



# Cultural heritage research

Survey and outcomes  
of projects within  
the Environment Theme

From 5th to 7th Framework Programme  
2012 Edition

*Research &  
Innovation*

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# 1 Introduction

## Background and context

Europe's cultural heritage is invaluable for its citizens and is irreplaceable. It provides a link to and a better understanding of the past, and promotes a sense of social and common identity. Over time, however, the fragility of European cultural heritage has increased, and its vulnerability to the harmful effects of climate change, pollution, natural and man-made disasters, neglect, vandalism and even mass tourism become all the more evident. Changing landscapes, deforestation and coastal erosion due to increasing urbanisation also take their toll. To avoid irreversible damage and loss, appropriate action is needed at every level.

In economic terms, the cultural heritage of Europe draws millions of visitors each year to monuments, historic city centres, archaeological sites, museums and galleries, generates employment and contributes significantly to tourism and business activity. In social terms, it contributes to the cohesion of the European Union (EU) and plays a fundamental role in European integration.

The EU recognises the dangers of inaction, and supports new research programmes that promote the long-term future protection and conservation of cultural assets. The EU regards the study and preservation of tangible and intangible cultural heritage as equally important to the preservation of European identity, cultural diversity, wellbeing and wealth. This is not only for present but also future generations.

Cultural heritage research has been a constant theme in all EU Framework Programmes (FPs) since they began in 1986. FP7<sup>(1)</sup> covers the period 2007-13 and has a broader than ever range of topics. These topics have emphasised the need for environmental impact assessment, the design and testing of new tools and models for risk evaluation and non-destructive techniques for diagnosis and conservation. They also feature strategies for mitigation and adaptation for the sustainable management of both movable and immovable cultural assets. An additional key element of FP7 is the ever-increasing support for networks of collaboration and cooperation between international partners with the aim of improving coordination and reducing fragmentation and duplication. These include not only researchers and industry partners such as large companies or small and medium-sized enterprises (SMEs), but also government departments, cultural institutions, associations, non-governmental organisations (NGOs), and others, to promote further synergies.

Indeed the Lisbon Treaty underscores the importance of cultural heritage and encourages the EU to take actions on a global scale to preserve its cultural heritage and promote cultural tourism. In line with this, several different Directorates-General (DGs) of the European Commission (EC) have programmes relating to these issues, among them: DG Research and Innovation, DG Connect, DG Education and Culture, DG Enterprise, and DG Regional Policy.

## Scope of the survey

The scope of this survey is to analyse the results and impacts of cultural heritage research projects funded through FP5, FP6 and FP7 up to 2012, as part of the DG Research and Innovation 'Environment (including climate change) Theme', with the sub-activity 'Protection, Conservation and Enhancement of Cultural Heritage, including Human Habitat' under the activity 'Environmental Technologies'. To do so the EU publication *Preserving our heritage, improving our environment* (Vol I and II <sup>(2)</sup>), as well as the European Commission databases (Cordis and Corda) were examined.

Section 2 of this survey presents key aspects of these projects such as their themes, types of organisations and geographical spread, the level of cooperation and coordination among partners, outcomes and benefits (social, economic and political). Section 3 provides a short overview of the 25 projects funded through the FP7 'Environment (including climate change) Theme' up to 2012.

To complete this analysis, relevant information was taken into account from the FP6 CHRAF project 'Priorities and strategies to support cultural heritage research activities within the European Construction Technology Platform (ECTP) and future FP7 activities' <sup>(3)</sup> regarding technologies and impact of FP5 and FP6 projects on cultural heritage.

The survey is intended as a valuable resource for all potentially interested end-users, but especially for two specific initiatives: the Joint Programming Initiative (JPI) on 'Cultural Heritage and Global Change: a new challenge for Europe' <sup>(4)</sup>, and the Public Private Partnership (PPP) on 'Energy-efficient Buildings' (EeB) <sup>(5)</sup>. Both initiatives have put a strong emphasis on coordination and cooperation between Member States at transnational level on one side, and public authorities and industry on the other side.

Annex 1 lists project countries, while Annex 2 shows the acronyms, abbreviations and titles of all projects.

1 FP7, the seventh framework supporting scientific research in the EU.

2 *Preserving our heritage, improving our environment*, Vol I 20 years of EU research into cultural heritage (ISBN 978-92-79-09027-1) and Vol II Cultural heritage research: FP5, FP6 and related projects (ISBN 978-92-79-09029-5).

3 See the following link for further details: <http://www.ectp.org/chraf/default.htm>

4 See the following link for further details: <http://www.jpi-culturalheritage.eu>

5 See the following link for further details: <http://www.e2b-ei.eu/default.php>

## 2 Results and outcomes of cultural heritage research

### Introduction

Framework Programmes (FPs) are the EU's main mechanism for funding research and development in Europe. Funding takes the form of a 'grant to the budget'. It consists of a reimbursement of the costs claimed by the participants on the basis of their cost declaration.

The maximum financial contribution from the European Commission (EC), funding scheme and expected impact are indicated in the annual Work Programme for each area (Activity/Sub-activity). For cultural heritage research, the areas and themes were defined as follows:

**Table 1 | Areas and themes for FP5 EESD\*, FP6 SSP\*\* and FP7 (incl. 2013 call) cultural heritage projects**

FP	Areas	Themes
FP5	Protection, conservation and enhancement of European cultural heritage	Improved damage assessment on cultural heritage
		Development of innovative conservation strategies
		Foster integration of cultural heritage in the urban setting
FP6	Protection of cultural heritage and associated conservation strategies	Assessment of air pollution effects on cultural heritage
		Sustainable impact assessment of protection and conservation treatments and their reversibility
		Effects of global change on cultural heritage
		Identification of durable ancient or traditional materials and craft technologies for application in modern conservation treatments of cultural heritage
		Cultural heritage and tourism
FP7	Protection, conservation and enhancement of cultural heritage, including human habitat	Consolidation and dissemination of results related to cultural heritage
		Damage assessment, diagnosis and monitoring for the preventive conservation and maintenance of cultural heritage
		Development and application of methodologies, technologies, models and tools for damage assessment, monitoring and adaptation to climate change impacts (excluding extreme events)
		EU cultural heritage identity card
		ERA-NET for the preservation of tangible cultural heritage
		Framework conditions to enhance most promising prototypes
		Technologies for protecting cultural heritage assets from risks and damages resulting from extreme events (earthquakes, fires, storms)

\* EESD: 'Energy, Environment and Sustainable Development' including the key action 'City of Tomorrow and Cultural Heritage'.

\*\* SSP: 'Scientific Support to Policies'.



FP	Areas	Themes
FP7	Protection, conservation and enhancement of cultural heritage, including human habitat	Compatible solutions for improving the energy efficiency of historic buildings in urban areas (single building)
		Non-destructive diagnostic technologies for the safe conservation of movable cultural assets
		Development of advanced compatible materials and techniques and their application for the protection, conservation and restoration of cultural heritage assets
		Coordination action in support of implementation by participating states of a JPI on Cultural Heritage
		Concepts and solutions for improving energy efficiency of historic buildings, in particular at urban district scale
		Development of advanced technologies and tools for mapping, diagnosing, excavating and securing underwater and coastal archaeological sites
		Development of advanced technologies and tools for mapping, diagnosing, protecting and managing cultural landscapes in rural areas (2013 call)
		ERA-NET Plus action: Development of new methodologies, technologies and products for the assessment, protection and management of historical and modern artefacts, buildings and sites (2013 call)

From FP5 onwards came a new focus on the creation of a European Research Area (ERA). ERA aims at scientific excellence, improved competitiveness and innovation through the promotion of increased cooperation, greater complementarity and improved coordination between relevant actors, at all levels.

