

SPAIN - NCP INPUT

The Common Framework was the template used to provide input to the Strategic Research Agenda (SRA) for the JPI Cultural Heritage and Global Change. These are inputs to the Common Framework from the individual participating country named above. To find out more about the process involved in

| Main driver (as identified in the DoW) | Additional drivers | Identifier | Notes of the Spanish NCP | Addition? Include new identifier | Research area | Research gaps | Research needs | Keywords | Activities/ instruments (for example, collaborative research; SME/industry involvement; knowledge exchange; end-user participation) | Benefits of the research area to cultural heritage | Criteria | | | Ranked Priorities | |
|--|--------------------|------------|--|----------------------------------|--|---|---|--|--|---|--|--|---|--|--|
| | | | | | | | | | | | Societal | Economic | Environmental | Ranked priority (National Consultation Panel priorities) | Ranked priority in terms of European collaboration |
| Use | | U.1 | | | Linking quantitative and qualitative data around cultural heritage | Quantified /systematic approach to information generated from the fields of history, art history, archaeology, geography. | Applying semantic and automated techniques to these data, processing large quantities of digitized data to give new insights and involve new users in cultural heritage | | In addition to those in the header, IT sector involvement. | Possibility of integrating all the necessary information in a single environment. Remote accessibility to such information by different specialists, favouring a multidisciplinary approach. | Remote access will empower digital heritage. This would enhance the interest of citizens, raising their awareness with heritage around them. | Creation of new services according to the type of device to access and the applications required. | Decrease of massive travelling to the original site (lower CO2 emissions). | 1 | 1 |
| Use | | U.2 | Can be integrated in U.1 | | Geographic Information System on tangible and intangible cultural heritage | Web mapping and Web GIS tools for the tele-monitoring and remote control of archaeological sites and cultural landscapes | Adaptation of existing schemes to the needs of cultural heritage field. | | Collaborative and interdisciplinary approach, IT sector involvement, consideration of new GIS technologies such as cognitive maps. | User friendly inventory of cultural heritage properties, effective management of cultural heritage | Wide public use of and access to cultural heritage | Increased number of visitors, effective use of public resources for protection of cultural heritage | Neutral | | |
| Use | | U.3 | | | Revitalisation of built and landscape heritage | Sustainable strategies for built heritage and landscape use/management | Development of policy and strategies. | | Involvement of politicians and decision makers; collaborative research; user involvement | Active participation of cultural heritage in economic life of society | Increased quality of life of society, increasing public support for cultural heritage | Increased lifetime of historic buildings/landscapes; increased number of visitors, revitalisation of degraded areas | Reduced CO2 emission due to increased lifetime of buildings | | |
| Use | | U.4 | | | New uses for cultural heritage | Influence of new uses of landscapes (for example management techniques) and built heritage on their tangible and intangible cultural heritage values | Development and exploration with new management techniques of built heritage, sites and landscapes; in balance with the activities/wishes of the local people. | | Exchange of knowledge and good practices | Maintenance of cultural heritage values of built and landscape heritage | Proper management, implies a correct exploitation / use of heritage, resulting in quality services. | A better management leads to a rationalisation of expenditure on the actions to be done on built heritage, sites and landscapes. | Rationalization on expenditure involves energy efficiency actions. | | |
| Use | | U.5 | | | Business development, finding new ways to engage with target groups and donors | Understanding the position of cultural heritage in society and the benefits of cultural heritage institutions to society. | Defining what makes cultural heritage institutions different from other institutions and determining whether this requires a specialised management approach. | | Business development strategies; impact measurements; sharing best practice and expertise. | Exploring new types of ownership and stakeholder, learn from approaches in other fields; and perhaps in the past - look at the way museums and concert halls started as initiatives of citizens | Changing societal role of cultural heritage institutions. | Cultural institutions will offer better value for money. | Neutral | | |
| Use | | U.6 | | | Wear and tear | Understanding of wear and tear of moveable and immovable heritage | Development of models and theoretical concepts. | Exploitation | Collaborative research | Improved management and preservation | Increased and better access | Resource conservation | Resource conservation | | |
