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Department of
Town Planning and Housing
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Republic of Cyprus

Understanding the economic Impact of cultural heritage
Better investments through improved evidence collection

The Valorisation of Cultural Heritage in the Italian National and Regional Agenda.

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MTR RIS3 TOSCANA
MID-TERM REVIEW

2014 2020 POR CreO
PROGRAMMA OPERATIVO REGIONALE
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CULTURAL HERITAGE: AN EXPANDING CONCEPT

In the last decades of the 20th century, the term "**Cultural Heritage**" was characterised by great expansion and semantic transfer. As for the first aspect, the term has enlarged from the initial meaning of **historic monuments and artworks** to the inclusion of **new fields of conservation** (historic cities, historic gardens and landscapes) up to **intangible assets** (customs, practices, values). Besides that, a new idea of cultural value has spread, based no longer on the objects' intrinsic quality, but rather on the community's recognition of these tangible and intangible assets as part of its **cultural identity** (VECCO, 2010).
The last conception has been strongly reaffirmed in the so-called "Faro Convention" (COUNCIL OF EUROPE FRAMEWORK CONVENTION ON THE VALUE OF CULTURAL HERITAGE FOR SOCIETY, CETS NO. 199_2005).

So we can affirm that nowadays, **cultural heritage is "the expression of the ways of living developed by a community and passed on from generation to generation, including buildings, places, objects, artistic expressions and values"** (ICOMOS, 2002).

In operational terms, cultural heritage is commonly distinguished in:
• **Built Environment** (Buildings, Townscapes, Archaeological remains)
• **Natural Environment** (Rural landscapes, Coasts and shorelines, Agricultural heritage)
• **Artefacts** (Books & Documents, Objects, Pictures, Sculptures)

The **policies for the cultural heritage** include actions for **protection, valorisation and participation**. They also attain to identity, social cohesion and wellbeing (EUROPEAN CULTURAL AGENDA, 2018).

CULTURAL HERITAGE IN THE ITALIAN LEGISLATION

The main reference is the **"Code of Cultural Heritage and Landscape"** (Leg. D. 42/2004)

General principles:

- The protection and valorisation of cultural heritage contribute to **preserve the memory** of the national community;
- The **State**, the **Regions** and **Local Authorities** support the conservation of the cultural heritage and favour its public fruition and valorisation;
- **Private owners** of assets belonging to the cultural heritage are obliged to guarantee their preservation and to organize fruition and valorisation activities in compliance with the protection legislation;
- The **conservation** of cultural heritage is a **matter of exclusive competence of the** State, while the **valorisation** is a matter of **cooperation between the State and the Regions**.

The notion of cultural heritage:

- Cultural heritage includes cultural and landscape assets;
- Cultural assets are immovable and movable things that present artistic, historical, archaeological, ethno-anthropological, archival and bibliographic interests, identified by law as testimonies of civilization;
- Landscape assets include buildings and areas that constitute the expression of the historical, cultural, natural, morphological and aesthetic values of the territory, identified by law.

CULTURAL HERITAGE IN ITALIAN AGENDA

The National **Ministry for Cultural Assets and Activities** (MiBACT) develops institutional actions to promote culture, European cultural cooperation and European Citizenship, through European Union Programmes (EUROPE FOR CITIZENS, FOCUS POINT EUROPEAN HERITAGE BRAND, FOCUS POINT EUROPEAN CULTURAL CAPITALS, CULTURAL CONTACT POINT - CCP ITALY, CREATIVE EUROPE DESK ITALY - CULTURE OFFICE).

The MiBACT coordinates and programs EU and National Funds, elaborating multi-year programs and strategic plans. The **European Structural Funds** are one of the most important financing sources.

The most relevant programs are:
* National Operational Program on Culture and Development 2014-2020 (ERDF)
* National Operational Plan on Culture, Tourism and Creativity Supply Chain 2014-2020
* Complementary Action and Cohesion Program 2014-2020
* National Strategic Plan for Big Projects on Cultural Heritage 2015-2018

Special attention to culture is devoted also by the **Ministry of Education, University and Research** (MIUR), especially in the **National Research Plan 2015-2020.**
The Plan is intended as a platform designed to guide Italy's industrial competitiveness and development through the instruments of knowledge. Based on the analysis of the strengths and weaknesses of the Italian research system, the document identifies 12 specialization areas with the aim to prioritize the most promising initiatives in applied research. The **Cultural Heritage** is considered **"a high potential technological area"**, **in which Italy has distinctive assets or competences**, to be supported to increase its industrial impact.