The promotion of partnering and collaboration is a central commitment of the European Commission. The overarching aim of the funding schemes or support instruments is to cluster the EU research efforts, to better structure the European Research Area and maximise outputs and impacts of the FPs.

In the following sections FP5, FP6 and FP7 projects are analysed according to the following criteria:

- Support instruments used
- Type of organisations involved
- Countries involved
- Type of instrument (contract) and funding
- Type of main outcomes/impacts
- Average number of partners per project
- Average project duration
- Average project budget
- Percentage of women involved as coordinator and project Work Package (WP) leader within the consortium.

## Support instruments

In cultural heritage research, the following support instruments have been used

- Shared Cost Actions (FP5) and Specific Targeted Research Projects (FP6)
- Concerted Actions/Thematic Networks (FP5) and Coordination Actions (FP6)
- Accompanying Measures (FP5) and Specific Support Actions (FP6)
- R&D Collaborative Projects (FP7)
- Coordination and Support Actions (FP7).

### Shared Cost Actions (FP5) and STREPs (FP6)

Shared Cost Actions (SCA) and Specific Targeted Research Projects (STREPs) are projects dealing with objective-driven research. They are limited in scope. They may consist of a research and technological development activity, a demonstration activity, or a combination of both.

Any legal entity can participate in a SCA or a STREP, but in practice primarily organisations active in the research field such as research institutes, universities and enterprises (including SMEs) are concerned.

SCAs and STREPs are based on a 'project approach' oriented towards the resolution of one specific issue or problem. They have one single component, being 'research/innovation' or 'demonstration'. In principle, they do not include any training activity.

Research activities are targeted and have precisely focused research objectives and measurable outcomes. Innovation activities include activities relating to the protection/dissemination of knowledge, socio-economic studies, activities to promote the exploitation of the results and possibly 'take-up actions'. Demonstration activities are designed to prove the viability of new technologies that offer a potential economic advantage, but which cannot be commercialised directly (e.g. testing of prototypes).

To promote applied research and encourage the development of market-oriented solutions, participants are asked to include industrial partners and namely SMEs in their research consortia. Specific SME oriented projects were available under FP5 and FP6 as SME Specific Measures. Their main purpose was to promote the participation of SMEs. Two ad-hoc instruments were envisaged:

- FP5 – Cooperative Research Projects (CRAFT): these were carried out by Research, Technology and Development (RTD) performers for the benefit of a number of SMEs from different countries on common specific problems or needs;
- FP6 – Collective research projects: these were carried out by RTD performers on behalf of industrial associations or industry groupings in sectors where SMEs are prominent, to expand the knowledge base of large communities of SMEs.

### Concerted Actions/Thematic Networks (FP5) and Coordination Actions (FP6)

Concerted Actions/Thematic Networks and Coordination Actions aim at promoting and supporting the coordination, cooperation or networking of a range of research and innovation projects or operators.

They share a specific objective to achieve improved integration and coordination of European research for a fixed period of time. They do not provide support for research and development.

Any legal entity may participate, but in practice the participants are primarily organisations involved in research and innovation such as research institutes, universities, enterprises (including SMEs) and public administrations, as well as potential end-users and stakeholders.

Coordination activities intend to complement other FP instruments and include, inter alia, studies, analyses, benchmarking exercises; establishment of roadmaps for research in specific topics; exchange of personnel; etc. Training activities can cover the following issues: exchange and dissemination of good practice; use of common information systems; and management of common activities, providing they are in direct relation with the above coordination activities.

## Accompanying Measures (FP5) and Specific Support Actions (FP6)

Accompanying Measures and Specific Support Actions aimed at contributing actively to the implementation of the Framework Programme, the analysis and dissemination of results, or the preparation of future activities with the view to enabling the European Union to achieve or define its strategic RTD objectives.

They may also be used to stimulate international cooperation, encourage and facilitate the participation of SMEs, small research teams, newly developed and remote research centres, as well as organisations from the newest EU Member States and Associated Candidate Countries in the priority thematic areas, in particular in Integrated Projects and Networks of Excellence. Specific Support Actions do not provide funding for research and development. They are more limited in scale than coordination actions and may be carried out by one single participant, or a group of several partners.

Specific Support Actions may cover one or more activities, including: organisation of conferences and seminars; development of research or innovation strategies; organisation of high level scientific awards and competitions; setting up of working groups and expert groups, etc.

## R&D Collaborative Projects (FP7)

R&D Collaborative Projects are research projects carried out by consortia with participants from different countries, aimed at developing new knowledge, new technology, products, demonstration activities or common resources for research. The size, scope and internal organisation of projects can vary from field to field and from topic to topic. Projects can range from small or medium-scale focused research actions to large scale integrating projects for achieving a defined objective. Projects may also target special groups such as SMEs.

## Coordination and Support Actions (FP7)

The aim of Coordination and Support Actions is coordinating or supporting research activities (networking, exchanges, trans-national access to research infrastructures, studies, conferences, etc.) and policies. European Research Area Networks (ERA-NETs) are considered as Coordination and Support Actions.

## Analysis of cultural heritage research projects

### Cultural heritage funding

Table 2 summarises information on 41 cultural heritage research projects of the FP5 EESD Programme, 23 projects of the FP6 SSP Programme and 25 ongoing projects of the FP7 'Environment' Programme (until 2012).

**Table 2 | Information on FP5, FP6 and FP7 (until 2012 included) cultural heritage research projects managed by Directorate-General for Research and Innovation, Directorate I – Environment**

Analysed data	FP5 EESD	FP6 SSP	FP7
Number of projects	41	23	25
Total number of partners (including coordinator)	322	183	292
Average number of partners	8	8	13
Average project duration (months)	35	31	37
Average EC funding /project (EUR) <sup>(6)</sup>	955 512	773 163	2 294 017
<b>Total EC funding (EUR) <sup>(7)</sup></b>	<b>39 175 997</b>	<b>17 782 581</b>	<b>57 350 415 <sup>(8)</sup></b>

As shown in Fig. 1, 2 and 3 below, the main proportion of European Commission (EC) funding for cultural heritage research was dedicated to 'Cost Shared Research' (CSR) represented by 'Shared Cost Actions' in FP5 EESD, 'Specific Target Research Projects' (STREP) and 'Specific Targeted Innovation Projects' (STIP) in FP6 and 'Collaborative Projects' (CP) in FP7.

In FP5, the relatively important percentage of CRAFT projects (10 %) represents a significant involvement of SMEs. This can be compared with the STIP projects in FP6 (9 %) more focused on demonstration activities to prove the viability of new technologies that offer a potential economic advantage (e.g. testing of prototypes).

<sup>6</sup> For each call, European Commission (EC) introduces funding thresholds which will be applied as eligibility criteria.

<sup>7</sup> For each programme, there is an indicative budget given in advance.

<sup>8</sup> The Work Programme 2013 for the 'Environment (including climate change) Theme' foresees a total budget of EUR 7 million for cultural heritage research.

