty of Architecture

Oratory of S. Girolamo and S. Maria Maddalena de' Pazzi inside Villa di Parugiano in Bagnolo di Montemurlo (Prato): topographic, laser scanning, thermographic and photogrammetric survey.

Research carried out in collaboration with Prof. G. Centauro - University of Florence - Faculty of Architecture

2008

Medieval castle of Bivona (Vibo Valentia): topographic, laser scanning and photogrammetric survey.

Project carried out in collaboration with:

studio SPIRA s.r.l.

Local government of Vibo Valentia.

Church of the Holy Sepulchre in Jerusalem (Israel): third campaign - topographic, gps and laser scanning.

Project carried out in collaboration with Prof. P. Malesani - University of Florence - Centro di Ateneo per i Beni Culturali (Centro di Ateneo per i Beni Culturali - University Centre for Cultural Heritage)

Franciscan Custody of the Holy Land

Furnace in Montelupo (Florence): topographic, laser scanning and photogrammetric survey.

Research carried out in collaboration with Prof. R. Parenti - University of Florence - Faculty of Arts and Philosophy

Medici Fortress in Arezzo: topographic, laser scanning and photogrammetric survey.

Project carried out in collaboration with the Local Government of Arezzo.

Mausoleum of the Sultan al-Zahir Baybars in Damascus (Syria): topographic, laser scanning and photogrammetric survey.

Earthen cliff villages in Syria: topographic, laser scanning and photogrammetric survey.

Research project of the European Union Culture 2007 "Coupoles et Habitats. Une tradition constructive entre Orient et Occident: les villages de Syrie du Nord".

Scientific coordinator: Prof. S. Mecca

University of Florence - Faculty of Architecture

Block of houses in the city centre Icheri Sheher in Baku (Azerbaijan): topographic and photogrammetric survey.

International project on scientific research and training activity "Cultural and Architectural Heritage in the city centre Icheri Sheher in Baku".

Scientific coordinator: Prof. S. Mecca

University of Florence - Faculty of Architecture

Basilica della Madonna dell'Umiltà in Pistoia: topographic, laser scanning, gps, thermographic and photogrammetric survey.

Project carried out in collaboration with the Soprintendenza per i Beni Architettonici, Paesaggistici, Artistici ed Etnoantropologici for the provinces of Florence, Pistoia and Prato.

Medici port of Livorno: topographic survey.

Research carried out in collaboration with Mr. A. Merlo, architect - University of Florence - Faculty of Architecture

2007

Church of the Holy Sepulchre in Jerusalem (Israel): second campaign - topographic, gps and laser scanning survey

Project carried out in collaboration with Prof. P. Malesani - University of Florence - Centro di Ateneo per i Beni Culturali (University Centre for Cultural Heritage)

Franciscan Custody of the Holy Land.

Grotto of Annunciation in Nazareth (Palestine): topographic and laser scanning survey aiming at seismic risk assessment

Project carried out in collaboration with Prof. P. Malsani - University of Florence - Centro di Ateneo per i Beni Culturali (University Centre for Cultural Heritage)

Franciscan Custody of the Holy Land



Roman marble cave of Carrara in Fossacava di Colonnata (Massa): topographic and laser scanning survey.
Research carried out in collaboration with Prof. C. A. Garzonio - University of Florence - Faculty of Architecture

Medieval bastion of Gravina di Puglia (Bari): topographic survey and digital straightening of façades, aiming at the metric and pathologic characterisation of surfaces and the progressive documentation of intervention stages

Project carried out in collaboration with:
studio SPIRA s.r.l.
Local government of Gravina di Puglia

City wall of Asciano (Siena): topographic and stratigraphic survey, location plan with gps tools, vectorial rendering and digital straightening

Project carried out in collaboration with the local Government of Asciano

Cliff area of Gravina di Puglia (Bari): topographic and laser scanning survey, analysis of the local building characters and vectorial rendering

Project carried out in collaboration with the local Government of Gravina di Puglia

Giotto's Campanile in Florence: 3D scanning and orthophotos

Project carried out in collaboration with the Opera del Duomo of Florence

Topographic polygon for gauging and validation of other measurement, design, construction and calculation systems (Turin)

Project carried out in collaboration with:
Prof. G. Barbato - Polytechnic University of Turin - Centro per la Qualità (Centre for Quality)
SEPA

Piazza Sant'Agostino in Arezzo: urban survey

Project carried out in collaboration with the Local government of Arezzo.