CULTURAL HERITAGE IN ITALIAN AGENDA

The 2014-2020 programming cycle of the cohesion policy, to ensure an effective use of European resources, has introduced the "ex ante conditionalities", understood as requirements and preconditions to be met for the use of the funds. For the R&I policies, this precondition resulted in the request to each administration owner of an Operational Program to have an **Smart Specialization Strategy** (**S3**).

In Italy, the elaboration of **21 regional S3 documents** (or RIS3) has allowed a recognition of the competences available in the territories, of the emerging technological fields and of the opportunities of application to the productive sectors.

The S3 identifies - for each territory - the **competitive advantages** and **technological specializations** most consistent with their respective potential for innovation, specifying the financial resources necessary for their activation and expressing transversal intervention strategies with respect to the programming tools.
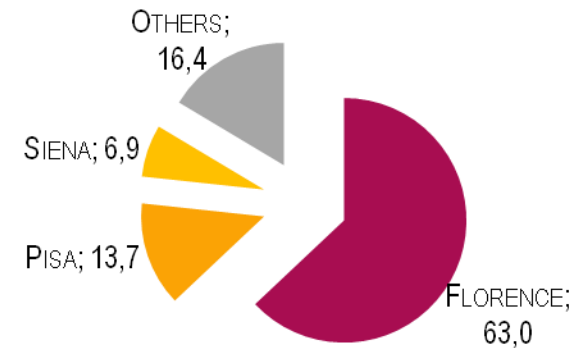
"Technologies for the Cultural Heritage" have been selected as one of the 12 priority areas for future development. The National Smart Specialization Strategy, has then summarized the regional indications in 5 national thematic areas of specialization, of which one is "**Tourism, Cultural Heritage and Creative Industry**".

TUSCANY: A SHORT PRESENTATION

	ITALY	TUSCANY	% TOSCANY ON ITALY
Population 2018	60,483,973	3,736,968	6.2%
Tourists in Art Cities 2017	110,046,581	18,482,411	16.8%
% Tourists in art cities on total 2017	26.2%	39.8%	-
Museums' visitors 2017	119,069,134	21,686,235	18.2%
Open museums 2017	4,889	528	10.8%
% Investments in Culture and Tourism on total EU Structural Funds (2007-13 and partly 2014-20)	6%	15%	-

Source: elaborations on ISTAT, Tuscany Region and Opencoesione data

MUSEUMS' VISITORS BY TUSCAN CITY (%)

OTHERS; 16,4

SIENA; 6,9

PISA; 13,7

FLORENCE; 63,0

CULTURE IN THE TUSCAN REGIONAL AGENDA

Cultural Current Expenditure (%)

Pie chart segments:
- Regional Participations to Cultural Institutions (Opera, Orchestra, etc.); 64,0%
- Other; 6,4%
- Other Cultural Institutes; 2,0%
- Museums and m. networks; 5,4%
- Archives and libraries; 4,9%
- Live shows; 5,0%
- Cultural events; 5,8%
- Places for arts (Artistic Residences); 6,5%

Source: elaborations on Tuscany Region's data

MAIN THEMES IN REGIONAL POLICIES

Valorisation of Major Cultural Attractors:
1) The Etruscan cities; 2) The Middle Ages and the Via Francigena; 3) The Renaissance: Medici's villas and gardens; 4) Science Museums; 5) Contemporary art

Support to Regional Museum System:
Agreement with National Ministry for Cultural Heritage (Mibact) for the realization of the "Regional Museum System"; Ecomuseums; Policies to increase population's access to culture

Support to Regional Library and Archival system (in particular digital services)

Tangible and Intangible Cultural Heritage, with particular attention in supporting memory policies on anti-fascism and deportation issues

