MINISTERIO DE CIENCIA E INNOVACIÓN
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CONSOLIDER-INGENIO 2010 PROGRAMME
Annual Follow-up Report

(This activity report corresponds to the 2010 natural year)

PROJECT REFERENCE NUMBER: Consolider TCP, CSD2007-00058
Coordinating Researcher: *Prof. Felipe Criado-Boado*
Project Title: *Research Programme on Technologies for the conservation and valorization of Cultural Heritage – ACRONIMUS: TCP*
Managing Institution: Spanish National Research Council (*CSIC)*
Project Initiation Date: end of 2008
Project Completion Date: 2012

The follow-up report must be written in English and must conform strictly to the following structure and size limitations:

I. Summary of key activities initiated by the project since the start of the funding period [one page]

II. Degree to which project objectives have been achieved, as measured by the indicators listed in Section 8 of the Implementation Agreement [four pages]

III. Description of project-related scientific and administrative management activities [one page]

IV. Description of budget expenditures, in relation to project objectives and the activities undertaken during the period covered by this report, including a distribution of partners' budgets [one page]

V. Brief description of the Research Activity Plan carried out between January 1, 2011 and December 31, 2011, as stated in Section 7 of the Implementation Agreement [two pages]

VI. National and international project visibility [one page]

VII. Problems and suggestions

Date: Santiago de Compostela, January 10, 2011

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NOTE: Please be advised that any change representing a modification of the grant concession conditions requires that the funding recipient submit an application stating a valid reason for the change. This application must be submitted before the project completion deadline has expired and requires the express approval of the designated administrative organ, likewise to be obtained before the project finalization deadline has expired.

These applications will be processed separately from the follow-up reports.

I. Summary of key activities initiated by the Programme since the start of the funding period [one page]

In this second year of the TCP Programme, we have continued to contribute towards consolidating the position of Cultural Heritage studies in the Spanish Research, Development and Innovation system. Firstly, this has meant increasing the scientific level of our answers to demands on Heritage studies, with reference to its interpretation, conservation and management. This occurs in an international context in which the importance of research on Heritage is recognized (a process of awareness which took shape in 2010 with the approval of one of the first Joint Programme Initiatives focusing on Heritage), and in a socio-economic context which emphasizes the value of heritage for sustainable development and the development of different communities.

As is already well known, the TCP Programme is conceived as an opportunity to consolidate the lines of research into Cultural Heritage of the different Groups that comprise the TCP Team. This year we have focused on the convergence of methodologies, the validation of techniques, and the integration of capacities and activities of each Group within a joint programme. Once again it must be stressed that our aim is not to do anything different from the current actions we carry out as part of our daily activity in our laboratories, but instead to reinforce this activity through positive interactions between the different groups.

The basic objectives of the TCP Programme are to provide an underlying structure for what until now has been quite a disperse and disjointed field of knowledge (Aim 1), at the same time as attempting to provide substantial progress in the area of research (Aim 2) and to increase institutional capacities (Aim 3). The 2010 actions related to Aims 1 and 2 are explained in further detail in section II. Important progresses have been made this year in relation to Aim 3, which are detailed below.

A number of institutional initiatives which were either adopted directly by TCP Groups or with their critical contribution (and which were anticipated in last year's report) have led to the structuring of new research bodies and infrastructures in 2010 (showing in brackets the TCP Group at the core of these initiatives) which increase the capacities of the Spanish Heritage R&D system by providing advanced support for Heritage studies: in January 2010 the new Institute of Heritage Sciences (*Instituto de Ciencias del Patrimonio*-Incipit) of the Spanish National Research Council was created in Santiago de Compostela (with contributions from LaPa, Sincrisis and GEMAP), and in May 2010, Felipe Criado-Boado was appointed as its director; the new *"Zaín"* Research Centre in Vitoria (GIAA), created with the participation of the Basque Government, the EHU, the Regional Administration of Álava and the City Council of Vitoria, has begun operations in a provisional office, while work is underway on its definitive headquarters; work is continuing on establishing the new Geosciences Institute in Madrid (PAP), directed by Rafael Fort; work continues on defining the Campus of Excellence in Cultural and Natural Heritage coordinated by the UJA (in which the CAAI is actively participating); a Thematic Science and Technology Network for the Conservation of Heritage has been created, comprising 65 research groups from the CSIC, universities, museums and cultural institutions and enterprises (financed by the Ministry of Science and

Innovation-MICINN and led by Micropath); and a multidisciplinary project on Geomaterials from Built Heritage has been obtained from the Regional Government of Madrid (financed with 999,600€ and led by the PAP group).

II. Degree to which Programme objectives have been achieved, as measured by the indicators listed in Section 8 of the Implementation Agreement [four pages]

Heritage is commonly understood as “monuments”, “art masterpieces” and “fine art”. Altamira, Las Médulas, the Cathedral of Vitoria or the archaeology of the Iberos are all outstanding examples of world Heritage, and they are also heritage elements which have been privileged and favoured by the research work of the TCP Groups. However, an innovative approach towards heritage reveals that in reality, its empirical and cultural status is more different and more complex than is commonly believed. For this reason, one of the constant challenges of the TCP Programme is to contribute towards clarifying the fact that Heritage is much more than fine art, and that research on Heritage has more objectives than conservation and restoration. Our research program contributes towards showing how Heritage is constituted as a social product, either in the past either in the present. This concept of research on Heritage necessarily leads to the pragmatics of a new kind of Science closely related to social aspects, understood as *science with people*. The main thesis of a “public science” is that the public are the users, promoters and even the producers of science and knowledge in their own lives. This is clearly illustrated in the case of Heritage, due to its close interrelationship with society and the community; Heritage cannot be understood, nor can it even exist, without it having a close relationship with communities and social agents. In this case, the TCP Programme will contribute towards the advancement of knowledge and the structuring of capacities on Heritage research, but also towards anticipating solutions for some of the major problems currently affecting the interaction between scientific knowledge and society.

After some changes and updating the composition of the team throughout 2010, the TCP Programme now comprises 166 people (97 male and 69 female), including 87 staff scientists and 21 post-doctoral researchers (47 female and 61 male).

The quantitative results of the TCP Team, listed accorded to the classification included in the *Implementation Agreement*, are the following (with the yearly commitment of the indicator shown in brackets):

ISI Papers 45 (50); **Other non-ISI Papers** 146 (145), including No ISI international papers, national papers and book chapters; **Books** 13 (15); **Conferences contributions** 190 (25); **Patents** 0 (4); **Spin-offs** 1 (1); **Competitive R&D funds** 2,500,000 € (500,000 €); **Private funds** 2,200,000 € (400,000 €); **International research proposals** 6 (1); **Ph.D.** 8 (10 yr); **Postgraduate credits** 135 (120)**; associated Pre-docs** 39 (40 yr); **associated Post-docs** 36 (40 yr)

These indicators only include the activity of the Team that is directly associated with the TCP Programme. The funding figures refer to the total amount of current funding obtained by the Team in 2010; it is not distributed over the yearly periods for which the projects last.

The full scientific production of the TCP Groups is greater than their output related to Heritage studies. Including those items what are not directly related to Heritage research, TCP Groups are responsible for the following total figures: **ISI Papers** 77 (50 yr); **Other non-ISI Papers** 207 (145), including No ISI international papers, national papers and chapter on books; **Books** 13 (15); **Conference contributions** 291 (25); **Patents** 0 (4); **Spin-offs** 1 (1); **Competitive R&D funds** 3,990,975 € (500,000 €); **Private funds** 4,501,882 € (400,000 €); **International research proposals** 8 (1).

In order to give a sense of meaning to the quantitative indicators, it is necessary to review the qualitative achievements from 2010 in each of the working packages of the Programme: the scientific activities included *Joint Activities*, which comprise the Basic Research core of the Programme, *Transverse Activities*, which comprise the Applied Research core and the *demonstration projects*; the transferring activities included *knowledge transfer*, *dissemination* and *training*.

After a first year in which work mainly concentrated on Joint Scientific Activities, 2010 was marked by a significant but still incipient development of Transverse Activities. All of the research activities are a result of the convergence of two or three different disciplines on the same scientific problem. The TCP Programme involves 20 different scientific disciplines, and organizes all of them through shared working plans and theoretical/methodological proposals (based on the model known as the *Heritage Value Chain*).

2010 Advances in Joint Scientific Activities. Together with the intensification and development of work in all of the areas indicated in the 2009 report, as well as the full normalization of work in the network of heritage and archaeometry laboratories created within the TCP Programme and supported to a significant extent by it, the following activity has been carried out:

Historical analysis of Heritage

- Beginning of a research line on Cultural Astronomy and its significance in interpreting heritage elements.
- Development of an Archaeology of the Present Past (beyond Historical Archaeology).
- Application to Spanish Civil War, Italian domination of Ethiopia, Ethiopian Civil War, Argentinean “Process” and post-colonial situations in Asia and Africa.

Geoarchaeology

- Non-destructive techniques: field survey protocols and documentation.
- Natural and social history of fire through archaeological, historical, palynological and geochemical indicators.
- A new approach towards maritime and coastal heritage, combining coastal geoarchaeology with archaeology, ethnography and history.

Archaeobiology

- High-resolution paleoclimatic reconstructions from fossil pollen records. Non-pollen palynomorphs: a new paleoenvironmental proxy record to establish ecosystem dynamics (erosion processes, fire events, etc.).
- Recovery of traditional ethnobotanical knowledge.
- Methodological advances in pollen analysis: past and present potential distribution of Iberian plant species (a phytogeographic approach using fossil

pollen data and species distribution); and new development for statistical processing of pollen data to correlate with several environmental proxies.

Paleoenvironment and paleoclimate

- Improving (paleo-) environmental reconstructions from natural sciences and its repercussions in the social sciences.
- Contributing towards climate and global change studies and forecasting through an analysis of environmental and human-environment interaction from heritage research.
- Developing several molecular characterisation methodologies to introduce them into fields of archaeological and heritage sciences for initiating various innovative lines of research.

Landscape Archaeology and Cultural Landscapes

- Typification of cultural landscapes and protocols to record and preserve cultural landscapes. Integrative approaches to cultural and environmental heritage and landscapes.
- Construction of agricultural landscapes from prehistoric to modern times. Landscape Archaeology research on rural and mining landscapes. Morpho-historical approaches.
- Defining an approach to urban landscape combining Landscape Archaeology, Archaeology of Architecture and History of Art, in order to obtain new insights into urban morphology and development.

Remote sensing. Archaeological applications

- Full establishment of the Joint Unit between CCHS and UPM to create a Laboratory for Archaeological Spectroscopy and Photogrammetry.
- Full establishment of the Laboratory of Geometric Representation (LaPa) for advancing applications on 3D scanning and high-resolution topographical techniques applied to building and mobile heritage, with case studies to validate the techniques in different areas and in cooperation with other TCP Groups.

Digital Humanities (Information and semantic technologies)

- Research and developments on SDIs and Heritage Information Systems.
- Commencement of activity of the working group on cultural heritage within the working group on the Spanish SDI.
- Methods engineering applied to Heritage and Humanities studies: development of a formal language for the description of architectural elements; design of methods to deal with the temporal dimensions of heritage objects (towards a 4D Information System) and to introduce subjective dimensions of heritage and historical information (towards XD –multidimensional- Information Systems).
- Opening to the general public of the SIP (Cultural Heritage Information System of Santiago de Compostela).
- Completion of the Cultural Heritage Information System of Uruguay (LAPPU).

Architecture and construction

- Full operation of a Joint Laboratory of Building Archaeology (GIIA – LaPa).
- Creation of a new laboratory for Building Archaeology in CAAI.

- More new advances in the simplified and rapid recording of architectural stratigraphies tested in several case studies.
- Chemical, physical and mineralogical characterisation of samples of architectural remains and mortars.

Analysis and technological characterization of materials
- Archaeometric approaches: physical, chemical, mineralogical and elemental characterization of cultural assets.
- Archaeometry and the History of technology. Analysis and technological characterization of materials: metals, glass and ceramics (from prehistoric times to the 20th century).
- Impact of climatic change and pollution by means of environmental sensors.
- Analysis of deterioration processes, integrated strategies and technologies for conservation and restoration.

Technologies for conservation and restoration
- Applications of Nanotechnology for the conservation of heritage.
- New laser methodologies for the cleaning of Cultural Heritage materials and substrates.
- Implementation of the GEMS (Geochemical equilibrium modelling by Gibbs Energy Minimization) thermodynamic modelling tool to predict the durability of materials in environments with different aggression levels.
- Study of the products of processes of deterioration, including anthropic actions and aggressions.

The work that has been carried out has led to the presentation of ***8 Ph.D theses*** which are actually the first to materialise the objectives of the TCP Programme (as those that were read in 2009 were mainly prior to the TCP and re-focused within it prior to their completion), and which have contributed significant new features in the following thematic areas:
- The house, family and community in the North-western Iberian Peninsula during the Iron Age.
- Characterization of podsolization in boreal, temperate and tropical environments, and its influence on the immobilization of metals.
- Identification, molecular characterisation and significance of historical fire residues in Galicia.
- Modelling Radar backscattering coefficient incorporating variables derived from multispectral optical imagery for the characterization of covers.
- Primary bioreceptivity of limestones from the Mediterranean Basin to phototrophic microorganisms.
- Deposition of TiO2 Nanostructures by Short Pulse Laser Irradiation.
- Study of the behaviour of two anti-graffiti coatings as protectors of building materials: Interaction anti-graffiti/substrate, properties and durability.
- Use of ceramic waste as alternative raw material in the preparation of eco-efficient cements.
- Innovation and emergence of a knowledge-intensive business service: a case analysis of commercial archaeology.

During this year, emphasis has been placed on the ***international profile of the programme***, through a substantial increase in the number of proposals

presented to international calls (8), obtaining 3 projects from international tenders, and a substantial increase in the presence and collaboration of the Programme in international contexts (see section VI).

2010 Advances in Transverse Activities. As foreseen from the outset, there was considerable development in these types of activities, which include the applied research core, demonstration projects, and transferral activities, including knowledge transfer, dissemination and training. We will cover these aspects in sections III and VI, and then describe the demonstration projects.

The Mining Zone of Pino del Oro and its surrounding area

The Mining Zone of Pino del Oro (ZoMiPO) is situated in the west of the province of Zamora. It consists of a series of gold mines from the Roman period. The work carried out over the last years has made it possible to document the processes involved in prospecting, extracting and treating the gold. Ancient settlements and agricultural structures have also been excavated in order to understand the social transformations that occurred in the past as a result of this mining activity. Within the TCP programme, efforts have been made to put protocols and methodological techniques into practice and to enhance this heritage, based on the scientific principles of the programme.

The archaeological heritage of Gijón: research and social projection

Research on the archaeological heritage of the city of Gijón and its surrounding area has been carried out over a long period of time. Over the last few years, work has been carried out in the City Council of Gijón in the Roman villa of Veranes, with the aim of discovering and showing the architectural, social, productive and town planning aspects of a Roman rural nucleus that became a rich complex in the last stage of the Roman Empire. The possibility of including this information and these remains in the project for the City Museum that will be built in the old Tobacco Factory opens the possibility of including these heritage elements in this exhibition context.

Bierzo RVN

A series of activities were carried out in 2007 against the backdrop of this project in the site of Castro Ventosa (Cacabelos-Villafranca del Bierzo, León) with the aim of investigating and enhancing the site. A series of groups took part in archaeological, geochemical and geophysical prospecting work on the site and its immediate surroundings; topography and morphological studies of the site; 3D scanning and reading of wall sections; archaeological excavations; pottery analysis, and palynological and carpological studies. The continuation of work on studying and enhancing this site is currently on pause due to a lack of funding and political decisions, which are completely outside the work of CSD-TCP. However, the scientific results are currently in the process of being disseminated.

III. Description of project-related scientific and administrative management activities [one page]

In 2010, major efforts were focused on analysing and formalising the working and organisational processes of the groups involved in the TCP Programme. This work involved two main processes: on the one hand, analysing the organisational situation of each group, but on the other, studying and evaluating the organisational models that can be used the best within knowledge-intensive services and enterprises. Models have been applied based on the post-bureaucratic organisational theory, for which specialised and prestigious advisers and consultants have been sought. This work led to a series of specific workshops that were held in Santiago de Compostela, in which representatives of other groups took part. The aim of this work is to progress towards an innovative organisation model for scientific practice in Heritage, which will be specifically implemented in the newly created institutional bodies referred to at the end of section I.

A new Joint Unit has been created between the CSIC and the USC which connects the three groups from Santiago de Compostela that belong to the TCP Programme, making it possible to interrelate them in order to make their collaboration viable within the new institutional context represented by the creation of the Incipit in this city.

According to the plans designed for the Integration and Management Activities of the TCP Programme, one important action in 2010 was the creation and commencement of operations of the diffusion and training services of the *Technical Coordination Unit* (TCU), which are mostly based in Madrid (CCHS – CSIC). The following have been designed and implemented: a database for controlling the personnel involved in the Programme and their dedication (which includes all of the institutional changes and is produced according to a gender perspective), a database for economic management, and a database on scientific and activity indicators. This database includes all of the output of the Groups that comprise the Team, differentiating between those that are directly connected with and are a result of the TCP Programme, and those derived from the disciplinary lines of research carried out by the Groups. When available, it also includes URLs that make it possible to connect to the digital repositories where the contents are available. This has made it possible to systematise all of the information that will finally be included on the website of the TCP Programme, which will be launched in 2011.

The TCU has also provided support for all of the Groups in practical aspects associated with the management of the Programme, as well as technical support to apply to calls, take advantage of resources or draw up contracts and collaboration agreements with private bodies and public authorities. This has made it possible to increase the success ratio of all of the Groups.

Several meetings of the TCP Coordination Team and the TCP Executive Board have been held.

The renewal of all contracted personnel (21 persons, 20 of whom are university graduates) has been carried out based on the presentation of a report on the activity performed and a working plan for the next year. This report was supervised by the Group Leader for each contracted member of staff, and subsequently evaluated by the TCP Coordination Team, which finally approved

the renewal of these contracts. The idea is to carry out a highly demanding evaluation of the work carried out by each contracted member of staff in order to guarantee the correct administration of the corresponding funds. In general, the management of these members of staff is a major effort, as the process of hiring them and renewing their contracts, apart from passing through the scientific filters of the TCP Programme, has to pass through the administrative filters of the CSIC and its 'job bank'.

Some reference can be made to Transfer of Knowledge activities that took place. During 2010, an in-depth analysis was made of the technological service capacities of the various TCP groups, comparing them with the characteristics of the sector in order to produce a 'package' consisting of a technological offer and a strategy for the commercialisation of Services and collaboration work. At the end of 2010 this analysis, which was initially carried out for the LaPa, GEMPA and Sincrisis, was extended to other TCP groups. In a second stage of this process, our aim is to extend the market survey to the whole of the heritage sector. Both procedures will make it possible to configure a transfer strategy based on the creation of External Services from the Groups, as well as the generation of spin-offs and start-ups.

IV. Description of budget expenditures, in relation to project objectives and the activities undertaken during the period covered by this report, including a distribution of partners' budgets [one page]

Budget execution of the Programme is currently following the planning. In this moment the 40,4% of budget is spent and nearly with the 60% is committed to be spent in the chronological spam of the Programme term. For the remainder of the funds is expected undertake spending between this year 2011 and the next.

The description of the budget corresponding to the research activity programme is as follows:

Personnel: A total of 24 contracts (for researchers and technical personnel) have been awarded for a total of € 773.903. These contracts have been awarded in order to recruit the specialised personnel for the research services detailed in section II. Part of this expenditure is also applied to the maintenance of the TCU (Technical Coordination Unit).

All of the expenditure detailed in this chapter has been implemented and managed by the Technical Coordination Unit, except in the case of the participating universities: the University of Jaén and the University of Santiago de Compostela. In these cases it was decided to sign specific implementation agreements for the transfer of funds, which include personnel costs and operating costs.

Equipments: With regard to section V, the need has been identified to acquire in the future the following equipment: an analytical system using X-ray fluorescence spectrometry and a spectral characterisation device. Both devices contribute towards completing the equipment and guaranteeing the fully effective operation of the TCP laboratories. In both cases, due to the high cost of the equipment, it has been decided to finance a percentage of the costs.

Consumables: As may be seen in the economic justification, most of the expenditure has been focused on laboratory consumables (chemical reagents, latex gloves, cuvettes, etc.) necessary for the work of the TCP laboratories.

Others expenses: This includes the expenses derived from taking part in conferences, meetings, seminars, etc.

Distribution of Partners' Budgets:

Group	Amount	Item
CAII-UJA	100,000	Personnel and operating costs
LPPP-USC	40,000	Personnel and operating costs
GIA-UPV	56.680	Personnel and operating costs
LaPa – CSIC	28.160	Operating costs
CCHS-CSIC (Labtel, Gyft, Est-Ap, Arqbio, Cervitrum, Arqueometal)	50.520	Operating costs
MICROPATH-CSIC	31.160	Operating costs
CEMAPA-CSIC	31.160	Operating costs
PAP-CSIC	31.160	Operating costs
LANAPAC-CSIC	31.160	Operating costs

V. Brief description of the Research Activity Plan carried out between January 1, 2011 and December 31, 2011, as stated in Section 7 of the Implementation Agreement [two pages]

All of the working units and Groups of the TCP Programme have a detailed working plan for this year which, in particular, details the plan for *Transverse Activities* and explores in greater detail the lines of work set underway in 2009 and 2010. The most important actions for 2010 are: (1) the full implementation of the plan for *Transverse Scientific Activities*, (2) maximizing all of the actions for interrelation and the implementation of multiplying synergies within the TCP, (3) strengthening the role of the TCP as a meeting point for projects and networks, and (4) strengthening the visibility and training plan.

Point (1):

It is a major priority to standardise the operability of the laboratories that have been created (or adapted from existing laboratories by orienting them towards studies on Heritage, thanks to the inclusion of specialised personnel). After having reached other objectives (as increasing their equipment, guaranteeing the operability of these teams, fostering the networking of all of the laboratories), this implies establishing protocols for operating conditions according to which they function as laboratories with the "TCP quality label". This is one of the major aims of our TCP Programme, but which is currently on hold due to the fact that because of other practical difficulties, it was not possible to focus on these tasks to the intended extent over the last year.

Transverse activities will mostly be carried out within the framework of demonstrative and exploratory projects, which have already begun, as described in previous section.

The structuring of the "Transverse Activities" Plan includes a number of important tasks which, despite being foreseen in the working plan for the

previous year, have been delayed due to their complexity, and will have to be developed during this year:

- Standardising of recording, inventory control, cataloguing and data gathering procedures, and the contextualisation of sampling. Initially, these were two different plans, but after the first few projects, it was considered preferable to combine them in a single working package and Task Force.
- Development of models for protocols for the operation and management of Heritage laboratories, differentiating between Protocols for Humanities and Sciences. These models must include procedures and techniques (the methodology used); the aim is not to recommend how things must be done, but instead to describe what the Groups do, defining when, how and why a certain technique should be used in the analysis of heritage elements.
- Construction of a metadata model for Heritage (which basically includes geoinformation technologies, IDEs and a metadata documentation model). This project depends on the previous two, meaning that it will be developed after them. One specific objective of this project is to consider the possibility of developing a specific tool for metadating.
- The design and modelling of a Heritage information system.

Each of these activities is entrusted to a Task Force, which must present their working plan, methodology and internal organisation for supervision by the Coordination Team.

Point (2):

- Start-up of the Intranet systems for each node of the TCP programme that make it possible to encourage and promote collaboration and teamwork. Several of these have already been designed and finalised, although they still have to be put into production. As a result of this work, a new standard corporate communication system will be developed
- The previous experience and results of the TCP indicate that it is necessary to identify products (other than publications) that can be maximised (such as patents, utility models, portals, thematic websites, etc.), although in this case they require additional financing that permits their development and valorization.
- An analysis of the progress of the TCP Programme up to now shows that it is necessary to create a specific strategy in order to identify and reinforce the possibility of generating patents within the programme. We believe that this will come about as a result of the special action of Knowledge Transfer described in section III.
- Research into the Economy of Heritage will be emphasized, through the recruitment of a post-doctoral researcher who can contribute towards this development.
- Co-authorship will be promoted within the TCP in order to optimise collaborations and synergies between different approaches and disciplines. The demonstration projects will be specifically product-oriented (whether this is a paper or a specific research output), which will not only stimulate co-authorship but which can also be made viable through it.
- Holding a scientific meeting of the TCP Team not only to examine the mid-way point of the Programme, but also the extension of the concept of Heritage and research on Heritage as promoted by the Programme.

Point (3):
In order to promote the function of the TCP Programme as the focal point for other institutional initiatives and to promote new opportunities for collaborative and innovative projects, the following specific actions will be carried out:

- The creation of a *Joint Unit between the CSIC and EHU* in order to channel a preferential relationship between the Incipit and Zain, aimed at promoting the convergence of studies and methodologies from landscape archaeology and architecture. This collaboration project also aspires to create a Post-Graduate School for Heritage Studies in South America.
- Implementation of the *IDE Archaeological project*, as the development of a Spatial Data Infrastructure which permits the online publication of research results from the group within a thematic geoportal. This means it will be necessary to adapt the existing IDEs and databases. A questionnaire has been produced and processed on the different types of information contributed by the participating groups, and the specific working groups for the different sub-projects will be set underway, focusing on the analysis of practical cases and the production of specific data models.
- Creation of the *Thematic Working Group on Historical Heritage (*GTT-PAH) *within the Working Group on the Infrastructure of Spatial Data of Spain* (GT-IDEE) of the Higher Geographic Council (*Consejo Superior Geográfico*). The aim of the GTT is to produce criteria, protocols and standards for the presentation of the information on historical heritage held by the different public authorities via the Internet, as part of the process of implementing the European INSPIRE directive in Spanish legislation.
-*UNESCO Rock Art World Archive WG* (WHC/HEADS 2010-19); the TCP Programme forms a part of the UNESCO panel of experts, and contributes the expertise and technology necessary to develop a pilot project for the creation of a worldwide information system on rock art, within the framework of the World Heritage Convention.
- Studies on the *durability and preservation of geomaterials from built heritage* with the aim of advancing our knowledge on the processes and mechanisms that cause alterations to geomaterials, as well as to develop strategies for their protection and preservation that increase their resistance to processes of deterioration and their durability.
- Project on the *biodeterioration of mural paintings in Etruscan and Roman tombs*, focusing on the Etruscan necropoli of Lazio and Tuscany, and the necropolis of Carmona, in collaboration with the **Soprintendeza della Toscana** and the **Istituto per la Conservazione e Valorizazione dei Beni Culturali**, in Florence.
- Creation of a *Microbiological Observatory of visitable caves* for the evaluation and control of fungal communities in caves subject to the impact of tourist activities. Based on work carried on in Altamira and Lascaux, an observatory will be established in caves in Andalusia for the early detection of outbreaks and contamination of fungi.

Information on **Point (4)** is included in the following section.

VI. National and international Programme visibility [one page]

TCP has a dynamic presence in external projection activities that do not only serve to divulge the programme, but also to produce value from research, to validate its practical results through interaction with the public, and to explore the public dimension of Heritage. Heritage items cannot be isolated from their valorization by the public. For this reason, any type of activity that interacts with the social environment is not limited to being an activity of scientific culture, but is itself converted into part of the research process, by introducing a reflexive stage in the work that makes it possible to clarify its multi-vocal and hermeneutic nature.

From amongst all of these activities, we can select the following:

Pilot experiences on **Community Science and Public Heritage**: projects in Neixón and Castrolandín (Pontevedra), on the Historical Memory of the Spanish Civil War, Archaeology of the Present, and Cultural Landscapes and Heritage in Uruguay's lowlands.

Closely connected with this, **thematic websites on specific projects** will be launched, which will not only be aimed at presenting information on each project, but also at stimulating and channelling the participation of different types of public in these projects. It is more effective and agile to create small 'thematic' websites than to contain all of the information on a single website for the whole programme. We aim to extend and build on the innovative experiment of the video-blog of A Lanzada (http://alanzada.wordpress.com/), which received 30,000 hits during the duration of the archaeological campaign, and led to 19,000 physical visits to the excavation site. These include: IDE Médulas, IDE Casa Montero, IDE ZoMiPO, DB on Archaeometallurgy of the Iberian Peninsula, DB of the AU Project, DB on Lead isotopes, Digital Corpus of Levantine Rock Paintings, Archive of Radiocarbon Datings from Iberian Prehistory, Landscape and Architecture of the Portuguese War of Restoration, and the Ruin Memories Project.

Main **national** events, networks and programmes in which the TCP has participated: organization of several activities (including two workshops, a stand exhibition and a lecturer) at the AR&PA (Art and Heritage) event held in Valladolid in November 2010; Santander UIMP meeting on "The Consolider Programme and Scientific Journalism".

Actions on the **Transfer of knowledge**: agreements with city and town councils, Autonomous Communities, Spanish Ministry of Culture, French Ministry of Culture for technical assistance and applied research on Heritage studies and conservation matters; Scientific and technical R&D contracts with private entities. Cooperation with COTEC and ARESPA on the analysis of needs and opportunities for Innovation on Heritage.

Dissemination and scientific culture actions: "Science Week" in Seville, Jaén, Santiago and Madrid. Oral presentations addressed to a large public both in urban and rural areas. Posters and photos exhibitions on different fields and topics related to TCP research. Altogether, these actions have involved around 5,000 persons who have filled out individual evaluation forms to assess their impact and success. Preparation of diffusion booklets and publications. Video about archaeastronomy ("O Sol nos Chaos"), prepared by SIncrisis and available through Internet.

Training: participation in Master courses at the Universities of Cantabria, Autónoma de Madrid, UPV, Alicante, Jaén, Santiago, Chile, Argentina, Uruguay; reception of visitors: some 25 national and international scholars and students have spent short-term scientific visits in TCP Groups; undergraduate students have received specialised, technical training, and have received an introduction to research methodologies through the CSIC JAE-Intro programme, or as students carrying out work experience on several projects.

TCP has actively collaborated and will continue to collaborate on new international institutional initiatives:

National and International research programmes and other connected research projects; participation in the CLIVAR Thematic Network (Climate variability and predictability) - Spain, dependent on World Climate Research Programme; participation in the GBIF Biodiversity Database (Global Biodiversity Information Facility in Spain); participation in the steering committee of the ESF/COST Interdisciplinary Science Initiative (ISI). A Network of Networks: "New Perspectives on Landscape Studies". Writing of the Science Policy Briefing "Landscape in a changing world: bridging divides, integrating disciplines, serving society"; participation in the Scientific Committee of the Heritage JPI; cooperation with the OPIs 2020 Strategy on Cultural Heritage, the CYTED Ibero-American Programme which has situated Heritage in a central position in its strategy for scientific cooperation, and the proposal for the creation in Spain of a new Science and Technology Network for Heritage Conservation.

Creation of the **Laboratory of Landscape Archaeology and Heritage of Uruguay** (LAPPU), action of scientific cooperation together with AECID and Universidad de La República de Uruguay.

In 2011 TCP will promote the **creation of a Heritage Post-graduate School for South America**, whose headquarters will probably be based in Uruguay. This project is a major result of cooperation between the LaPa and GIIA.

During 2010 the TCP has submitted **eight international scientific calls** in order to divulge the programme and extend its networking: EU Culture 2007-2013 Programme, ERC advanced and starting grants, Marie Curie programme, 7FP, ACE Project (EU Culture 2007-2013 Programme), and POCTEP (INTERREG funds) for collaboration with a Portuguese consortium to extend TCP through cross-border cooperation in Galicia and in Castile-León.

The TCP has also carried out **research and fieldwork in several countries**, including: Portugal, France, Italy, Morocco, Russia, Uruguay, Chile, Argentina, Peru, Colombia, Guinea, Ethiopia, Formosa and Mongolia.

VII. Problems and suggestions

The 2009 included a detailed and justified list of the practical and scientific problems that were detected during the initial implementation of the programme. As many of these problems are still present, despite the fact that some of them have been solved or are in the process of being solved, in this report we can be much more brief and focus on some of the most important problems.

The main problem currently facing the Programme is the difficulty involved in summing it up in a brief, comprehensive manner, due to its large size and the wide range of themes, approaches and disciplines it involves. This is not only a problem connected with the management of the programme, but also a problem in terms of divulging and communicating its results to the general public, and therefore promoting its impact. This year it will be necessary to think about a specific alternative to overcome this problem, such as producing a book, or a series of book, with the format of “new approaches to Heritage” in order to not only demonstrate the range of subjects we are dealing with, but also the innovative way of doing it in order to produce new ways of representing and valuing heritage.

Another, different problem is the current economic crisis. This is having a serious effect on the whole of the R&D system, and is compromising the viability and continuity of a large number of actions. This is not something specific to our programme; however, what is specific to it is the fact that the crisis is hitting the heritage sector especially hard, not only in terms of decreased activity in the area of culture, but also because of its close links with the property sector. Faced with this situation, it is a priority to focus on studies on the economy of heritage.

However, the crisis in the field of heritage has another feature which is peculiar to it. It shows that the business model that has been in effect until now in this sector is insufficient. Until now, this business model has been based on construction companies, more than on the knowledge-intensive service enterprises to which this type of activity belongs (this is one of the consequences of the analyses carried out in the TCP Programme). Here we find one of the problems connected with the current innovation policy in place in Spain (and in many other countries); innovation is denatured as a result of being considered as technological or industrial innovation, while forgetting the social and organisational dimensions that favour innovation. Heritage activity cannot be understood or its development promoted without opening the way to this other type of innovation. Here, the problem lies in the fact that a conclusion is reached that contradicts the current policies of innovation.

Finally, this highlights our own incoherence in having suggested, as indicators of knowledge transfer, a number of yearly patents that we are not in a condition to achieve. In this case, we have not made a mistake in terms of the number or our ability to achieve patentable results: instead, we have committed a textbook error in considering that innovation is equal to patents.