Fig. 1 |  
Type of instrument (%)  
for 41 FP5 EESD projects

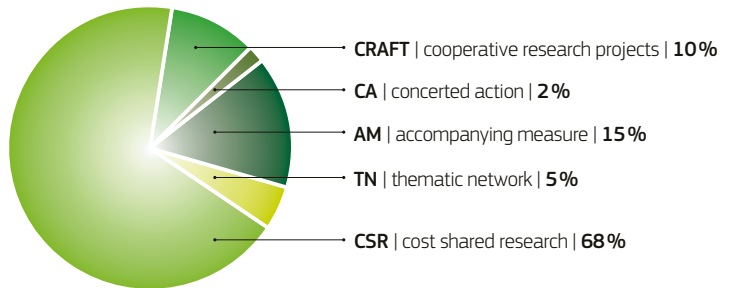


Fig. 2 |  
Type of instrument (%)  
for 23 FP6 SSP projects

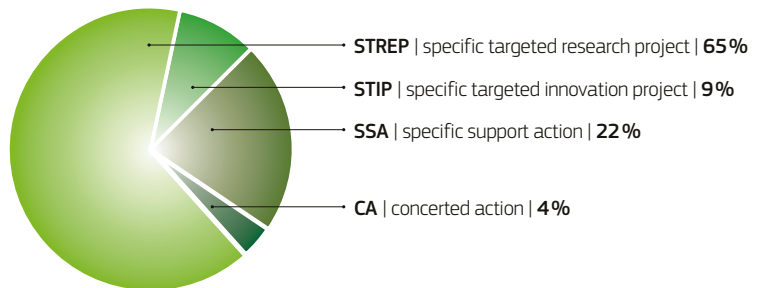
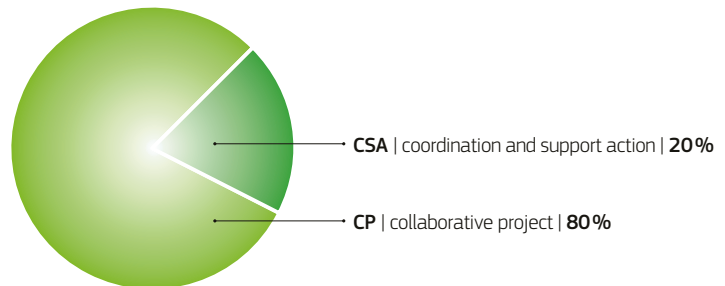


Fig. 3 |  
Type of instrument (%)  
for 25 FP7 projects



## Types of networks and organisations involved

Figure 4 gives an overview of the types of organisations involved. It shows that research organisations (public and private) and higher education institutions are fairly equally placed regarding project coordination (CO) (RES 46 % and HE 41 % in FP5; RES 48 % and HE 39 % in FP6; RES and HE: both around 40 % in FP7).

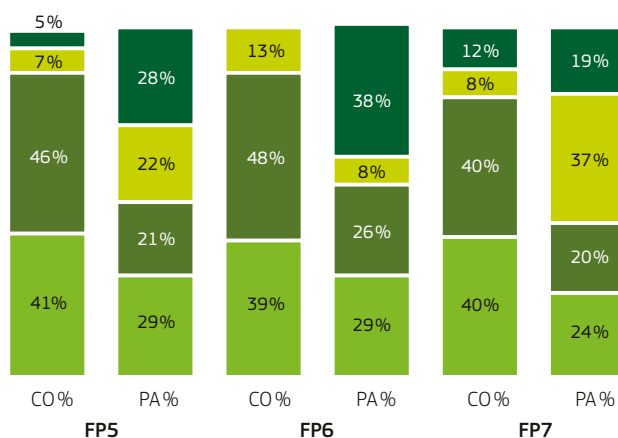
The involvement of industrial organisations, including SMEs and consultants, as project coordinators is limited: 7 % in FP5, 13 % in FP6 and 8 % in FP7 (until 2012). Organisations classified as 'others' mainly represent 'users' and 'stakeholders'. Only a few participate as coordinators: 5 % in FP5, 0 % in FP6 and 12 % in FP7.

Figure 4 shows that in FP5 and FP7 the participation of research organisations, higher education institutions, industry, users and stakeholders ('others') was fairly evenly distributed, which demonstrated a good balance of competence overall. In FP7 it seems that industrial participation is growing (37 %) which could be related to the evaluation criteria in FP7 calls. In FP6 industrial participation was not particularly strong due to the more policy orientation of the 'SSP' Programme.

Fig. 4 |

### Type of organisations involved in FP5, FP6 and FP7 projects

CO | coordinators  
PA | partners



The number of projects in which organisations are involved demonstrates their dynamism and workforce. The Italian 'Consiglio Nazionale delle Ricerche' (CNR) and the UK's 'University College of London' (UCL) have been particularly active since FP5 either as coordinator of projects or as partner (PA).

Regarding involvement as project partners, the French 'Cercle des Partenaires du Patrimoine – Laboratoire de Recherche des Monuments Historiques' (CPP-LRMH), the Slovenian University of Ljubljana and the Czech 'Institute of Theoretical and Applied Mechanics' (ITAM) can also be considered as very active, followed by the German 'Fraunhofer Gesellschaft zur Förderung der angewandten Forschung' (FhG), the French 'Centre National de la Recherche Scientifique' (CNRS), the Spanish 'Consejo Superior de Investigaciones Científicas' (CSIS) and Norway's 'Norwegian Institute of Air Research' (NILU).

It is clear that these research organisations and universities have, through their involvement in the FPs, contributed to building a European Research Area (ERA) in the field of cultural heritage. The European Commission (EC) conferences organised at regular two yearly intervals also contributed significantly to reinforcing research networks in this area.

### Geographic distribution of networks by analysing the EU Member States, Associated Countries and Third Countries involved

In FP5 the countries with the highest percentage of coordinators (CO) were the United Kingdom (20 %), followed by Italy (15 %), Germany (12 %) and the Netherlands (10 %). The countries with the highest percentage of partners (PA) were Italy (16 %), the United Kingdom (11 %), Germany (11 %) and France (9 %).

Under FP6, Italy became the leading country with respect to the highest percentage of coordinators (22 %), followed by Belgium (17 %) and Germany (13 %). Regarding the highest involvement as partners, Italy was equally placed with the United Kingdom (13 %) whereas France (11 %), Germany (10 %) and the Netherlands (9 %) followed slightly behind.

This trend is confirmed for Italy in FP7 projects (44 % of coordinators), whereas each of the following countries, Germany, France, Spain and Slovenia counts for 8 %. The strongest participation from partners other than coordinators comes from Italy (15 %) and Germany (13 %). The Figures 5 and 6 summarise these findings for FP5, FP6 and FP7 cultural heritage research projects regarding the participating countries of coordinators and partners.

Among the 10 countries from Central and Eastern Europe that joined the EU in 2004, the most active are Slovenia and Poland, followed by the Czech Republic. For example, Slovenia coordinated 5 % of the projects in FP5, 9 % in FP6 and 15 % so far in FP7.

The participation of partners from Associated Countries and Third Countries combined was 5 % in FP5, 9 % in FP6 and 8 % in FP7. There is a trend in the increase of Third Country participation (12 % in FP7), namely for countries from the Mediterranean area. This proportion increases when including programmes other than the FP5 EESD and the FP6 SSP, namely the MPC and INCO-MED programmes.

Fig. 5 | **Countries of the project coordinators (CO) in FP5, FP6 and FP7 (%)**

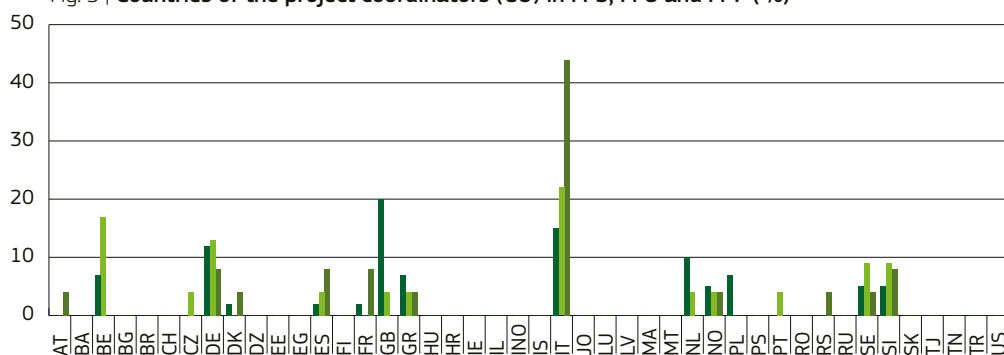
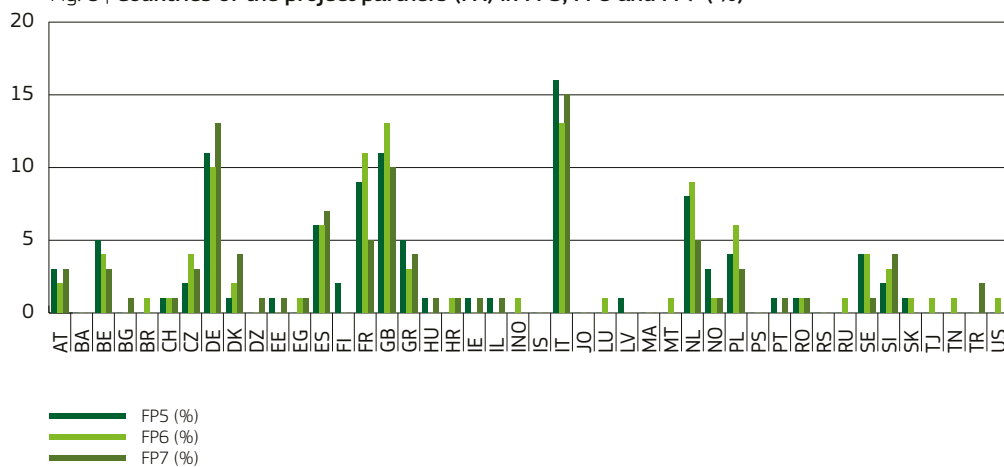


Fig. 6 | **Countries of the project partners (PA) in FP5, FP6 and FP7 (%)**



## Type of activities undertaken

By analysing the topics and issues addressed by research projects under FP5, FP6 and FP7, it can be observed that:

- atmospheric pollution and climate change impacts for cultural assets show a growing significance. This is most probably linked to the increasing vulnerability of tangible cultural heritage, especially immovable heritage;
- damage assessment mostly related to immovable heritage has become a continuous challenge;
- novel microbiological tools for conservation have not been identified as a priority topic under FP6 and FP7, but nanomaterials and nanotechnologies have been introduced in FP7 calls;
- the number of projects related to dissemination involving either the organisation of conferences, workshops or training courses has decreased, particularly in FP7, but these activities are now more deeply embedded in each research project;
- the topic of 'risk analysis and protection from extreme events' has been added in FP7 to reinforce the challenge of tackling climate change impacts on cultural heritage;
- two new topics have been added in the fields of research on the preservation of underwater archaeological sites (2011 call) and of cultural landscapes (2013 call); and
- in FP7 the cultural heritage research community has taken the opportunity to build on the networking nurtured under various initiatives of the former FP5 and FP6 programmes enabling the development of a cooperation framework and strategies within an ERA-NET project, which paved the way for the JPI on 'Cultural Heritage and Global Change: a new challenge for Europe' implemented through a Coordination and Support action. A first ERA-NET Plus action will be launched (2013 call).

## Type of outcomes

As shown in Table 3, the distribution by type of outcome is quite similar from FP5 to FP7 projects, with the exception of training seminars and conferences in FP7.

**Table 3 | Main outcomes of FP5, FP6 and FP7 (until 2012 included)**  
cultural heritage research projects

Main outcomes	FP5		FP6		FP7	
	No. of projects	%	No. of projects	%	No. of projects	%
New instruments/software	11	27	6	26	7	28
New products/materials	8	20	4	17	7	28
New methodologies/strategies/ databases/guidelines	16	39	9	39	10	40
Training seminars and conferences	6	14	4	18	1	4

The majority of projects has led to the development of new methodologies/strategies/databases and guidelines, followed by new instruments and software development.

In acknowledgement of this and of the difficulties often faced by developers of products and tools in making the leap from prototype to market, which is clearly the case for some of the outputs of FP5 and



FP6 cultural heritage research projects, the EU launched a call (FP7-ENV-2008.1) especially dedicated to 'Framework conditions to enhance most promising prototypes'. The aim was to provide a needed boost to researchers and developers in overcoming some of the remaining hurdles to exploiting and commercialising further the outputs of their successful research implemented under FP5 and FP6 projects.

## Gender issues

Table 4 shows that the participation of women in FP5, FP6 and FP7 projects on cultural heritage research is relatively high compared to other fields of research. In FP5 projects 32 % of coordinators were women<sup>(9)</sup>. In FP6 projects 39 % of the coordinators were women and 23 % of Work Package leaders were also women. In FP7 projects so far, women represent 44 % of project coordinators and 29 % of Work Package leaders<sup>(10)</sup>.

**Table 4 | Participation of women in FP5, FP6 and FP7 (until 2012 included)**  
cultural heritage research projects

Participation of Women	FP5		FP6		FP7	
	No. of Women	%	No. of Women	%	No. of Women	%
Coordinators	13	32	9	39	11	44
Work Package leaders (Partners within consortium)	-	-	37	23	84	29

## Impact

As for the overall impact of FP5 EESD and FP6 SSP projects in the field of cultural heritage, it is here worth mentioning the conclusions of the FP6 CHRAF project study 'Priorities and strategies to support cultural heritage research activities within ECTP and future FP7 activities'<sup>(11)</sup>. For the time being, this study represents the most complete work in this regard.

The study highlighted that most FP5 and FP6 projects have a quite high social impact in terms of dissemination, communication and education activities towards both society in general and the scientific community more specifically.

With regards to the policy implications of these projects, the policy focus of the FP6 calls for cultural heritage under the FP6 'Scientific Support to Policies' SSP Programme, may explain why FP6 projects tend to have a higher impact.

9 For FP5, the analysis has been performed only on the basis of the first name of the coordinator.

10 For FP6 and FP7 projects, this analysis has been performed on the basis of the Grant Agreement where male or female participation are clearly indicated.

11 Deliverable D14 'Mapping FP5-FP6 projects in Cultural Heritage and assessment of results regarding technologies and impact' of the CHRAF project.

Due to the growing importance of environmental issues within EU policies, FP6 projects tend to have a slightly higher impact in this area.

In terms of economic impact, the low level of direct economic benefits for the research consortia can be considered a weakness for these initiatives. The main outputs of the FP5 and FP6 projects in particular tend not to have any commercial follow-up and their potential economic benefits (in terms of improvement of the local economy, new job opportunities, etc.) are not always adequately or directly addressed. As the study highlights, the consortia characteristics may partially explain such a weakness: consortia mostly involve scientists, with significant experience in dissemination of scientific results, but with no training or expertise in exploiting project outputs. It is too early to draw conclusions regarding the economic impact of FP7 cultural heritage projects.

## Lessons learnt

The most positive benefit of FP5 and FP6 is the constitution of a real European Research Area (ERA) in the field of cultural heritage research, generating new knowledge and sharing good practice.

The Member States that joined the EU in 2004, and in 2007, are now fully integrated in research projects and have even gained a certain leadership. In addition, Associated Countries, like Norway, are very active participants in FPs. Likewise Third Countries, especially from the Mediterranean area, are also becoming increasingly involved as FP7 progresses.

As the promotion of partnering and collaboration is a central objective of the European Commission (EC), this can be seen as a success. Nevertheless the fragmentation of this research area still needs to be addressed and should be overcome through better coordination.