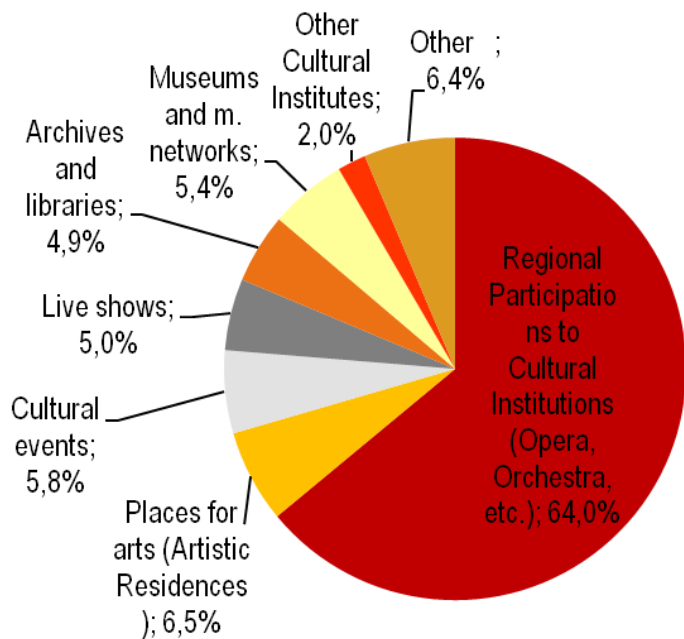Support to National and International networks of contemporary art

Support to Live and Reproduced Shows (Regional Orchestra, Opera theatre, Music schools, etc.)

Tax breaks for private donations (Art bonus)

Research and Culture Grants to promote cooperation between University and Cultural Institutions

RIS 3 Technologies, Cultural Heritage and Culture, to promote technology transfer

TUSCAN REGIONAL SPECIALIZATION PLATFORM «TECHNOLOGIES, CULTURAL HERITAGE & CULTURE» AND RESEARCH & INNOVATION SMART SPECIALIZATION STRATEGY (RIS3)

In Tuscany, the Research & Innovation Smart Specialization Strategy (**RIS3**) was approved for the first time in **2015** and reviewed in **2019** (February).

In 2017 the **Regional Specialization Platform «Technologies, Cultural Heritage and Culture»** was established (DGR 815/2017).

It is a committee formed by representatives of:
- Tuscany Region - Directorate of Culture and Research;
- IRPET - Regional Institute for Economic Planning of Tuscany;
- University Departments, Higher Education Schools and Research Centres competent in the field;
- Companies active in the sector;
- Experts on the topic, gathered in a temporary Advisory Board.

Its main goals are:
- to bring out the needs for innovation and research in the field of cultural heritage in terms of preservation, management and valorisation;
- to promote, through technological innovation applied to material and immaterial cultural heritage, a new model of social and economic development, based on quality of life and productions with high cultural and creative content.

CLASSIFICATION OF CULTURAL HERITAGE

A) The cultural assets referred to in art. 10 of the Code (Leg. D. 42/2004):
- the assets of artistic, historical, archaeological or ethno-anthropological interest;
- the collections of museums, art galleries, galleries and other exhibition sites, photographs, with their negatives and matrices, cinematographic films and audiovisual supports in general, of rare and valuable nature;
- the archives and the single documents that have a particularly important historical interest, the maps and the musical scores having a rare and valuable character;
- library collections of libraries of particular cultural interest, manuscripts, autographs, correspondence, incunabula, as well as books, prints and engravings, with related matrices, of a rare and valuable nature;
- the movable or immovable things that have a particularly important interest due to their reference to political, military, literature, art, science, technology, industry and culture in general, or what are the testimonials of the identity and history of public, collective or religious institutions;
- the collections or series of objects, to anyone belonging who, by tradition, fame and particular environmental characteristics, or by artistic, historical, archaeological, numismatic or ethno-anthropological importance, have an exceptional interest.

B) The Unesco Sites referred to in art. 133 of the Code (Leg. D. 42/2004) which for Tuscany are:
- Historic centres of Florence, Pisa, San Gimignano, Siena, Pienza; the landscape of Val d'Orcia, and Medici's Villas and Gardens.

C) The regional cultural heritage represented by:
- cinema and audiovisual supply chain, live shows, classical and contemporary music and festivals;
- archives also libraries, libraries, documentary networks;
- places of memory / resistance / human rights;
- cultural associations and institutes;
- historical events, museum poles and museums spread throughout the territory, eco-museums, art galleries, galleries and other exhibition sites;
- the practices, the representations, the expressions, the knowledge and the abilities - as well as the tools, the objects, the artifacts and the cultural spaces related to them;
- contemporary art and the arts representative of social practices, rituals and festive events.

NEW TECHNOLOGIES AND CULTURAL HERITAGE: EXPECTED EFFECTS

FIELD:
PRESERVATION, MONITORING, RESTORATION

EXPECTED EFFECTS: COSTS REDUCTION, LASTING RESULTS, GREATER ECONOMIC SUSTAINABILITY THANKS TO COSTS REDUCTION

FIELD:
DEVELOPMENT OF NEW ARTISTIC-COMMUNICATIVE FORMS

EXPECTED EFFECTS: EVOLUTION OF COMMUNICATION MODELS DEVELOPED BY CULTURAL INSTITUTIONS, WITH AN IMPACT ALSO ON PRODUCTION PROCESSES

FIELD:
NEW PROFESSIONS' DEVELOPMENT

EXPECTED EFFECTS: SWITCH FROM TRADITIONAL TO MORE INNOVATIVE AND SKILLED PROFILES

FIELD:
AUDIENCE DEVELOPMENT, EDUTAINMENT

EXPECTED EFFECTS: NEW MARKETS, NEW USERS, INCREASING USER LOYALTY, INCREASING ECONOMIC AND SOCIAL SUSTAINABILITY THANKS TO MORE REVENUE AND SOCIAL COHESION
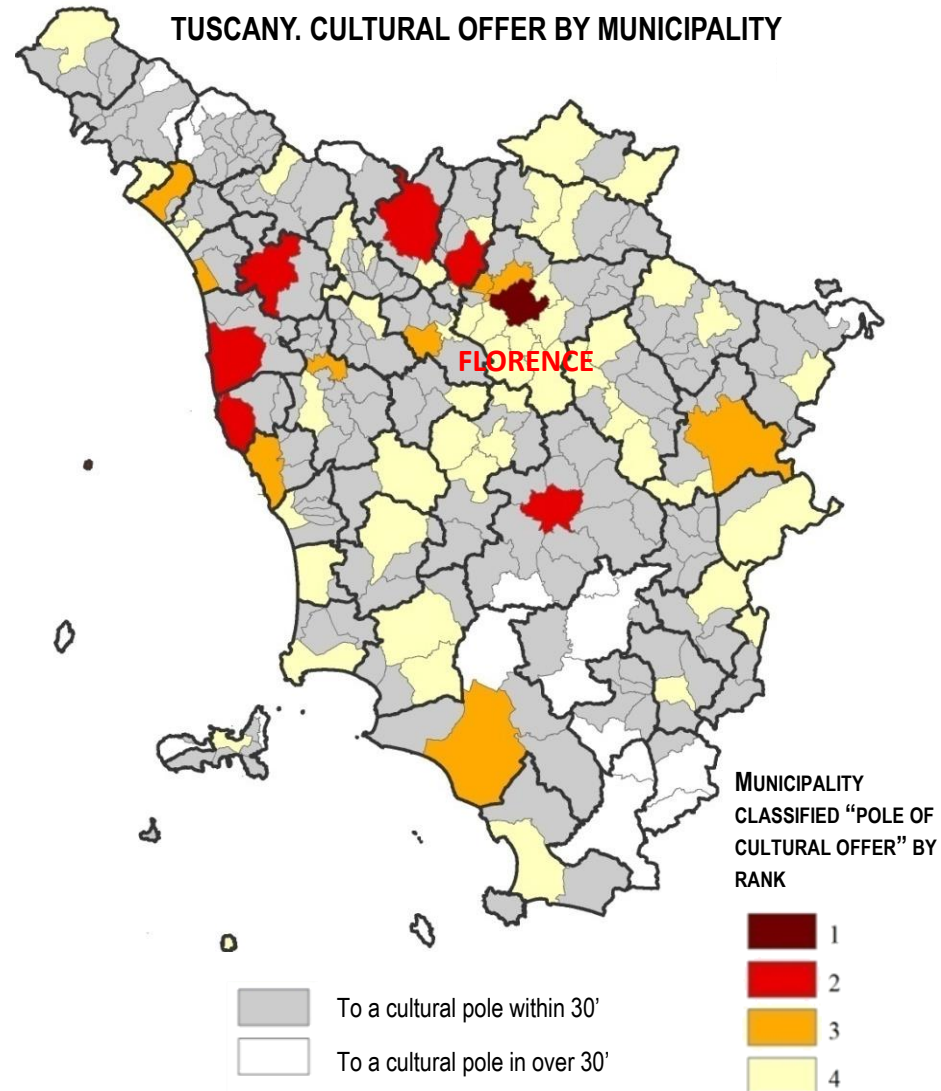
MAIN TECHNOLOGICAL TRENDS 2018 (GARTNER INSTITUTE)

1. ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (FLEXIBILITY, CUSTOMIZATION)
2. DIGITALIZATION, AUTOMATION (IMMERSIVE ENVIRONMENTS, CONSERVATION)
3. NETWORKS AND PLATFORMS (SERVICE ORGANIZATION, RESOURCE SHARING)

TECHNOLOGIES AND CULTURAL HERITAGE IN TUSCAN RIS3

Working method:

1)mapping regional offer of cultural heritage (national and regional museums, archaeological areas, Unesco sites, historical theatres, libraries, etc.);

2)mapping regional offer of higher education and specialized training related to cultural heritage (restoration schools, chemistry and physics departments, etc.);

3)mapping regional companies active in fields related to cultural heritage (restoration, managing, ICT);

4)analysis of the sector literature and of the most recent policy documents;

5)Interviews with some industry or institutional excellence (museum, library, etc.)

6)online questionnaire to stakeholders (Universities, Research centres, companies, museums, etc.)

7)result discussion among the members of the Regional Specialization Platform «Technologies, Cultural Heritage and Culture»

8)writing "Roadmaps" for technological upgrading and valorisation of cultural heritage

TUSCANY. CULTURAL OFFER BY MUNICIPALITY

FLORENCE

MUNICIPALITY CLASSIFIED "POLE OF CULTURAL OFFER" BY RANK

- 1
- 2
- 3
- 4

To a cultural pole within 30'

To a cultural pole in over 30'

THE ROADMAPS FOR RESEARCH AND TECHNOLOGY TRANSFER IN CULTURE

ROADMAP 1	ROADMAP 2	ROADMAP 3
Title/Goal		
SUSTAINABLE FRUITION OF CULTURAL HERITAGE, SOCIAL INCLUSION AND WELL-BEING THROUGH CULTURE	VALORISATION OF SKILLS IN THE CULTURAL CHAIN	KNOWLEDGE AND CONSERVATION OF CULTURAL HERITAGE
Technologies		
ICT •Virtual and augmented reality •Digital and virtual Storytelling, Advanced Multimedia, Mobile App •Smart Guides, Virtual Tours • Gamification and serious games •Social media •Location Based Services (LBS) •Bigdate collection, management and profiling PHOTONICS, MICRO AND NANO-ELECTRONICS • Electro-optical and laser sensors •Electromagnetic sensors • Audio-video setting systems • Interactive video systems •Interactive carpets • Immersive 3D Cave •3D recording and rendering devices • 3D printing • Holography and laser show •Multimedia totems and robotics	PLATFORMS •New organizational methods for digitalization / cataloguing platforms •Management and service platforms ADVANCED MATERIALS •Laser technologies •New materials •New production methods OTHER INNOVATION •Training offer enhancement •Development of partnerships between institutions and SMEs	ICT • Georeferenced Information Systems • IoT protocols PHOTONICS • Laser systems for restoration (cleaning, controlled ablation) •Laser tools for diagnostics and archaeometry (LIPS, Raman) • X-ray and tomographic apparatus • Macro and 3D optical and laser micro-relief • UV / Vis / IR / THz spectroscopic devices • Fibre optic sensors for monitoring • Multi- and hyperspectral imaging devices •Panoramic 2D and 3D imaging •Seismic, acoustic and ultrasonic sensors • 3D printing (replicas, integration ...) NANO AND BIO-TECHNOLOGIES, ADV MATERIALS • Nanomaterials for deacidification, cleaning, consolidation • New polymeric consolidates • Biomaterials for restoration MICRO AND NANO-ELECTRONICS • Microwave treatment systems •Nanotubes for controlled heating DRONE REMOTE SENSING (UAV) •Digital photogrammetry and 3D / 4D modelling • Multispectral and hyperspectral • Geophysical instruments

CONSERVATION OF «MATERIAL HERITAGE»

Urban pollution, extreme weather events produced by global warming and the growing anthropic impact associated with the growth of tourist flows determine an acceleration of the degradation processes, which puts at risk the preservation of the material heritage and its transfer to future generations. These are well-known unfavorable dynamics, which must be mitigated through the development of new instruments and methods of low-impact intervention.

The scientific and technological know-how on safeguarding the heritage acquired in Tuscany over the last fifty years represents an internationally recognized excellence, a resource of research, development and innovation of great value, enriched by the numerous research that the research organizations, Protection Agencies and Companies have built over time: technologies and methods for the characterization of the constituent materials; diagnostics of degradation mechanisms; restoration, preventive conservation and monitoring; microclimatic controls; security and protection; documentation, use, communication and more.

Exemplary cases of such a virtuous process are: methodological and market leadership in laser technologies for restoration; excellence on nanostructured materials for consolidation and surface protection; advanced diagnostics (from photonics to nuclear ones) and digital solutions for documentation, access, promotion and use.

TECHNOLOGIES APPLIED TO CULTURAL HERITAGE

The identification of highly innovative enabling technologies focus on the methods of material knowledge and the preservation of the good, in full awareness of their multiple values at national and international level. This area has in fact grown above all thanks to the ability of the actors involved to intercept national and European resources destined for R&I. It is no coincidence, in fact, that in H2020 Tuscany is currently coordinating European projects for a total cost of over 50 MEuro. One of these resulted in the proposal to launch the European Infrastructure E-RIHS (European Research Infrastructure for Heritage Science), duly approved by ESFRI, which will be based in Florence.

Tuscany, as already highlighted in the illustration of the RIS3 Roadmap, is aware that its cultural and environmental assets constitute a formidable engine of development that requires continuous renewal and promotion to make the most of its added value.

In the field of cultural heritage conservation the main enabling technologies concern the following families:
- Photonics
- Nanotechnology
- Advanced materials
- Micro and nano-electronics
- Biotechnology
- Advanced Manufacturing

THE STRATEGIC TECHNOLOGICAL LINES OF INTERVENTION

- Tools, materials, techniques and strategies for low-impact restoration and maintenance based on technological solutions developed in the field of photonics, electromagnetism, green chemistry and biotechnology (bacterial cultures, yeasts and others). Laser technologies, phototreatment, microwave treatments, and low impact chemical products (nanomaterials, natural products and more) for the controlled removal of altering material layers, new nanostructured materials for the consolidation and protection of surfaces, artefacts of cultural interest;

- Advanced tools and methods for non-invasive diagnostics and archaeometry in order to increase knowledge, the ability to interpret material contents and intervention on the good, with particular reference to non-invasive photonic techniques (without sampling) for measuring the shape (I take 3D macro and micro structural, stereoscopic, multiview, fire scan etc), stratigraphy (optical coherence tomography, confocal microscopy, THz tomography, synchrotron radiation based techniques etc), spectral properties (multi- and hyperspectral imaging, spectroscopy UV / ViS / NIR / SWIR)) and composition with portable techniques (eg laser-induced plasma spectroscopy, Raman spectroscopy and others) or based on large scale facility. Then add the necessary archaeometry to the interpretation of the execution procedures and the transformations undergone during the course of his life, as well as for the authentication of the same; in this last case the 14C dating by Accelerator Mass Spectrometry is of great importance.

THE STRATEGIC TECHNOLOGICAL LINES OF INTERVENTION

- intelligent optoelectronic devices capable of monitoring the causes of degradation (air quality, microclimatic factors and museum anthropic impact) through miniaturized environmental sensors based on recent developments in photonics, micro and nanoelectronics, as well as sensors capable of measuring effects on artifacts (deposits, chromatic alteration, corrosion, erosion etc.), taking full advantage of the new potential offered by innovative portable analytical instruments or, in some cases, handheld devices, based on laser spectroscopy, in the UV / ViS / NIR / SWIR, in the region of X, microwave and THz, together with the potential of particle techniques.

- Technologies for structural safety, prevention and protection against calamitous events, vandalism and terrorism based diagnostics (seismic tests, georadars, ultrasounds and others), modelling, stress simulation, anti-seismic design and monitoring using accelerometers, pressure-voltage sensors (Bragg fibre optic, piezoelectric, laser and other lattices), interferometry and other laser measurements in reflection and flight time. Devices for surveillance through vision and digital targeting, alarm systems and more and for transport safety through black box systems, radio-frequency identification (RFID) and more.

- Technologies for the marking, authentication and traceability of goods based on 2D and 3D laser and chemical engraving, deposition, digital encoding, tagging with various materials, RFID and others represent a technological field of enormous interest.

VIRTUOUS EXAMPLES OF RESTORATION, CONSERVATION AND ENHANCEMENT OF CULTURAL HERITAGE

BAPTISTERY OF SAN GIOVANNI IN FLORENCE
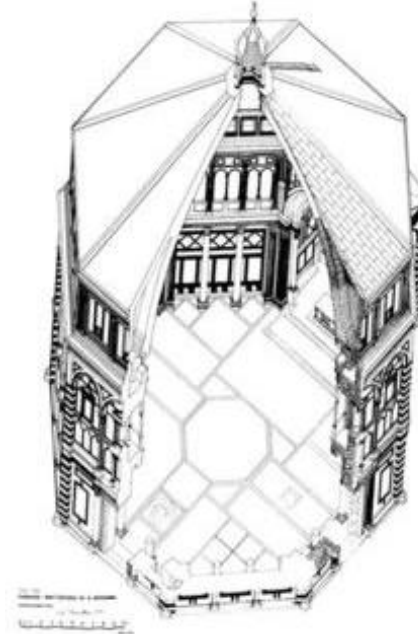
The Baptistery dedicated to St. John the Baptist, patron of the city of Florence, rises in front of the Cathedral of Santa Maria del Fiore, in Piazza San Giovanni. The building's floor plan is octagonal and the main facade faces the cathedral, while the apse is located to the west. The Baptistery of San Giovanni in Florence was built to welcome worthily the baptismal font of the cathedral. It was built between the eleventh and twelfth century, perhaps renovating a Roman building dating from the fifth or sixth century; expanded and decorated in the thirteenth century. The roof and lantern are later than a century; in 1202 the circular apse was replaced by a rectangular pocket which is called scarsella. In 1128 the building became officially a baptistery.

BAPTISTERY OF SAN GIOVANNI IN FLORENCE - CLEANING OF THE MARMOREE FACADE PART

LASER IS ABLE TO WORK EVERYWHERE, EVEN IN LITTLE INTERSTICES. WHEN THE LASER BURNS THE DEEP BLACK CRUST IT SEEMS LIKE AN EXPLOSION.

THE LASER WORKS PERFECTLY ON THIS KIND OF MARBLE DECORATION, DEEPER THAN AMMONIUM CARBONATE COMPRESS. THE DIMENSION WAS NOT A PROBLEM ON THE SCAFFOLDINGS

WHY ?

Easy to use: after setting every restorer can use it with the safety equipment

Selective cleaning: after setting it cleans just the black crust or other dark surface, not the clean one

Non invasive cleaning: no pressure on the stone, no mechanical action on the materials

WHEN ?

When the marble or the stone is in phase of pulverisation behind the black crust, when the material is very weak and the static is compromised.

When the geometry of the monument is really complex

When the thickness of the black crust is really strong

VIRTUOUS EXAMPLES OF RESTORATION, CONSERVATION AND ENHANCEMENT OF CULTURAL HERITAGE

CHURCH OF SANTO STEFANO ROTONDO: STRUCTURAL INTERVENTIONS OF SAFEGUARD AND SEISMIC IMPROVEMENT
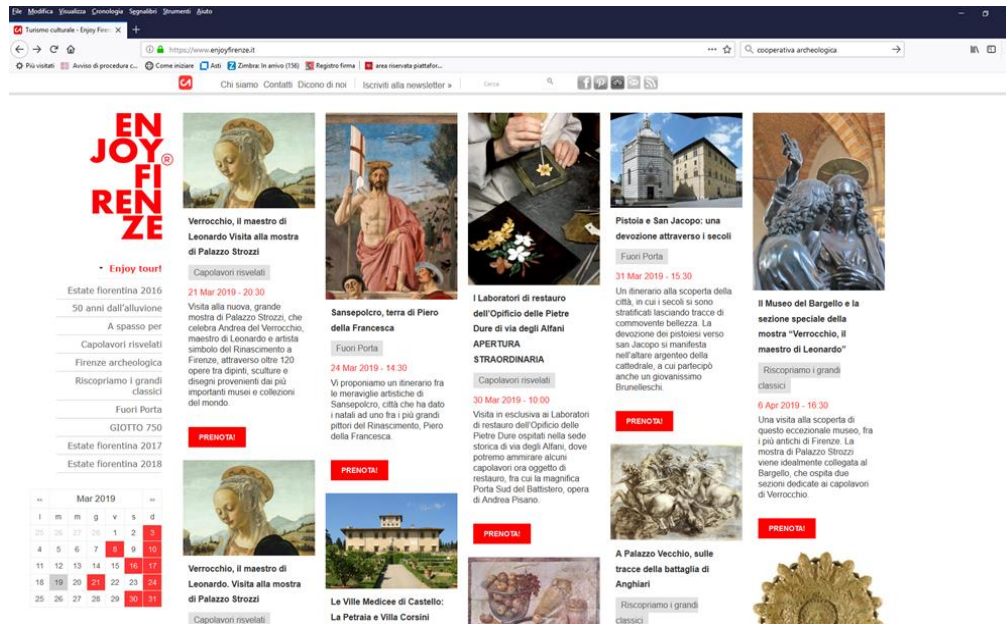

Santo Stefano Rotondo's church (V century A.D.), located on the top of Celio hill along S. Stefano Rotondo street, is affected by the excavation of tunnels for C line subway. Although interferences with the ancient structures are quite unlikely, because of the considerable depth of the tunnels, nevertheless, considering the high value of the artworks and the level of conservation of the monument, it has been decided to undertake some structural interventions, in order to preserve the church and improve its seismic behavior, both temporarily and definitively.

Undertaken intervention
The interventions carried out earlier than the implementation of the subway's tunnels, were related to the consolidation of the masonry of the central drum and the ambulatory, by means of injections with liquid mortar lime based and permanent insertion of 3 AISI 316 steel hoops (photo 1), the strengthening of the attic's main wooden beams by means of steel bars (photo 2) and consolidation of the remaining part of the third ring's wall, with corten steel buttresses (photo 3). The restoration of frescoes and mosaics were related to the cohesion of the several layers of plaster, by means of injections of a consolidant mixture and pointing of cracks. After the consolidation of frescoes, props with tubes and joints system have been installed in order to shore the decorated surfaces.

ADVANCED AND INTEGRATED SOLUTIONS TO THE PROBLEMS OF CONSERVATION AND ENHANCEMENT OF ASSETS AND USE OF CULTURAL ACTIVITIES

Online booking, guided tours in collaboration with the Archaeological Heritage Office for Tuscany

https://www.enjoyfirenze.it/

Example of an integrated service in the Cultural sector, which operates throughout the national territory, with particular attention to archaeological dissemination, with the Enjoy Brand – EnjoyFirenze e EnjoyGenova.

Particular attention is given to cultural teaching in collaboration with local authorities, schools, tour operators and private associations, with which it organizes introductory courses in Archeology, meetings and workshops focused on individual issues of cultural interest, visits, internships and fields school aimed at the scholastic and extra-scholastic world, for the different age groups.

It also offers services of: planning, realization and management of exhibitions, events and cultural parks management of museum structures consulting and design of cultural and leisure time facilities and services, specialized publishing services, promotion and communication, public-private partnership projects, global service and facility management, territorial marketing consultancy.

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Nicosia, Cyprus

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