Publications (since 2007)



2011

G. Tucci, A. Nobile, M. Riemma

The Basilica della Madonna dell'Umiltà in Pistoia: survey, analysis and documentation of the dome.

Abstract accepted to the 23rd International CIPA Symposium. Prague, September 12th – 16th, 2011

G. Tucci, D. Cini, A. Nobile

Effective 3D digitization of archaeological artefacts for interactive virtual museum.

Proceedings of the ISPRS, International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences, 4th International Workshop 3D-ARCH 2011: 3D Virtual Reconstruction and Visualization of Complex Architectures. Trento, March 2nd – 4th, volume XXXVIII-5/W16, ISSN 1682-1777, awaiting publication.

G. Tucci, V. Bonora

From real to... "real". A review of geomatic and rapid prototyping techniques for solid modelling in cultural heritage field.

Proceedings of the ISPRS, International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences, 4th International Workshop 3D-ARCH 2011: 3D Virtual Reconstruction and Visualization of Complex Architectures. Trento, March 2nd – 4th, volume XXXVIII-5/W16, ISSN 1682-1777, awaiting publication.

G. Tucci, L. Bombardieri, A. Conti, L. Fiorini

3D survey of the Early-Middle Bronze Age Workshop Complex and cemetery area at Erimi-Laonin tou Porakou (Cyprus)

Proceedings of the ISPRS, International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences, 4th International Workshop 3D-ARCH 2011: 3D Virtual Reconstruction and Visualization of Complex Architectures. Trento, March 2nd – 4th, volume XXXVIII-5/W16, ISSN 1682-1777, awaiting publication.

2010

G. Tucci, A. Nobile, M. Riemma

Laser scanner surveys and the study of the geometry and structure of the dome in the Basilica della Madonna dell'Umiltà in Pistoia.

Abstract accepted; International Scientific Conference "Domes In The World". Florence, November 3rd – 6th, 2011.

G. Tucci, V. Bonora, N. Crocetto, A. Nobile, L. Al Turk

Rilievi e documentazione di superfici musive a supporto del progetto di conservazione: il caso del Mausoleo del Sultano al-Zahir Baybars in Damascus (Surveys and documentation on mosaic surfaces for the preservation project: the case of the Mausoleum of the Sultan al-Zahir Baybars in Damascus).

Acts of the First International Meeting "Ravenna Musiva. Conservazione e Restauro del Mosaico Antico e Contemporaneo", Ravenna, 22nd – 24th October 2009. ISBN 978-88-7849-054-3. Pages: 441 – 451. Bologna, Ante Quem. 2010.

G. Tucci, F. Algostino, L. Bucalossi, A. Conti, A. Nobile

Cultural Heritage and Sustainable Valorization in the Governorate of Tartous with Reference to the Euromed IV Project: The Contribution of Geomatics.

Proceedings of EuroMed 2010, Third International Euro-Mediterranean Conference "Digital Heritage", Limassol, Cyprus, November 8th – 13th, 2010, LNCS 6436 (Editors: M. Ioannides, D. Fellner, A. Georgopoulos, D. G. Hadjimitsis), ISBN-13 978-3-642-16872-7. Pages: 399 – 408. 2010.

G. Tucci, A. Nobile, G. Ridolfi, L. Papacchini

La rupe tufacea di Pianiano (VT): dal rilievo integrato al progetto di consolidamento dei centri abitati instabili (The tuffaceous rock of Pianiano (VT): from the integrated survey to the consolidation project of instable built-up areas)

Acts of the 14th ASITA National Conference. Brescia, 9th - 12th November 2010. ISBN 978-88-903132-5-7. Pages: 1649 – 1654. 2010.

A. Conti, L. Fiorini, A. Nobile, G. Tucci

La Cappella e la Paggeria del Parco mediceo di Pratolino: un caso studio per il workshop del Corso di perfezionamento in Geomatica per la Conservazione dei Beni Culturali dell'Università degli Studi di Firenze.



(The Chapel and the Paggeria of the Medici Park in Pratolino: a case study for the workshop of the Postgraduate Course in Geomatics for Cultural Heritage Preservation of the University of Florence).
Acts of the 14th ASITA National Conference. Brescia, 9th - 12th November 2010. ISBN 978-88-903132-5-7.
Pages: 643 – 648. 2010.