| | | | The Spanish NCP considers this a priority area, of a high strategic value to persuade policy makers to invest in CH research and conservation. | U.7 | Economic value of cultural heritage, its exploitation and conservation | Economic return of investment in cultural heritage research and conservation. Indirect impact of CH in the local economies | Economic models and data to assess the economic impact of investments in this fields. | cost-effectiveness | collaborative research | Increase of the resources dedicated to the cultural heritage | Increased awareness of the social environment | Highlighting the economic value of CH will help to attract public and private investments in its conservation | | | |
| Access | | A.1 | | | Dissemination of cultural heritage knowledge | (Interactive) methods and education tools to increase the legibility of sites and landscapes | Development of (interactive) methods and education tools for a broad public. | | Interdisciplinary approach, visualisation | Raising public awareness, innovative disclosure and educative tools | Increasing public support, positive attitudes and curiosity for cultural heritage | Increased number of visitors; benefits to creative industries | Neutral | | |
| Access | | A.2a | | | Semantic linking of cultural heritage information | Development of the concept of hybrid collections: material and their digital representations, development of digital platforms promoting creative processes | Automated application of domain or object specific knowledge. | Tourism, mobility, digital, visualisation, semantics, security | Collaborative and interdisciplinary research; industry involvement; creative industry involvement | Usability; placing cultural heritage in a meaningful and broader context. | Increased access to cultural heritage | Increased number of visitors; benefits to creative industries; content creation; development of new services and products. | Reduction of environmental impact; potential reduction in footprint to exhibitions, sites etc | | |
| Access | | A.2b | | | | Improving the intellectual, sensory and physical access to heritage through human-machine interactions | Development and evaluation of human-machine interactions. | | Collaborate with and learn from the instruments for linking data and working together in "hard" sciences | | | | | | |
| Access | | A.3 | | | Visualisation of heritage | Increase in amount and complexity of data used on smaller interfaces | Develop understanding of how to visualise complex, unstructured and semantically rich data. | | Evaluation tools; study in the computer use of cultural heritage; measuring instruments like eye and hand moving detectors; interaction design | Better understanding of how people interact in a digital environment. | Increased access to cultural heritage | Benefits to creative industries (e.g. Interactive design, 3D techniques, augmented reality, gaming). | Neutral | | |

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| Access | | A.4 | | | Interaction with digital cultural heritage | The ways users interact with digital cultural heritage | Acquiring knowledge of the changing behaviour with digital cultural heritage compared to physical digital heritage. | | Log analyses (text mining); statistical methods | Better knowledge of the interaction between people and cultural heritage; building better interfaces. | Increased access to cultural heritage; potential to influence behaviour. | Benefits to creative industries (e.g. interaction design, 3D techniques, augmented reality, gaming). | Neutral | | |
| Access | | A.5 | A.5 and A.6 can be joined in a single area | | Technical recognition of moving and still images | Moving and still images are not searchable | Development of techniques that identify images rather than textual representations. | | Pattern recognition; new search technologies for images; artificial intelligence and evaluation methods. | Improved accessibility to large amounts of still and moving images | Increased access to cultural heritage | Benefits to creative industries and other commercial uses | Neutral | | |
| Access | | A.6 | A.5 and A.6 can be joined in a single area | | Technical recognition of handwritten text | Images of handwriting are not searchable | Development of algorithms applicable over wider ranges of text. | | Pattern recognition; methods to convert shapes into ASCII; new search technologies for images. | Better access to handwritten text | Better access to handwritten text | Potential commercial uses | Neutral | | |
| Access | | A.7 | | | User interaction | Value proposition of social tagging | Automated evaluation techniques; reconsideration of authority. | | | Curators at a distance; more freedom for the users | User involvement; better use of wisdom of the crowd | Added value of cultural heritage; less intervention by curators. | Neutral | | |
| Access | | A.8a | | | Tele-survey of tangible cultural heritage | Advanced systems for the tele-survey, remote sensing and laser techniques to investigate terrestrial and underwater cultural heritage | Development of systems for underwater investigation. | | Collaborative and interdisciplinary research; industry involvement; | Underwater cultural heritage revealed, documented and better protected | Hidden heritage returned to society; increased knowledge of common history | Increased number of visitors at the coastline; | Reduced threat caused by underwater waste and chemical weapons | | |
| Access | | A.8b | | | | Innovative devices for the tele-survey of movable artefacts | Development of systems for distant survey. | | Collaborative and interdisciplinary research; industry involvement; | Effective use of highly skilled professionals; | Easy access to distant cultural heritage, especially for students and young researchers | Reduced cost of students education as well as cultural heritage protection | Reduced carbon footprint | | |
| Access | | A.9a | | | Management strategies for secure access to objects | Materials and techniques for safe exhibition, storage, handling, packing and transport of the artefacts, with related monitoring systems and guidelines | Development of better materials, techniques and systems. | | Collaborative and interdisciplinary research; industry involvement | Reduced risk related to extensive public access; mobility of collections | Wide and easy public access to cultural heritage | Increased competitiveness of European industry; increased number of visitors | Reduced carbon footprint | | |
| Access | | A.9b | | | | Strategies and techniques for using the new media complex | Development of recommendations and guidelines related to safe use of new media. | | Collaborative and interdisciplinary research; industry involvement | Better visibility of cultural heritage | Better understanding of cultural heritage by the public | increased number of visitors | Neutral | | |
| Access | | A.10a | | | Security technologies and systems in museums, libraries, archives and historic buildings | Integrated systems for effective detection, prevention and reaction to risk situations such as fire, theft, vandalism attacks | Development of systems for effective protection. | | Collaborative and interdisciplinary research; industry involvement | Reduced risk related to fire, theft and vandalism attacks | Treasures of society better protected | Increased competitiveness of European industry; increased number of visitors; reduced cost of insurance of cultural heritage objects | Neutral | 6 | 6 |
| Access | | A.10b | | | | Techniques to support the identification of fakes or stolen artefacts, as well as the related data bases, with special reference to the insurance issues | Development of adequate techniques and databases. Development of unequivocal description procedure or artworks (physical and chemical fingerprint). | | Collaborative research; knowledge exchange | Art market better controlled | Society better protected against fraud | Reduced cost of insurance of cultural heritage objects | Neutral | | |
| Access | | A.11 | | | Management strategies for secure access to archaeological sites and cultural landscapes | Techniques/approaches for sustainable management, mechanisms for public presentations and access of sites and landscapes | Development and exploration of access policy of built heritage, sites and landscapes. | | Knowledge and experience exchange, best practices | Reduced risks related to extensive public access | Public access of cultural heritage | Increased number of visitors | Improved sustainability | | |
| Access | | A.12 | | | Deinstitutionalisation of cultural heritage | What is the role of cultural heritage institutions in a digital world? | Defining where cultural heritage sits in a digital world and determining whether there is a need for a new kind of institution. | | Inclusion of ICT in the daily work of all kind of organizations related to the cultural heritage sector. Involvement of all stakeholders so ICT to be essential and not only complementary | Multidisciplinary and multisectoral commitment to have a global vision of heritage, according to today's common | New societal role of cultural heritage institutions | New economic role of cultural heritage institutions | Neutral | | |
| Access | | A.13 | Can be included in A.8b | | Tagging and tracking | Wireless micro tagging solutions for real-time tracking | Technology development. | Security | Collaborative research; industry and policy involvement | Safety and prevention of illicit trafficking | Safety | Prevention of misappropriation | Neutral | | |
| Access | | A.14 | Can be included in A.2b | | Haptics | Development of haptic systems for remote tactile access to heritage | Technology development. | Remote access | Collaborative research; industry and policy involvement | Improved access to heritage | Improved access to heritage | Development of new services and products | Lower environmental impact of new products and services | | |
| Access | | A.15 | | | Lighting | Development and understanding of new lighting solutions, including the effect of light on materials | | Lighting | Development of specific lighting systems (including remote management). These must be aesthetically compatible with the assets where they are installed, being equally energetically efficient, in addition to be keeping the sensitive meaning of the site. | Development of techniques and technologies specific to the cultural heritage without losing its essence. | Compatibilization of functional and touristic uses. Better benefits to users. | New skilled services and exploitation ways. | Effective contribution to the sustainability of cultural heritage assets. | | |
| Access | | A.16 | | | IP rights and copyright issues (also for new media) | Legal studies in public domain for digital cultural heritage | Adjusting legislation to a digital environment. | | | | | | | | |
| Interpretation | | I.1 | | | Cultural interpretations of heritage | Understanding factors that shape our understanding of cultural heritage | Determining how local communities and tourists shape the questions asked about cultural heritage. | | Collaborative and transdisciplinary approach; end-user involvement; participatory research | | | | | | |

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| Protection | | P.1 | | | Risk assessment | Lack of integrated web-based risk assessment tools | Development of web-based software. Lack of a reference database with enough temporal representativeness. Consensus on the definition of the parameters and variables to register along time. | | Collaborative research; IT sector involvement | Better protection; effective management of cultural heritage | Neutral | Reduced cost due to effective resources use | Reduced CO2 emission | | |
| Protection | | P.2 | | | Energy efficiency of historic buildings | Strategies for improving the energy efficiency of indoor environments. | Development of economic, energy-efficient and user-friendly systems for indoor environments. | Transport, extreme events, maintenance, conservation, energy efficiency | Collaborative research, politician and end-user involvement; implementation of policy | Improved image of cultural heritage field in to national plans towards EC directives; increased sustainability of cultural heritage. | Increased comfort and life quality of society; incomes from resale of CO2 allowances; raising awareness of the standards required for cultural heritage protection. | Reduction in energy requirements; cost of historic buildings and stimulation of new technologies. | Reduction of energy consumption; lower carbon footprint | | |
| Protection | | P.3 | | | Digital content | Long-time preservation of digitised and born-digital cultural contents | Value assessment; risk assessment costs; format knowledge; aspects of look and feel; software (applications like games, digital installations etc.) preservation; web preservation. | | Involvement of the manufacturers of the hardware that supports the digital content. Involvement also of the developers of software for viewing, manipulation and editing of these contents. Standardization and assurance of the durability of formats. | Preservation of digital content | Safeguarding the cultural representations of a society; long-term easy access to the cultural heritage. | Better return on investment in the longer term; reduced recovery costs of lost digital content; development of creative industries. | Environmental impact does not need to be repeated; risk: storage and actions cost growing energy | 7 | 4 |
| Protection | | P.4a | | | Materials, technologies and procedures for maintenance and conservation of cultural heritage | Protection, exposition, conservation and restoration of cultural heritage, taking into account the criteria of durability, minimal intervention, reversibility, compatibility and retreatability | Development of material and techniques. | | Collaborative research; industry involvement; knowledge exchange | Preservation of authentic substance and value of cultural heritage | Raising awareness of the standards required for cultural heritage protection. | Increased competitiveness of European industry | Reduction of CO2 emission due to protection of original materials | 5 | 9 |
| Protection | | P.4b | | | | Long-term effects of conservation treatments, carried out at present and in the past, on historic materials, objects and sites, including modelling and simulation of these effects, in order to improve the materials and procedures of the conservation practice | Development of evaluation methodologies. | | Knowledge exchange, interdisciplinary research; industry involvement; participation of end-users | Preservation of authentic substance and value of cultural heritage | Raising awareness of the standards required for cultural heritage protection. | Decreased cost of misguided conservation treatments due to increase time span between conservation treatments | Neutral | | |
| Protection | | P.5 | | | Protection and conservation of modern materials used in contemporary art and architecture | Identification, conservation and protection of contemporary materials such as plastics, ceramics, information carriers, concrete and other composite objects and constructions, electronics, new alloys, glasses, dyes, mortars and other, as well as of objects made of them | Development of models, theoretical concepts, novel tools, methods and materials for conservation of contemporary arts. | Conservation | Knowledge exchange, interdisciplinary research; industry involvement; participation of end-users | Preservation of authentic substance and value of cultural heritage; optimisation of the use of resources, development of standards | Raising awareness of value of contemporary art; preservation of contemporary heritage | Reduced financial losses caused by degradation of contemporary art; better use of resources | Neutral | | |
| Protection | | P.6 | | | Industrial heritage | Protection of industrial heritage | Development of strategies towards protection of industrial heritage. | | Collaborative research; involvement of politicians; user involvement | Raising awareness of value of this heritage | Raising awareness of the undervalued heritage; enhancement of local identity | Revitalized degraded city areas; job creation in degraded areas | Reduced CO2 emission due to increased lifetime of buildings and structures | | |
| Protection | | P.7 | | | Built heritage | Stabilisation of historic structures endangered by adverse changes in hydrogeological conditions in the ground | Development of technologies for stabilising. | | Collaborative research, user involvement | Preparedness to impact of global climate change | Safety of buildings and structures ensured | Improvement of industry competitiveness; revitalized degraded areas | Reduced CO2 emission due to increased lifetime of buildings and structures | | |
| Protection | | P.8 | | | Landscape heritage | Protection of cultural landscape and heritage | Development of strategies towards conservation of cultural heritage; new forms of governance. | | Collaborative research; policy support research; transdisciplinarity | Protecting landscape heritage; rising awareness of heritage value | Raising awareness of the heritage; enhancement of local identity | Revitalized degraded areas; job creation | Preserve physical condition of landscapes | | |
| Protection | | P.9a | Very closely related with P.11 | | Understanding and modelling of decay | Development of models for reliable prediction of the behaviour of materials, objects and assemblies under various combinations of stressors (chemical, physical, biological) | Development of models and theoretical concepts, and comparison with experimental data (specially for modern materials). | Conservation, climate | Collaborative research | Optimisation of the use of resources, development of standards | Sustainable use of heritage | Optimisation of the use of resources | Better use of energy | 8 | 5 |
| Protection | | P.9b | | | | Understanding and modelling future risks of biological decay due to spread of species (mould, insects, rodents etc) with climate change | Development of models. | | Collaborative research, knowledge transfer | Optimisation of the use of resources, development of new products | Improved access to heritage | Development of new services and products | Neutral | | |
| Protection | | P.10 | | | Defining and understanding damage | Developing and defining the concept of useful lifetime for various forms of heritage | Development of models and theoretical concepts. | Conservation | Collaborative research, participatory research, end-user involvement | Optimisation of the use of resources, development of standards | Sustainable use of heritage | Optimisation of the use of resources | Better use of energy | | |

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| Protection | | P.11a | Very closely related with P.9 | | Investigation of damage mechanisms | Multidisciplinary approach on the interactions between environment and materials | Understanding of interactions between environment and materials/objects/collections; development of new tools. Experimental approach specially for modern materials (database generation) | | Collaborative research; | rising awareness of potential threats | reduced risk of potential losses; knowledge transfer between sectors as health, security, safety etc. | Understanding of damage mechanism of materials can be used by other sectors of industry experiencing problems with product durability. In consequence competitiveness of European industry will increase. Reduced cost of potential losses | Neutral | 2 | 3 | |
| Protection | | P.11b | | | | Interactions between specific environmental factors (temperature, moisture, ...) and complex artefacts made of different materials | Understanding of interactions between environment and materials/objects/collections; development of new tools. | | Collaborative research; | rising awareness of potential threats | reduced risk of potential losses; knowledge transfer between sectors as health, security, safety etc. | Understanding of damage mechanism of materials can be used by other sectors of industry experiencing problems with product durability. In consequence competitiveness of European industry will increase. Reduced cost of potential losses | Neutral | | | |
| Protection | | P.11c | | | | Degradation of chemically unstable materials (special focus on modern materials) | Understanding of material transformation. | | Interdisciplinary approach; involvement of industry | rising awareness of potential threats | reduced risk of potential losses; knowledge transfer between sectors as health, security, safety etc. | Understanding of damage mechanism of materials can be used by other sectors of industry experiencing problems with product durability. In consequence competitiveness of European industry will increase. Reduced cost of potential losses | Neutral | | | |
| Protection | | P.12a | | | Non-invasive testing | Development of non-invasive and non-destructive testing methods for immovable and moveable cultural heritage | Development of models and technologies. | Conservation | Collaborative research, knowledge transfer. Promotion of the use of new technologies by the organizations responsible for the conservation of heritage assets (mainly public administrations). | Optimisation of the use of resources, development of standards | Improved access to heritage | Development of new services and products | Lower environmental impact of new products and services | 3 | 2 | |
| Protection | | P.12b | | | | Development of non-invasive real-time condition monitoring technologies and software support systems for immovable and moveable cultural heritage, including new photonic sensors integrating colour and 3D vision | Development of models and technologies. | Conservation | Collaborative research, knowledge transfer. Promotion of the use of new technologies by the organizations responsible for the conservation of heritage assets (mainly public administrations). | Optimisation of the use of resources, development of standards | Improved access to heritage | Development of new services and products | Lower environmental impact of new products and services | | | |
| | | | | | P.12c | | Evolution of existing non-invasive techniques (from medical diagnostic or remote analysis) to fulfil the requirements of heritage studies | | | | | | | | | |
| Protection | | P.13 | | | Intervention | Development of new environmentally-friendly materials and processes for conservation (consolidation, cleaning, restoration ...) based on new technologies, e.g. nanotechnology, photonic technologies, rapid prototyping | Development of new services and products. | Conservation | Collaborative research, knowledge transfer | Optimisation of the use of resources, development of new products | Improved access to heritage | Development of new services and products | Lower environmental impact of new products and services | 10 | | |
| Protection | | P.14 | | | | Environmental sensing and dosimetry | Development of sensing systems to detect and control active biodeterioration | Development of new services and products. | Maintenance | Collaborative research, knowledge transfer | Optimisation of the use of resources, development of new products | Improved access to heritage | Development of new services and products | Neutral | | |
| | | P.15a | | | | Climate change mitigation and adaptation | Development of decision-making tools for a climate-proof heritage, including extremely-long-term monitoring solutions | Development of models and concepts. | Climate | Collaborative research, knowledge transfer, participatory research | Optimisation of the use of resources, development of new products | Improved access to heritage | Development of new services and products | Neutral | | |

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| | | P.15b | | | | Understanding of rebound effects ('unintended consequences') of climate change mitigation and adaptation strategies | | Climate | | | | | | | | |
| | | | | P.16 | Balance between accessibility and public protection legal regulations, and values preservation of built heritage | The detection and understanding of those negative effects can cause the strict application of legal rules in the perception and reading of the built heritage | Development and implementation of complementary or alternative accessibility and safety measures and systems, less harmful | Legal regulations damaging | Collaborative Research, knowledge sharing | Elimination or reduction of the potential impact of the strict application of legal norms, on the singular values of the buildings, spaces and collections | Improvement of perception and understanding of cultural heritage | | | | | |
| Recognition | | R.1a | | | Cultural Heritage ethics and identity | Is there an ethical or cultural boundary to what you can do with cultural heritage? | Raising awareness of/proficiency in digital possibilities (ranging from understanding processes to actual coding). | Tourism, Exploitation function, energy efficiency | Sharing expertise and best practice in Centres of Competence | How does the use of cultural heritage contribute to identity | Increased knowledge of the role of cultural heritage in society; increased wellbeing | New opportunities for the use of cultural heritage in commercial settings (e.g. creative industries) | Neutral | 12 | 8 | |
| Recognition | | R.1b | | | | How does the use of cultural heritage contribute to identity at a personal, national, European, and/or global level? | Determining how cultural identity can contribute to the wellbeing of a community, including recovery from conflict. | | | How does the use of cultural heritage contribute to identity | Increased knowledge of the role of cultural heritage in society; increased wellbeing | New opportunities for the use of cultural heritage in commercial settings (e.g. creative industries) | Neutral | | | |
| Recognition | | R.2a | Research area equal to R.3 | | Value of Cultural Heritage | Cultural value of treatments, interventions | Development of an approach/methodology/new theoretical concepts. | Values, representation, identity (sense of place), perception, meaning, significance | Collaborative research; knowledge exchange; participatory research; end user involvement | Increased quality of treatments, interventions | Better understanding by the public of cultural heritage and quality of life | Increase/decrease in visitors | Neutral - no negative environmental impacts | | | |
| Recognition | | R.2b | | | | To understand the perceptions and aspiration of people for cultural value | Application of existing knowledge and approaches to this area. | | Collaborative research; knowledge exchange; participatory research; end user involvement | Understanding interactions between stakeholders and cultural heritage | Better understanding by the public of cultural heritage and quality of life | Increase/decrease in visitors | Neutral - no negative environmental impacts | | | |
| Recognition | | R.3 | Research area equal to R.3. Can be included as R.2c | | Value of Cultural Heritage | Changing values/meanings of physical heritage in a digital world | Development of an approach/methodology/new theoretical concepts. | | Interdisciplinary research, evaluation tools, theoretical propositions | Renewing value of physical heritage | Better understanding of the role of cultural heritage | | