ABSTRACT: For the protection of Cultural Heritage from environmental damage and in particular against flood, a research project has been proposed under the 6th European Framework Program to support policy-oriented research. The main aim is the development of preventive conservation strategies and the identification of appropriate measures. Clear recommendations for mitigating or removing damage from Cultural Heritage objects will be provided through the project results. CHEF proposes the integration of multidisciplinary research as scientific support to European policies. In this frame the necessary technological basis and cost efficient and effective tools for the development of new and innovative strategies will be provided.

1 INTRODUCTION

The European Community has suffered from disastrous floods in recent years, which caused enormous damages (compare Fig. 1) and left hundreds of people dead in several European countries. The flooding occurred across regional borders and involved neighbouring states along the rivers Elbe (2002), Odra (1997), Rhine (1993 and 1995) and many more. Floods can not be prevented. Europe will have to face further flood catastrophes due to the change of climate and due to further building activities in flood-prone regions [1] [2] [3].

Although very comprehensive, projects, strategies and further administrative measures, which started after the recent flood events, do not
include the particularities of movable and immovable Cultural Heritage like objects in museums and libraries, historic buildings, parks and sites (historic cities), which are threatened by flood catastrophes. For protecting the common European Cultural Heritage against flood hazards and environmental conditions related to flood, a focus has to be put on the mapping of the above mentioned risk-areas including the objects worthy of protection. It is required to assign a high protection level to particular monuments or to areas where valuable historic sites are located [4].

This decision requires a lot of knowledge and experiences, because a multitude of reasons can have an influence on the characterisation and classification of these objects. The aspects which have to be considered vary from historic significance and context of the object, building structure or landslide to technical problems like lack of documentation, unknown structural condition and assembly, unknown material properties and characteristics or unknown parameters of exposure.

Thus, a research project titled Cultural Heritage Protection against Flood (CHEF) has been proposed under the 6th European Framework Program to support policy-oriented research. The main goal of the CHEF project is avoiding or mitigating the damage of movable and immovable Cultural Heritage related to flood by considering preventive and emergency measures, damage evaluation methodologies, as well as restoration and repair techniques. The project will bring together existing information and experiences regarding flood problems and contains innovative aspects based on experimental and theoretical research activities in the laboratory and on-site.

The project CHEF contributes to the call area 8.1 B.3.6 The protection of Cultural Heritage and associated conservation strategies, Task 4: To help protect Cultural Heritage from environmental damage particularly in relation to flooding: to develop preventive conservation strategies, to identify appropriate measures and to provide clear recommendations for mitigating or removing damages from Cultural Heritage objects, particularly in relation to flooding; policy-oriented research, Scientific Support to Policies (SSP) by considering aspects varying from historic significance and context of the object, building structure or landslide to technical problems like lack of documentation, unknown structural condition and assembly, unknown material properties and characteristics and unknown parameters of exposure.

2 PROJECT OBJECTIVES AND POTENTIAL IMPACT

As flooding is a very complex phenomenon, a project, targeting at investigating flood mechanisms and related issues, has to reach for ambitious goals. Looking at the work plan of CHEF, it appears that the project can be regarded as a series of interwoven tasks and activities, which try to bring out the big picture and integrate many different aspects of flooding and Cultural Heritage protection. In the following an overview about the main objectives, each reflected also by a designated work package, is given:

1 Classification of movable and immovable Cultural Heritage according to their vulnerability and sensitivity to flood

a. Analysis of previous floods and related environmental hazards, quantification of their characteristics in terms of suitable hydraulic parameters
b. Evaluation of results of related projects
c. Analysis of exposure by means of adequate survey
d. Risk assessment of Cultural Heritage based on quantified hazards, exposure maps and GIS.

2 Analysis and classification of damage processes in different materials (soil, brick, stone, wood, metal, textile, paper, etc), structures (buildings, bridges) and sites (cities, gardens, archaeological sites) induced by flood and flood related environmental impacts in close cooperation with museums and further stakeholders. This includes:

a. Set-up of a damage catalogue
b. Investigation of the influence of water, salt and biodegradation on material properties
c. Comparison to results of modelling.

3 Validation and evaluation of methods and sensors for non-destructive testing and monitoring of material and structural parameters, environmental technologies will have to be provided.

4 Definition of threshold levels for exposure and damage before restoration, also in relation to the use of the objects/buildings.

5 Analysis of preventive measures before flood and temporary (emergency) measures during and soon after flood for movable and immovable Cultural Heritage. The influence of these measures on material and structure will be addressed.

6 Assessment of restoration and repair techniques after flood.

7 Assessment of running and new case studies on different objects concerning infrastructure, buildings, parks, cities.

8 Generation of practical recommendations by definition of strategies for the protection, conservation and repair of movable and immovable Cultural Heritage.

The potential impact of the project on the conservation of Cultural Heritage is direct and transparent: The strategies to be developed in the project can help to make protection and repair of Cultural Heritage against flood and related hazards far more effective and allow carrying out these measures on a large scale. With a reasonable management of Cultural Heritage sites, whole neighbourhoods can be prevented from deterioration. Another aspect is the understanding of damage processes not only induced by flood but also by other aggressive environmental conditions, such as air pollution, microclimate, earthquakes, traffic vibrations, etc. This knowledge will help to take precautions against it and will thus reduce the impact of environmental damage on historic structures. But also social problems like unemployment, equal opportunities and health and safety of citizens will be positively influenced by CHEF. The project results will be disseminated by publications, project reports, contacts with end-users and mainly by publishing recommendations which will be practical and adapted to the needs of a broad array of institutions, operational services and specialists in the public sector dealing with civil protection, land development, regional planning and risk management.

3 WORK PLAN

The scientific and technological approach aims at identifying characteristic parameters for flood and flood related hazards, which have an impact on movable and immovable Cultural Heritage depending on their vulnerability (compare Fig. 3 and 4). The understanding of damage processes in materials and structures by using environmental technologies will provide the basis for evaluation and further developing strategies for preventing, mitigating and repairing damages at Cultural Heritage related to the objectives and policies of the European Community. It is planned to implement a project with a clear multidisciplinary approach as an obvious reaction upon the requirements described in task 4 of the above-mentioned call.

The research will be carried out through eight work packages. These work packages and their interaction will provide a clear progress beyond the current state of the art:

- WP1: Identification of typical environmental hazards related to flood and being decisive to Cultural Heritage. Here, flood mechanisms and hydrology will be one important aspect. Movable and immovable Cultural Heritage will be classified according to its sensitivity. This is going to be investigated in the first of the work packages and serves mainly as an input for the measures, strategies and methods, which are worked on in detail in the subsequent
work packages. This part of the project will also provide an overview about existing plans for protection of Cultural Heritage objects and will examine the experiences (historic and recent) made during floods especially in Europe. The threat posed at Cultural Heritage by flooding is quantified in this subtask, based on the analysis of existing literature and archived documents. The selection of the best-suited technical investigation tools is also addressed, with reference to the hydraulic and hydrologic models available and their interpretation in view of Cultural Heritage vulnerability assessment.

The work of WP 1 will be carried out by the institutions ITAM, CRUIE and IDK\textsuperscript{1}.

- WP2: Damage analysis of different materials and movable Cultural Heritage, their properties and their interaction with moisture, salt, pollution and other phenomena related to flooding catastrophes. In this context a survey of possible flood-related damage, a validation of non-destructive and minor-destructive methods for damage detection and quantification, a classification of damage and the definition of damage threshold will be given. The direct contact of water and contaminants occurring during the flood as well as the modified environmental conditions after the flood leads to various damages and/or contaminations of soil, building materials and movable heritage objects. These damages and modifications strongly depend on the flood and environmental parameters (duration of flood, height of water, flow rate, contaminations, temperature, etc), on the type of material (brick, stone, metal, wood, paper, textile, etc), on the material parameters (porosity, grain size, density, etc) and the structure and conditions of the objects. Therefore, the damages are manifold and gained knowledge from recent floods and a damage classification is urgently required.

The work of WP 2 will be carried out by the institutions BAM, TUD and ISML.

- WP3: Classification of damage on historic structures and sites including buildings, infrastructure (e.g. bridges) and cities for understanding the mechanisms of damage. Static and dynamic loading, moisture and salt transport, contamination and erosion problems will be considered as well as the vulnerability of whole structures and sites. Investigations will be based on previous experience, new and existing data recorded from on-site investigations, monitoring and laboratory tests and numerical simulations. Existing databases and past experience will be analysed and damages as they belong to types of buildings or structures and to sites will be summarized related to different materials. A damage catalogue containing exposure data and applicability tips for remedial works will be created. Damage as well as protective measures will be analysed in order to identify the most urgent problems for further more detailed studies. Previously defined vulnerability indicators will be validated (element-at-risk, susceptibility and exposure). A cooperation with the User Group will be mobilised and exploited.