Although many promising products and tools have been developed in various FP5 and FP6 projects, the main weakness of cultural heritage research projects is the poor exploitation of otherwise promising results. Most of the projects have been launched by research organisations or higher research institutions and the final project achievements or outputs do not sufficiently address the needs of stakeholders and end-users.

In FP5 and FP6, the instruments for research and development projects were oriented towards the resolution of a specific issue or problem and the protection/dissemination of knowledge and promotion of exploitation, but not towards tackling barriers to the commercialisation of new products and tools.

## 3 Overview of FP7 cultural heritage projects

### Introduction

The 25 FP7-funded cultural heritage research projects analysed in this survey represent a broad range of concepts and challenges in Europe's efforts to protect and preserve cultural heritage against potential environmental impacts. They aim for a better understanding, management and coordination of approach to conservation.

There are numerous and serious threats to the preservation of European cultural heritage. These include pollution from vehicle and industrial emissions, heating and air-conditioning, natural and human hazards. The cultural heritage assets at risk are both moveable (such as paintings, sculpture, manuscripts) and immovable (buildings and their artistic and architectural features such as frescoes, balconies, staircases). Their surfaces can react to changes in temperature and humidity, and with chemicals and gases to change colour, crack, corrode or crumble. Their structures can be attacked by pests, or destroyed by the powerful forces of earthquakes or floods.

The peculiar locations, construction or composition of cultural heritage assets compared to modern counterparts can mean greater vulnerability to natural and human-induced damage. Failure of diagnosis, of advance warning, coordination or appropriate solutions can hinder efforts to address these vulnerabilities. The economic and social costs of acting too little and too late are enormous: more extensive repairs and restoration works are required, and in some cases invaluable cultural heritage assets are lost altogether.

It is critical, therefore, to develop new and better tools and methodologies to sensitively map, monitor and predict the risks from environmental impacts. These and a rapid sharing of data are essential for an integrated and rapid response by heritage management and conservation teams.

Key features shared by all projects described in this study are the existence of international partnerships between scientists and other professional engaged in cultural heritage conservation, including curators, conservators, managers, architects, and small to medium-sized businesses. This diversity of expertise encourages the development and wide dissemination of adequate strategies and appropriately tailored novel products and technologies to heritage professionals.

For the purpose of this study, the 25 projects are grouped into six topic areas, according to a common goal or application: damage assessment and preventive conservation; predicting and responding to climate change and extreme events; mapping and monitoring – scaling up and zooming in; traditional and advanced materials and technologies for improved conservation; enhanced energy efficiency in historic buildings and urban districts; coordination of national research programmes and priorities.

## CHALLENGE N° 1

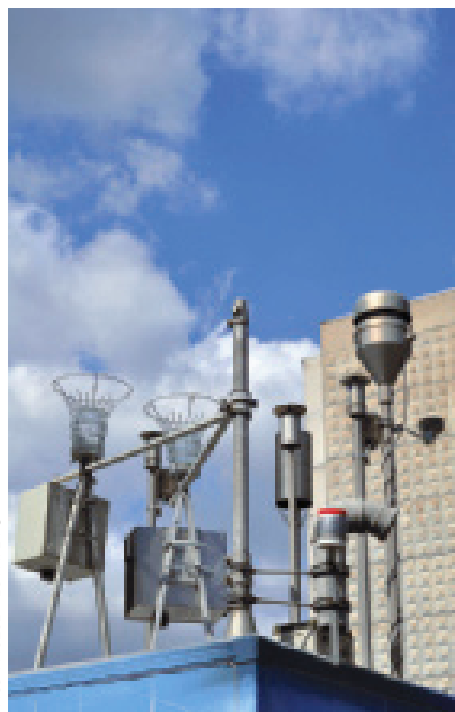
## Damage assessment and preventive conservation

Damage from pollution can severely affect the exterior facades of historic buildings, but this is not the whole picture: collections preserved inside historic or recent buildings are also at risk. The focus of this cluster of projects is on developing forecasting models, advanced sensor technologies and early-warning devices for assessing and monitoring the impact of both outdoor and indoor pollution to develop an adequate preventive conservation strategy.

Total EU contribution | **EUR 10 069 989**

Number of countries with project partners | **22**

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### THE PROJECTS

#### MEMORI

Providing the conservation market with innovative, non-destructive and early-warning devices to assess indoor environmental conditions for protecting organic materials displayed in museums collections.

More info | [www.memori-project.eu](http://www.memori-project.eu)

#### MUSECORR

Providing the conservation market with highly sensitive sensors to monitor, in real-time, the corrosive potential of indoor pollutants on metal, to protect heritage objects in museums collections.

More info | [www.musecorr.eu](http://www.musecorr.eu)

#### POPART

Developing a European-wide acceptable strategy for assessing the deterioration of plastics to preserve and maintain the 20th century plastic art in museums.

More info | [www.popart.mnhn.fr](http://www.popart.mnhn.fr)

#### SMooHS

Developing marketable modular prototypes of wireless sensors and networks to monitor environmental impacts on historic buildings, to tackle better and prevent the processes of deterioration.

More info | [www.smoohs.eu](http://www.smoohs.eu)

#### SYDDARTA

Developing a prototype portable instrument for monitoring cultural heritage assets, by using '3D Hyperspectral imaging', which is also applicable for authentication purposes.

More info | [www.syddarta.eu](http://www.syddarta.eu)

#### TEACH

Developing a cost-effective kit from existing and new devices for monitoring the weathering of cultural heritage assets and correlating damage to materials displayed indoors caused by outdoor pollution, to develop an adequate preventive conservation strategy.

More info | [www.teach-project.eu](http://www.teach-project.eu)

## CHALLENGE N° 2

## Predicting and responding to climate change and extreme events

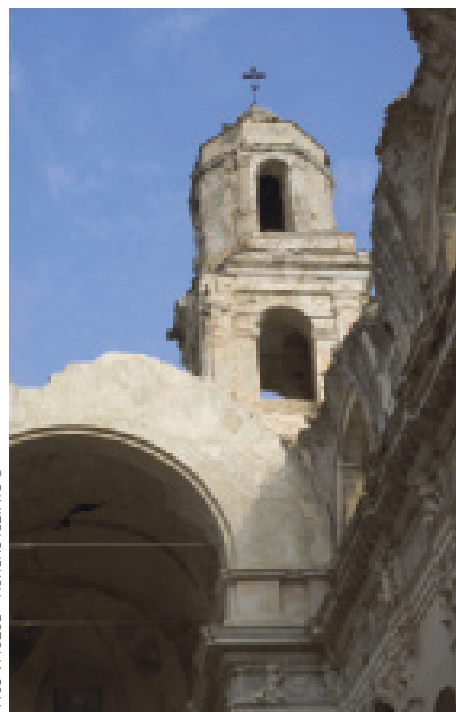
Climate change and extreme events such as earthquakes, fires, floods and storms, pose serious threats to cultural heritage, both movable and immovable.

The focus of this cluster of projects is on developing predictive models, early-warning devices and novel materials and technologies for adaptation and mitigation strategies. This will also contribute to the issuing of new guidelines, standards and policies whose scope goes even beyond the field of cultural heritage.

Total EU contribution | **EUR 12 635 547**

Number of countries with project partners | **22**

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### THE PROJECTS

#### CLIMATE FOR CULTURE

Predicting the risks for cultural heritage associated with climate change by using high resolution climate models and developing tools for mitigation and adaptation strategies tested at regional scale on a large number of case studies.

More info | [www.climateforculture.eu](http://www.climateforculture.eu)

#### FIRESENSE

Developing an integrated early-warning system based on wireless sensors, for monitoring remotely, archaeological sites and historic buildings in rural areas for the risk of wildfire and storms.

More info | [www.firesense.eu](http://www.firesense.eu)

#### NIKER

Developing advanced materials and technologies and assessing the risks to cultural heritage in specific regions, to improve the resistance of historic buildings to the forces of earthquakes.

More info | [www.niker.eu](http://www.niker.eu)

#### PERPETUATE

Assessing and modelling the vulnerability of structures and the way they behave during earthquakes in relation to their ground, foundations and building materials, and designing innovative, low impact and reliable strengthening interventions to prevent damage.

More info | [www.perpetuate.eu](http://www.perpetuate.eu)

## CHALLENGE N° 3

## Mapping and monitoring cultural heritage – scaling up and zooming in

For the preservation of cultural heritage it is crucial to develop and validate innovative cost-effective methods and non-destructive diagnostic technologies to map and monitor the state of preservation of, and the impact of environmental changes on, movable and immovable cultural heritage.

Global Information Systems, new data handling systems and robotised applications have the potential to meet these needs for a more sustainable approach to preserving archaeological and historic sites and buildings.

Total EU contribution | **EUR 6 962 730**

Number of countries with project partners | **17**



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### THE PROJECTS

#### ARROWS

Adapting technologies from military and space research and developing small low cost underwater robotic vehicles to reduce the cost of archaeological mapping, diagnosis and excavation.

Website under construction

#### EU-CHIC

Developing guidelines for harmonised and efficient methods and tools and indicators to monitor and periodically inspect historic buildings.

More info | [www.eu-chic.eu](http://www.eu-chic.eu)

#### SASMAP

Developing new tools, techniques and best practice guidelines for locating, assessing, monitoring and safeguarding underwater archaeological sites.

More info | <http://sasmap.eu/>

#### WRECKPROTECT

Developing tools for predicting the spread of wood-degrading shipworm, to protect shipwrecks and submerged archaeological sites in the Baltic Sea.

More info | [www.wreckprotect.eu](http://www.wreckprotect.eu)

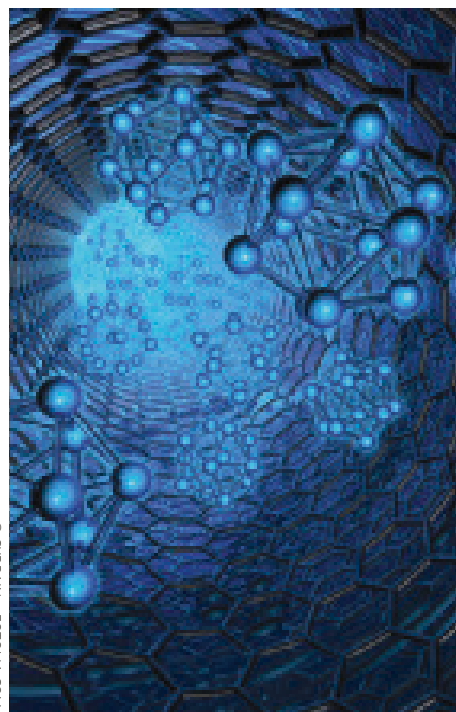
## CHALLENGE N° 4

## Traditional and advanced materials and technologies for improved conservation

In general traditional materials and techniques are used for conservation work. New materials and techniques (including bio- and nanotechnology) may offer additional and longer-lasting solutions, especially for consolidating, coating or cleaning to preserve cultural assets or improve their physical state. However, these advanced materials and technologies should be environmentally friendly and harmless for the user.

Total EU contribution | **EUR 13 553 027**

Number of countries with project partners | **20**



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### THE PROJECTS

#### HEROMAT\*

Developing innovative environmentally friendly materials for improved protection of historic buildings and monuments through consolidation, self-cleaning and anti-microbial action.

More info | [www.heromat.com](http://www.heromat.com)

#### IMAT

Designing and testing accurate, mobile and versatile heating mats, based on carbon nanotubes, for the conservation of cultural heritage objects.

More info | [www.imatproject.eu](http://www.imatproject.eu)

#### NANOFORART\*

Developing and testing new nano-materials and responsive systems for the conservation and restoration of moveable and immovable artworks as well as setting up related protocols.

More info | [www.nanoforart.eu](http://www.nanoforart.eu)

#### NANOMATCH

Integrating results from nanotechnology research with existing products, to ensure more effective preservation of wood, stone and glass.

More info | [www.nanomatch-project.eu](http://www.nanomatch-project.eu)

#### PANNA

Developing new coatings which are compatible with historic materials (stone, metal and paint), and a new atmospheric plasma torch for cleaning, deposition and removal.

More info | [www.panna-project.eu](http://www.panna-project.eu)

#### ROCARE

Ensuring the production of high quality Roman cement at industrial scale, to supply the market for the conservation of historic buildings.

More info | [www.rocare.eu](http://www.rocare.eu)

\* Projects managed by DG Research and Innovation, 'Industrial Technologies' Directorate.

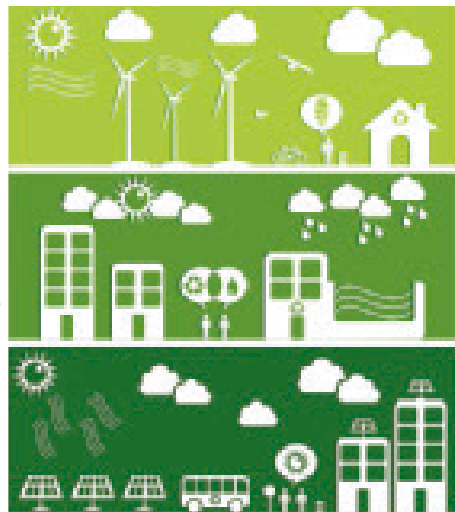
## CHALLENGE N° 5

## Enhanced energy efficiency in historic buildings and urban districts

Historic quarters give uniqueness to our cities. They are a living symbol of Europe's rich cultural heritage and reflect society's identity. However, historic buildings are not energy efficient and are substantial contributors to greenhouse gas emissions and rising energy bills. At a time when climate change poses a real and urgent threat to humanity and its infrastructure, it is vital to improve our approach to the refurbishment of historic buildings and prevent their destruction. However, these interventions should respect the historic and cultural value of the building. Therefore, research teams are developing new solutions to improve and monitor the energy efficiency of historic buildings, from the level of individual structures to entire urban districts.

Total EU contribution | **EUR 9978897**

Number of countries with project partners | **18**



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### THE PROJECTS

#### 3ENCULT

Developing solutions for improving the energy efficiency at a historic building scale by designing and testing new products and tools and by contributing to the Directives on Energy Performance of Buildings and related European standards.

More info | [www.3encult.eu](http://www.3encult.eu)

#### EFFESUS

Developing a methodology, technologies and tools for energy-efficient interventions on historic buildings in urban areas, which take into account their cultural value. Results will include a Decision Support System and multi-scale model to aid energy management on a district-wide scale.

Website under construction



## CHALLENGE N° 6

## Coordination of national research programmes and priorities

In addition to collaborative research projects, there are other types of projects aiming at promoting better coordination within the very fragmented field of cultural heritage research.

The European Commission encourages and supports efforts from Member States and Associated Countries to jointly programme their research activities. Public authorities, funding agencies, research organisations and private companies are joining forces and working together in the related aspects of research and education.

Total EU contribution | **EUR 4 151 247**

Number of countries with project partners | **17**

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### THE PROJECTS

#### CHRESP

The 8th European Commission Conference on Sustaining Europe's Cultural Heritage through fostering dissemination, exploitation and setting-up of research spin off for the benefit of end-users, conservators and restorers, managers and owners of cultural patrimony.

More info | [http://ec.europa.eu/research/environment/pdf/publications/fp7/cultural\\_heritage/chresp\\_preprint.pdf](http://ec.europa.eu/research/environment/pdf/publications/fp7/cultural_heritage/chresp_preprint.pdf)

#### JHEP

Providing administrative and logistical support to the setting up, and initial implementation, of the Joint Programming Initiative (JPI) for research on 'Cultural Heritage and Global Change: a new challenge for Europe', which aims at the preservation of tangible, intangible and digital cultural heritage.

More info | [www.jpi-culturalheritage.eu/jhep](http://www.jpi-culturalheritage.eu/jhep)

#### NET-HERITAGE

The first significant initiative coordinating national programmes and supporting European programmes for research and training applied to the protection of tangible cultural heritage.

More info | [www.netheritage.eu](http://www.netheritage.eu)

## 4 Conclusion and future trends

This survey reveals that European cultural heritage research has gained a significant presence through successive rounds of EU funding. This is evident through an increasing number of projects involving networks of European partners, with a wide geographical spread. Partners from Associated Countries and Third Countries from around the Mediterranean are also becoming active players.

By analysing the outcomes of FP5, FP6 and FP7 supported projects several important trends can be identified. In particular, and in keeping with a more marked push for practical outcomes, FP7 projects have contributed to a significant number of new methodologies, strategies, databases and guidelines for diagnosing, monitoring and predicting environmental impacts on cultural heritage assets. Many projects have also produced new instruments, software, products or materials. The range of possible topics widened during FP7 to cover, for example, the evaluation of risks from extreme events and the preservation of cultural landscapes and underwater archaeological sites. Furthermore, women have taken increasingly prominent roles, as project coordinators or Work Package leaders.

It may also be observed that FP7 projects in cultural heritage research have significant numbers of industry partners, including SMEs, with an emphasis on marketable tools and products, and cooperation for the purpose of technology transfer and industrial manufacture. This proves the potential of cultural heritage research to boost the European economy and create new job opportunities.

More and more efforts have been put into strengthening collaboration and cooperation among all relevant stakeholders such as researchers, policy-makers, SMEs, conservation professionals, and Member States through the representatives of their national organisations. However, there is still scope for reducing fragmentation further through improvements on existing levels of coordination. This is also why the Joint Programming Initiative (JPI) on 'Cultural Heritage and Global Change: a new challenge for Europe', a Member State driven initiative, has been launched with the support of a Coordination Action funded by the European Commission. The overall initiative aims at bringing together a diverse set of partners in order to develop a Strategic Research Agenda on cultural heritage research, and is expected to prepare and implement joint activities and calls for proposals.

With FP7 drawing to a close at the end of 2013, the European Union is looking to the next programme for Research and Innovation, 'Horizon 2020', which aims for 'smart, sustainable and inclusive growth'. This involves three mutually reinforcing priorities: 'Excellent Science', 'Industrial Leadership' and 'Societal Challenges'. The latter includes climate change, resource efficiency and raw materials, which also integrates sustainable land development.

The conservation and safeguarding of cultural heritage involves issues interconnected with all these priorities. Both the Framework Programmes and the initiatives encouraged by the European Commission, such as the 'Public Private Partnership (PPP)' on 'Energy-efficient buildings' or the JPI on 'Cultural Heritage and Global Change: a new challenge for Europe', aim at reinforcing links across these priorities.

It is expected that 'Horizon 2020' will continue promoting multidisciplinary and cross-cutting aspects of cultural heritage research. Indeed research on cultural heritage significantly contributes to the European Research Area and is pioneering the future of EU research by its strong efforts to coordinate research within and across Member States and its substantial mobilisation of public and private stakeholders and funding.

## 5 Annexes

### Annex 1

Country names	ISO 3166-1-alpha-2 code	Country names	ISO 3166-1-alpha-2 code	Country names	ISO 3166-1-alpha-2 code
ALGERIA	DZ	ICELAND	IS	PALESTINIAN TERRITORY OCCUPIED	PS
AUSTRIA	AT	INTERNATIONAL NON-GOVERNMENTAL ORGANISATIONS	INO	POLAND	PL
BELGIUM	BE	IRELAND	IE	PORTUGAL	PT
BOSNIA AND HERZEGOVINA	BA	ISRAEL	IL	ROMANIA	RO
BRAZIL	BR	ITALY	IT	RUSSIAN FEDERATION	RU
BULGARIA	BG	JORDAN	JO	SERBIA	RS
CROATIA	HR	LATVIA	LV	SLOVAKIA	SK
CYPRUS	CY	LITHUANIA	LT	SLOVENIA	SI
CZECH REPUBLIC	CZ	LUXEMBOURG	LU	SPAIN	ES
DENMARK	DK	MALTA	MT	SWEDEN	SE
EGYPT	EG	MEXICO	MX	SWITZERLAND	CH
ESTONIA	EE	MOROCCO	MA	TAJIKISTAN	TJ
FINLAND	FI	NETHERLANDS	NL	TUNISIA	TN
FRANCE	FR	NORWAY	NO	TURKEY	TR
GERMANY	DE			UNITED KINGDOM	GB
GREECE	GR			UNITED STATES	US
HUNGARY	HU				

### Annex 2

List of EU cultural heritage projects in FP5, FP6 and FP7 (until 2012 included) funded within the environment programmes (see also website of the Environment Directorate of DG Research and Innovation: [http://ec.europa.eu/research/environment/index\\_en.cfm?pg=cultural](http://ec.europa.eu/research/environment/index_en.cfm?pg=cultural)).

#### FP5 EESD projects

**APPEAR** Accessibility projects – sustainable preservation and enhancement of urban subsoil archaeological remains.

**ASSET** Assessment of suitable products for the conservation treatments of sea-salt decay.

**BACPOLES** Preserving cultural heritage by preventing bacterial decay of wood in foundation piles and archaeological sites.

**BIOBRUSH** Novel approaches to conserve our European heritage: Bioremediation for building restoration of the urban stone heritage in European states.

**BIODAM** Inhibitors of biofilm damage on mineral materials.

**BIOREINFORCE** Biomediated calcite precipitation for monumental stones reinforcement.

**CARAMEL** Carbon content and origin of damage layers in European monuments.

**CATS** Control and preventive strategies to avoid damage caused by cyanobacteria and associated micro-organisms in Roman hypogean monuments.

**CHEPRISS** Cultural heritage protection in a sustainable society.

**COALITION** Concerted action on molecular microbiology as an innovative conservation strategy for indoor and outdoor cultural assets.

**COLLAPSE** Corrosion of lead and lead-tin alloys of organ pipes in Europe.

**COMPASS** Compatibility of plasters and renders with salt loaded substrates in historical buildings.

**CURE** (\*) Centre for urban construction and rehabilitation: technology transfer, research and education.

**DEMOTEC** Development of a monitoring system for cultural heritage through European cooperation – accompanying measure.

**DIAS** Integrated tool for in-situ characterization of effectiveness and durability of conservation techniques in historical structures.

**FIRE-TECH** Fire risk evaluation to European cultural heritage.

**FRIENDLY HEATING** Both comfortable for people and compatible with conservation of art works preserved in churches.

**HISTO-CLEAN** Intelligent measurement technology for laser cleaning of historical buildings and monuments.

**IDAP** Improved damage assessment of parchment.

**IMPACT** Innovative modelling of pollution and conservation thresholds.

**INKCOR** Stabilisation of iron gall ink-containing paper.

**ISHTAR** (\*) Integrated software for health, transport efficiency and artistic heritage recovery.

**ITECOM** Advanced study course: innovative technologies and materials for the conservation of monuments.

**ITER** Isotopic technologies applied to the analysis of ancient Roman mortars.

**LASERACT** Laser multitask non-destructive technology in conservation diagnostic procedures.

**LICONS** Low intrusion conservation systems for timber structures.

**LIDO** A light dosimeter for monitoring cultural heritage: development, testing and transfer to market.

**MASTER** Preventive conservation strategies for protection of organic objects in museums, historical buildings and archives.

**MIMIC** Microclimate indoor monitoring in cultural heritage preservation.

**MIP** Transition metals in paper.

**MODHT** Monitoring of damage to historical tapestries.

**MULTI-ASSESS** Model for multi-pollutant impact and assessment of threshold levels for cultural heritage.

**ONSITEFORMASONRY** On-site investigation techniques for the structural evaluation of historical masonry buildings.

**PANEURO** 5th EC conference 'Cultural Heritage Research: a pan-European Challenge'.

**PAPYLUM** Chemiluminescence: a novel tool in paper conservation studies.

**PARELA** Paper restoration using laser technology.

**ROCEM** Roman cement to restore the built heritage effectively.

**RUFUS** (\*) Re-use of foundations for urban sites.

**SUIT** Sustainable development of urban historical areas through an active integration within towns.

**SUSTAINABLE HERITAGE** Advanced study course on science and technology of the environment for the sustainable protection of cultural heritage.

**VIDRIO** Determination of conditions to prevent weathering due to condensation, particle deposition and micro-organism growth on ancient stained glass windows with protective glazing.

\* The projects CURE, ISHTAR and RUFUS were implemented through the Key Action 'City of tomorrow and cultural heritage' of the FPS EESD programme but developed in the framework of the urban part of this Key Action and cover only partially cultural heritage issues.

## FP6 SSP projects

**ARCHAIA** Training seminars on research planning, characterisation, conservation and management in archaeological sites.

**ARCHAEOMAP** Archaeological management policies.

**AUTHENTICO** Authentication methodologies for metal artefacts based on material composition and manufacturing techniques.

**CHEF** Cultural heritage protection against flooding.

**CHRAF** Priorities and strategies to support cultural heritage research activities within ECTP and future FP7 activities.

**COINS** Combat online illegal numismatic sales.

**CONSIST** Comparison of conservation materials and strategies for sustainable exploitation of immovable industrial cultural heritage made of iron and steel.

**CONSTGLASS** Conservation materials for stained glass windows – assessment of treatments, studies on reversibility and performance of innovative restoration strategies and products.

**CULT-STRAT** Assessment of air pollution effects on cultural heritage – management strategies.

**DESALINATION** Assessment of desalination mortars and poutices for historic masonry.

**FING-ART-PRINT** Fingerprinting art and cultural Heritage – in situ 3D non-contact microscale documentation and identification of paintings and polychrome objects.

**GRAFFITAGE** Development of a new anti-graffiti system, based on traditional concepts, preventing damage to architectural heritage materials.

**MULTI-ENCODE** Multifunctional encoding system for assessment of movable cultural heritage.

**NOAH'S ARK** Global climate change impact on built heritage and cultural landscapes.

**PAPERTREAT** Evaluation of mass deacidification processes.

**PICTURE** Pro-active management of the impact of cultural tourism upon urban resources and economies.

**PROPAINT** Improved protection of paintings during exhibition, storage and transit.

**SALTCONTROL** Prevention of salt damage to the built cultural heritage by the use of crystallisation inhibitors.

**SAUVEUR** Safeguarded cultural heritage – understanding and viability for the enlarged Europe.

**SENSORGAN** Sensor system for detection of harmful environments for pipe organs.

**SPRECOMAH** Seminars on preventive conservation, monitoring and maintenance of the architectural heritage.

**SurveNIR** Near-infrared spectroscopy tool for collection surveying.

**SUSTAINING HERITAGE** 6th European Commission conference 'Sustaining Europe's cultural heritage: from research to policy'.

## FP7 projects (until 2012 included)

**ARROWS** Archaeological robot systems for the world's seas.

**CHRESP** 8th European Commission conference 'Cultural heritage research meets practice'.

**CLIMATE FOR CULTURE** Damage risk assessment, economic impact and mitigation strategies for sustainable preservation of cultural heritage in the times of climate change.

**EFFESUS** Energy efficiency for EU historic districts sustainability.

**EU-CHIC** European cultural heritage identity card.

**FIRESENSE** Fire detection and management through a multi-sensor network for the protection of cultural heritage areas from risk of fire and extreme weather conditions.

**HEROMAT (\*\*)** Protection of cultural heritage objects with multifunctional advanced materials.

**IMAT** Intelligent mobile multipurpose accurate thermoelectrical mild heating device for art conservation.

**JHEP** Coordination action in support of the implementation of a JPI on cultural heritage and global change: a new challenge for European Commission.

**MEMORI** Measurement, effect assessment and mitigation of pollutant impact on moveable cultural assets – Innovative research for market transfer.

**MUSECORR** Protection of cultural heritage by real-time corrosion monitoring.

**NANOFORART (\*\*)** Nanomaterials for the conservation and preservation of movable and immovable artworks.

**NANOMATCH** Nanosystems for the conservation of immovable and moveable polymaterial cultural heritage in a changing environment instrument.

**NET-Heritage** European network on research programme applied to the protection of tangible cultural heritage.

**NIKER** New integrated knowledge based approaches to the protection of cultural heritage from earthquake-induced risk.

**PANNA** Plasma and nano for new age 'soft' conservation.

**PERPETUATE** Technologies for protecting cultural heritage assets from risks and damages resulting from extreme events, especially in the case of earthquakes.

**POPART** Strategy for the preservation of plastic artefacts in museum collections.

**ROCARE** Roman cements for architectural restoration to new high standards.

**SASMAP** Development of tools and techniques to survey, assess, stabilise and preserve underwater archaeological sites.

**SMooHS** Smart monitoring of historic structures.

**SYDDARTA** System for digitization and diagnosis in art applications.

**TEACH** Technologies and tools to prioritise assessment and diagnosis of air pollution impact on immovable and movable cultural heritage.

**WRECK PROTECT** Strategies for the protection of shipwrecks in the Baltic Sea against forthcoming attack by wood degrading marine borers.

**3ENCULT** Efficient energy for EU Cultural Heritage.

\*\* Projects managed by DG 'Research and Innovation'/Directorate 'Industrial Technologies'.

European Commission

**EUR 25503 EN – Cultural heritage research: survey and outcomes of projects within  
the Environment Theme – From 5th to 7th Framework Programme – 2012 Edition**

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Europe's cultural heritage is invaluable and irreplaceable, and yet faces numerous environmental threats. Since 1986, the European Union (EU) has supported research and innovation projects aiming to improve the preservation of cultural heritage. This study represents a synthesis of all cultural heritage research projects funded within the Environment Theme, up to 2012, through the EU's Framework Programmes (FPs) FP5, FP6 and FP7.

The projects were analysed according to criteria including the types of organisations involved, their geographical distribution, types of outcomes and their impacts (social, economic and political), as well as the level of cooperation and coordination among partners. A separate section gives an overview of 25 projects funded through FP7, grouped into thematic clusters according to six different challenges.

It emerges from this analysis that throughout the various Framework Programmes (FPs) the networking within and between project consortia has contributed to improving the knowledge needed for preserving cultural heritage and has created a European research community in the field of cultural heritage preservation.

Although the dissemination of project results is embedded in each project, there is room for improvement in terms of knowledge transfer and commercial exploitation of results. The commercialisation process would certainly benefit from the help of specialists in this field. Fragmentation is still a major issue in cultural heritage research. In line with the general approach of the European Research Area (ERA), further efforts are required to improve communication and coordination of research, including the strengthening of links with policy and user needs. It is important that research leads to practical solutions for conservation experts and that it results in viable tools for the widest possible circle of end-users.

### *Studies and Reports*