G. Tucci, V. Bonora

Il rilievo della Basilica del Santo Sepolcro a Gerusalemme (The survey of the Church of the Holy Sepulchre in Jerusalem)

Acts of the 14th ASITA National Conference. Brescia, 9th - 12th November 2010. ISBN 978-88-903132-5-7.
Pages: 1643 – 1648. 2010.

G. Tucci, F. Algostino, V. Bonora, L. Bucalossi, D. Cini, A. Conti, L. Fiorini, A. Nobile, L. Menci, F. Ceccaroni, D. Bianchini, M. Ghezzi

Musealizzazione Virtuale. Esperienze di rilievo e modellazione 3D per un allestimento interattivo e accessibile da Web (Virtual Museumification. Survey and 3D modelling for a web-accessible interactive exhibition).

Archeomatica, year 1, no. 3 (September 2010). ISSN 2037-2485. Pages: 30 – 33. Edizioni A&C2000 s.r.l. 2010.

G. Tucci, V. Bonora, A. Conti, L. Fiorini, A. Nobile

Il rilievo integrato: occasione di approfondimento ed aggiornamento Professionale (Integrated survey: close examination and professional update).

Archeomatica, year 1, no. 3 (September 2010). ISSN 2037-2485. Pages: 38 – 41. Edizioni A&C2000 s.r.l. 2010.

G. Tucci, A. Nobile, V. Bonora

Surveying hypogeous structures: the case study of Santa Maria in Stelle in Valpantena.

Proceedings of VAST 2010, 11th International Symposium "Virtual reality, Archeology and Cultural Heritage". Paris, September 21st – 24th, awaiting publication.

2009

G. Tucci, V. Bonora, A. Nobile, K. Tokmakidis

Geomatic methods of surveying.

In: S. Mecca, L. DiPasquale (by), *Earthen Domes and Habitats. Villages of Northern Syria: An architectural tradition shared by East and West*, ISBN 978-884672535-6. Pages: 157 – 162. Pisa, Edizioni ETS 2009.

G. Tucci, V. Bonora, A. Nobile, K. Tokmakidis

Surveying and documenting corbelled dome architectures.

In: S. Mecca, L. DiPasquale (by), *Earthen Domes and Habitats. Villages of Northern Syria: An architectural tradition shared by East and West*, ISBN 978-884672535-6. Pages: 296 – 311. Pisa, Edizioni ETS 2009.

G. Tucci, V. Bonora, A. Nobile

Rilievo 3D per lo studio della morfologia e delle tracce di lavorazione di una cava storica (3D survey to study the morphology and processing traces of an historical cave).

Acts of the 13th ASITA National Conference. Bari, 1st - 4th December 2009, ISBN 978-88-903132-2-6.
Pages: 1803 – 1808. 2009.

G. Tucci, V. Bonora, N. Crocetto, A. Nobile

Misurare l'irregolare: applicazioni della geomatica alla tutela e al recupero di un habitat rupestre a Gravina in Puglia (Measuring irregularities: application of geomatics to preserve and restore a cliff habitat in Gravina in Puglia).

Acts of the 13th ASITA National Conference. Bari, 1st - 4th December 2009, ISBN 978-88-903132-2-6.
Pages: 1809 – 1814. 2009.

G. Tucci, V. Bonora, A. Nobile

Innovative survey methods for the digital documentation of Vernacular Architectural Heritage in Syria.



Proceedings of the 22nd CIPA International Symposium "Digital Documentation, Interpretation & Presentation of Cultural Heritage". Kyoto, Japan, October 11th - 15th, 2009, ISSN 0256-1840. Pages 1 – 6. 2009.

G. Tucci, V. Bonora, N. Crocetto, A. Nobile
New technologies for surveying building ruins.

Proceedings of the 22nd CIPA International Symposium "Digital Documentation, Interpretation & Presentation of Cultural Heritage". Kyoto, Japan, October 11th - 15th, 2009, ISSN 0256-1840. Pages 1 – 6. 2009.

G. Tucci, V. Bonora
Teaching geomatics.

Proceedings of the 22nd CIPA International Symposium "Digital Documentation, Interpretation & Presentation of Cultural Heritage". Kyoto, Japan, October 11th - 15th, 2009, ISSN 0256-1840. Pages 1 – 6. 2009.

2008

A. Peroni, G. Tucci (by)
Nuove ricerche su Sant'Antimo (New researches on Sant'Antimo)
AA.VV. ISBN 978-88-6055-198-6. Florence, ALINEA 2008

G. Tucci
Geomatica e Patrimonio Culturale (Geomatics and Cultural Heritage)

In: A. Peroni, G. Tucci (by), Nuove Ricerche su Sant'Antimo (New researches on Sant'Antimo), ISBN 978-88-6055-198-6. Pages: 119-121. Florence, ALINEA 2008

V. Bonora, G. Tucci
Strumenti e metodi di rilievo integrato (Integrated surveying tools and methods)

In: A. Peroni, G. Tucci (by), Nuove Ricerche su Sant'Antimo (New researches on Sant'Antimo), ISBN 978-88-6055-198-6. Pages: 123-134. Florence, ALINEA 2008

G. Tucci, V. Bonora, S. Moretti, D. Ostuni
Nuovi rilievi per l'abbazia di Sant'Antimo (New surveys on Sant'Antimo abbey)

In: A. Peroni, G. Tucci (by), Nuove Ricerche su Sant'Antimo (New researches on Sant'Antimo), ISBN 978-88-6055-198-6. Pages: 135-145. Florence, ALINEA 2008

V. Bonora, G. Cruciani Fabozzi, G. Tucci
The use of 3D Scanning and Rapid Prototyping for the Documentation, Conservation and Communication of Archaeological Remains: a Recent Experience in the Sanctuary of S. M. del Lavello (Lecco, Italy) DMACH 2008 Conference "Digital Media and its Applications in Cultural Heritage", Petra University, Amman, Jordan, 3rd-6th November 2008 ISBN 978-9957-8602-5-7. Pages: 12-23. 2008

2007

V. Bonora, G. Tucci
Campanile di Giotto (Giotto's Campanile)

In: M. Bini, C. Battini (by), Nuove Immagini di monumenti fiorentini. Rilievi con tecnologia scanner laser 3D (New images of Florentine monuments. Survey through 3D laser scanning technology), ISBN 978-88-6055-232-7. Pages: 48-49. Florence, ALINEA 2007

V. Bonora, G. Tucci
The Rucellai Chapel and the Tempietto del Santo Sepolcro

In: M. Bini, C. Battini (by), Nuove Immagini di monumenti fiorentini. Rilievi con tecnologia scanner laser 3D (New images of Florentine monuments. Survey through 3D laser scanning technology), ISBN 978-88-6055-232-7. Pages: 68-69. Florence, ALINEA 2007

G. Tucci
Introduzione (introduction)



In: G. Tucci, F. Sacerdote (by), *Sistemi a scansione per l'architettura e il territorio (Scanning systems for architecture and the territory)*, ISBN 978-88- 6055-119-1. Pages: 11-12. Florence, ALINEA 2007

V. Bonora, G. Tucci

Il laser scanner terrestre e il rilievo dei Beni Culturali (Terrestrial laser scanner and Cultural Heritage survey)

In: F. Sacerdote, G. Tucci (by), *Sistemi a scansione per l'architettura e il territorio (Scanning systems for architecture and the territory)*, ISBN 978-88-6055-119-1. Pages: 89-123. Florence, ALINEA 2007

V. Bonora, F. Rinaudo, G. Tucci

Il campanile di Giotto. Scansioni laser e ortofoto di precisione per il controllo e la manutenzione del rivestimento lapideo delle facciate (Giotto's Campanile. Laser scanning and precision orthophotos to monitor and maintain the stone covering the façades)

Acts of the 11th ASITA National Conference, Turin, 6th-9th November 2007, Vol. 1. Pages: 453-458. 2007

G. Tucci, V. Bonora

Application of high resolution scanning systems for virtual moulds and replicas of sculptural works

Proceedings of the 21st CIPA International Symposium "AntiCIPAting the future of the cultural past", 1st-6th Oct. 2007, Athens, Greece, Vol. 1. International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Vol. XXXVI, Part 5/C53. ISSN: 1682-1750. CIPA International Archives for Documentation of Cultural Heritage, Vol. XXI - 2007. ISSN: 0256-1840. Pages: 721-726. 2007

F. Sacerdote, G. Tucci (by)

Sistemi a scansione per l'architettura e il territorio (Scanning systems for architecture and the territory)

ISBN 978-88-6055-119-1. Authors: F. Rinaudo, A. Guarnieri, A. Vettore, D. Vicentini, V. Bonora, G. Tucci, M. Bini, G. Forlani. Florence, ALINEA 2007