The work of WP 3 will be carried out by the institutions ITAM, POLIMI and IDK.

- WP4: According to the long term experience the best preventive measure for movable heritage objects is their replacement from endangered localities to safe storage. Such a simple procedure failed in many recent cases and this sub-task is suggested to analyse the reasons and to prepare more robust and reliable approaches. Therefore, its main focus will be not only on administrative measures but it will involve also technical measures as well as critical evaluation of methods and possible needed improvements. Preventive measures for immovable heritage are designed according to the classification of individual objects at risk. Conventionally, both “structural” and “non-structural” interventions are addressed in flood protection related issues; the latter ones include both macro-structural interventions, when involving interventions along the river network, and micro-structural ones, when limited to the passive protection of the resources located on the flood prone territory. The management of objects and sites is usually ensured by different subjects and also the measures and their impacts may differ quite substantially. Therefore, the objects are treated separately from site to site. Temporary emergency measures prepared before the flood and their

\textsuperscript{1} The abbreviation and full names of the involved institutions will be explained in the next section.
effectiveness will be studied considering technical measures. This will encompass temporary barriers as well as construction measures for stabilization of the whole building or strengthening of structures based on knowledge of building condition and probable exposure parameters. For restoration and repair, post-flooding short term techniques (drying and dehumidification, reducing temperature, after flood care etc.) as well as long term techniques (pollution removal, salt removal, desalination etc.) for repair of damage of historic building materials, which require a very distinct and careful treatment (paintings, frescoes, original building materials) shall be collected and critically analyzed. To correctly perform a restoration activity after catastrophic events, it is highly recommended to execute a careful diagnosis on the damaged works of art.

The work of WP 4 will be carried out by the institutions ITAM and ZAG.

- **WP5**: Assessment of running and new case studies on different objects concerning infrastructure, buildings, parks, cities. Two to three cases will be studied in detail concerning a multitude of aspects like a small castle surrounded by a park and containing a museum. Full-scale models in the shape of small buildings will be also used as intermediate case between laboratory and real buildings. It will be studied how historic floods occurred and have geographically spread. Former concepts and methods used to restore the affected case studies are going to be evaluated. An analysis of previous and running case studies carried out in similar projects will be part of this work package in order to get a wider base for the development of recommendations and guidelines.

The work of WP 5 will be carried out by the institutions ECOLAND, ITAM, IDK, CRUIE and POLIMI.

- **WP6**: Development of guidelines and recommendations for the strategies concerning the assessment of vulnerability of Cultural Heritage against flood, the prevention and mitigation of damage, the emergency and the medium and the establishment of long term post-flooding action plans is the main subject of this work package. The collected damages (damage catalogue) as well as the case studies will be included in existing data bases. A development of strategies for the protection and conservation of buildings, historic areas, movable Cultural Heritage objects which bear the risk of flooding is taking place in close collaboration with the end-users. Meetings during the project will serve as knowledge exchange between consortium members and end-users. Towards the end of the project, an open workshop will be organised.

The work of WP 6 will be carried out by the institutions ITAM, CRUIE and IDK.

- **WP7**: The work in the project has to be framed within a strict project management. This work package includes the administrative and the technical coordination of the project. The coordinator is supported by the WP-Leaders, who take on the responsibility for the technical supervision in their work packages.

The work of WP 7 will be carried out by BAM.

- **WP8**: The planning of dissemination activities will be carried out during the project under the leadership of the Exploitation Manager with involvement of WP-Leaders and User Group members. This task includes the dissemination of non confidential information about the project objectives and work plan, coming events (seminars), published papers, demonstration actions, training courses, lectures at universities and especially the dissemination of the final practical recommendations.

The work of WP 8 will be carried out by the institutions ITAM, BAM and IDK.

### 4 PARTNERS AND USER GROUP

The consortium includes members from 7 different European countries:

1. Bundesanstalt für Materialforschung und –prüfung, Berlin, Germany (BAM)
2. Institute of Theoretical and Applied Mechanics ITAM ASCR v.v.i., Prague, Czech Republic (ITAM)
3. Institut für Diagnostik und Konservierung an Denkmalen in Sachsen und Sachsen-Anhalt e.V., Dresden, Germany (IDK)
4. University of Genova, Italy (CRUIE)
5. Slovenia National Building & Civil Engineering Institute, Ljubljana, Slovenia (ZAG)
6. University of Innsbruck, Austria (UIBK)
7. Technische Universität Dresden, Germany (TUD)
8. UNESCO Chair ECOLAND, University of Bucharest, Romania (ECOLAND)
9. Department of Structural Engineering (DIS), Politecnico di Milano, Italy (POLIMI)
10. Industrial Microbiological Services Ltd., United Kingdom (IMSL)

These institutes provide a lot of experience on different skills related to flood protection of Cultural Heritage:

- Experience with problems related to civil and structural engineering with a strong focus on historic materials and structures
- Development of methods for testing and monitoring of different parameters of materials, structures and objects with only minor invasion
- Measuring climate and climate control of historic buildings
Figure 5. CHEF Consortium members during the Kick-Off Meeting on 26th of February 2007 in Brussels.

- Characterization of historic building material and successful implementation of modern material in historic structures and systems
- Numerical modelling, laboratory determination and experimental verification of transient hygrothermal transport processes in materials and building components; physico-chemical modelling (influence of salt transport and crystallisation) and physiobiological modelling (conditions for mould and algae growth) connected with deterioration and aging effects of the building substance
- Investigation of continuous drying out processes
- Structural assessment of historic building
- Structural modelling
- Town and urban planning and engineering of the territory
- Safeguard of the historic-architectonic heritage of city centres against the hydraulic and hydrological hazard, vulnerability assessment and mitigation initiatives
- Water and soil protection engineering, hydrology and water resources management
- Mechanical behaviour of soil, theoretical modelling (theory of hypoplasticity) and experimental determination of material parameters for soil models.

The balance between old EU member countries and new EU members together with associated states is especially adapted to the experience gained with floods from rivers and costs in neighbouring regions: Czech Republic, Slovenia, Romania, Austria, Italy, United Kingdom and Germany. These countries were heavily affected by flood hazards during the last 10 years.

To involve the public and to raise awareness it is important to plan dissemination actions, which target at many different groups. It is necessary to present the project and its objectives, results and approach in an easily understandable and straightforward way. To keep the balance between scientific approach and public acceptance is a difficult task, but the experienced consortium in cooperation with the User Group will be able to manage this.

It is envisaged that another major opportunity to promote the results obtained from the proposed project will be in the form of advice to local authorities, historic monument protection trusts and associations, national governments and the EU in the field of spatial development, specifically sustainable protection of historic monuments.

This in turn should serve to put future EU policies on protection of historic monuments onto an even more widely respected scientific footing both in Europe and world-wide.

The transfer of the research results will be in the form of reports, scientific papers in journals, presentations at international conferences, case study fact sheets, patents on novel technologies developed within the proposed project and an Internet Website. Other possibilities will be hands-on demonstrations and courses and the inclusion of the results in regulations and guidelines.

In the universities presented by the partners, the results of the research will be exploited through workshops and continuing education courses for the students.

Several dissemination activities are targeting at a broad audience and are meant to demonstrate the transformation of scientific research into a practical context.

All these actions have the following objectives:

- Exploitation of project results
- Information of possible users
- Information of public
- Integration of related projects
- Involvement of other organisations
- Transnational networking
- Future education of staff.

Dissemination activities will be organised by the Exploitation Manager in close co-operation with the coordinator and those project partners with close ties to end-user, managers or government or local officials responsible for operating and maintaining historic buildings. In that context the User Group plays an important role for the integration of organisations and other projects related to the maintenance and care of Cultural Heritage buildings.

The consortium of CHEF has already contacted several national trusts, authorities, companies, museums, universities in order to establish a large User Group for dissemination activities. Many institutions all over Europe have expressed their interest in the project and their willingness to support the activities.

5 FIRST RESULTS

Since the official project started in February 2007, some results are already available.
5.1 **Report on experiences from floods**

As an overview about the whole complex topic, it was necessary to perform a state of the art survey and to find out, which measures have been taken in the past to prevent or reduce the impact of natural flooding disasters and to survey possible repair interventions that have proven to be suitable for the restoration of valuable buildings after the flood.

Several factors are influencing Cultural Heritage and the losses due to flood and it is important to develop all-embracing strategies taking into account not only technical measures against flood but to consider also the “human factor” and other aspects that bare a threat to vulnerable buildings.

An evaluation of countermeasures against flood damage has to start with an analysis of former incidents. In many cases data are not available but still it is possible to draw valuable conclusions from reports and recordings of earlier catastrophes. Even the comparison of old pictures or photographs that show, how a Cultural Heritage building is located in its natural surrounding allows to identify some of the relevant characteristic parameters of flooding.

The “Report on experiences from previous and historic floods, summary about the characteristic parameters of these events” was worked out by the University of Genoa, Italy under the leadership of Prof. Luca Lanza and with the contributions of other project partners. It provides a summary of the experiences gained from major floods occurred in the past and their synthetic descriptive parameters, which may help in future assessment of the severity of floods in relation to Cultural Heritage. The main types of floods are presented, and typical problems are illustrated by means of recent and past examples related to the impact on Cultural Heritage.

The report is one of the agreed deliverables of the project and will be published after the next project meeting in April 2008.

5.2 **Interfaces to running Flood and Cultural Heritage projects**

Another deliverable of the project compiles a list of other projects, both national and international, related to mitigation of damages from floods. This report was made by the Institute of Theoretical and Applied Mechanics ITAM ASCR v.v.i., Prague, Czech Republic, led by Miloš Drdácký.

It provides basic information about other related running projects dealing with flooding, and on their impact on Cultural Heritage. An analysis is made also on other natural hazards, e.g. earthquake, landslides, subsidence etc. and their threat for Cultural Heritage.

The report “Interfaces to running Flood & Cultural Heritage projects” provides a list of identified projects and includes short comments on their content and main results.

The European Commission has launched several international research projects on natural hazards affecting Cultural Heritage. These projects are valuable for the CHEF project because most of them European relevance and provide highly objective information. To take advantage of the synergies of similar research projects it is necessary to use the contacts that have been established within many networks, especially with end-users, who are the most important addressees for the project results.

It is a major issue that during the next project years the listed contacts with the leaders and partners of the related projects will be activated in order to establish a common scheme for sharing experience and to collaborate in filling the gaps presently existing in our knowledge concerning protection of Cultural Heritage from flood effects.

Examples of very prominent international projects related to damage of flooding events are NOAH’S ARK [6], RIMAX [7], and ELLA [8]. The objectives of NOAH’S ARK (Global Climate Change Impact on Built Heritage and Cultural Landscapes, running from 2004–2007) were to determine the meteorological and climate change parameters that are most critical to the built cultural heritage. Moreover to research and address future expected damages and disseminate optimum adaption strategies. The RIMAX (Risk Management of Extreme Flood Events) project aims at developing and implementing improved instruments of flood risk management by the integration of different disciplines and several participants. It focuses on extreme flood events in river basins which means events with a return period of more than a 100 years and a highly destructive potential. ELLA (Preventive flood management measures by transnational spatial planning, running 2004-2007) focuses on damage related to flood events of the river Elbe in Germany. It is worked towards trans-national strategies and regional planning for flood control. This includes international knowledge, experience and data exchange.

5.3 **Literature compilation**

A large number of articles, publications, reports and websites have been collected and analyzed in order to get a broad overview about the topic. Especially for the recent floods in Germany and the Czech Republic in 2002 a lot of valuable material is available. For an effective analysis the material has been classified according to the following topics:

- Recommendations on floods
- Reports about floods – lessons learned
- Risk management of floods
- Damage of materials.
This compilation allows the comparison of countermeasures that have been taken in different European countries to reduce the impact of flooding. The reports about various regional flooding events show that the visible and invisible damages and consequences may vary significantly even if flooding occurs in the same region at different times.

5.4 Template for damage at Cultural Heritage objects/buildings

A questionnaire has been developed in the frame of the project to identify frequent and typical damage at Cultural Heritage objects or buildings. This questionnaire will be distributed among end-users and is meant to catch the users demand for investigation methods or for desired restoration activities. The template addresses owners or stakeholders of buildings and compiles information about damage that has affected a structural element, a building or an object of historic value. The record of damage includes meaningful pictures or illustrations and asks, in a first step, for the following criteria:

- Building/Object/Structural element
- Origin of damage
- Flood parameters
- Material properties
- Applied analysis methods: Applicable analysis methods
- Proposed method or activity for future protection
- Proposed method for restoration.

Flood-related damage, a classification of damage and the definition of damage threshold is the output of this task. Based on the results of this survey, the CHEF consortium will give recommendations and guidelines for specific risk minimizing actions, which can then be implemented in the contingency planning.

5.5 Laboratory research

To gain more knowledge about materials and movable Cultural Heritage, their properties and their interaction with moisture, salt, pollution and other phenomena related to flooding catastrophes the building materials itself are investigated. Experimental investigations will be combined with numerical modeling of structural behavior as well as of moisture transport. Together with deterministic models, probabilistic models to study the building and material vulnerability will be implemented. For experimental investigations, several non-destructive and minor destructive testing methods as well as sensors and equipment for monitoring will be evaluated and validated for selected testing problems.

In the frame of the FP5 project ONSITEFOR-MASONRY [9] [10], a large specimen has been constructed at BAM. This specimen, called “Obelix”, features several characteristics of historic masonry and was built for the validation of investigation methods. Traditional manufacturing techniques and historic materials were used to create a specimen, which is very similar to real historic buildings. One of its features is the possibility of defined moistening. “Obelix” is standing in a basin, allowing the simulation of ascending moisture and it contains several tubes, which enable a complete moisture penetration in some parts.

The specimen is particularly well suited for the investigation of moisture and salt transport and for the development or testing of sensors.

5.6 CHEF website

A project website has been established (www.chef.bam.de), offering an overview about the project and its work packages. Anyone interested is invited to get into contact with the consortium members and to get informed about recent project activities.

6 MEETINGS

The success of the project will definitely be based on the distribution of the project results to relevant interested parties, like owners of Cultural Heritage buildings, stakeholders or other institutions responsible for the preservation of monuments. The mitigation strategies developed in the project are only valuable, if they can be implemented in those networks, which
have the possibility to establish contingency plans. Therefore it is very important to run the project with participation of end-users and to address the public as often as possible. It is planned to invite end-users to most of the project meetings and to discuss the usefulness and impact of the project results.

The Kick-Off Meeting of the CHEF Consortium members took place on 26th of February 2007 in Brussels. The work plan to achieve the ambitious goals has been presented to the representatives of the European Commission.

The 2nd Periodic Meeting of the project was organized as a two days event. The first day was scheduled as a regular working meeting to exchange first results and to plan further dissemination activities. On the second day invited end-users were present and together with the group an exchange of experiences, gained during previous floods took place.

Presentations about flooding as a global phenomenon, followed by impressive reports about recent flooding events in Germany, Slovenia, Czech Republic and the United Kingdom highlighted the importance of the topic. The introduction of methods for assessment and diagnosis of affected buildings and sites as well as the presentation of treatments for damaged historic materials contributed to the exchange of knowledge between consortium and end-users. This was extended by lectures about preventive flood management measures, flood management in historic cities, urban development, open space planning, monument preservation and strategies for risk minimization.

Another meeting, the 3rd Periodic Meeting is scheduled for the 14th and 15th of April 2008 and will be held in Genoa, Italy. Again, besides a regular project meeting, one day will be dedicated for the involvement of end-users and interested public.

7 CONCLUSIONS AND OUTLOOK

The risk of flooding or other natural hazards has increased significantly in recent decades due to climatic change and building activities in risk-prone areas. The European Community is aware of this situation and has raised programmes to support research initiatives, which aim at prevention of natural disasters and minimizing the impact on Cultural Heritage. For the 7th Framework Programme of the European Commission a Tentative Roadmap has been set up for the area Environment including Cultural Heritage. The research need covers the following topics:

- Managing environmental changes, hazards, damage, mitigation and preventive conservation
- Protection of archaeological sites and cultural landscapes
- Fostering the integration of Cultural Heritage in the rural/urban setting.

The proposed project CHEF already deals with topics, which are important for the framework described above. It can be a very good starting point for further initiatives in this field. The large consortium and the involvement of the User Group offer many possibilities for networking. It is very likely that the consortium or groups within this partnership will react upon future calls for projects in FP7. The work plan of the project described here can be further extended by including more case studies or by concentrating on different aspects of Cultural Heritage protection. There are several starting points for new initiatives or for extended co-operations with other groups or institutions dealing with Cultural Heritage. This project will fulfill the proposed work plan and provide the agreed deliverables but should also be regarded as some kind of “think tank” for future research.

ACKNOWLEDGEMENTS

The project CHEF is funded by the European Commission in the 6th Framework Program. The presented results have been achieved by all Partners of the project, which are listed in Chapter 4.

REFERENCES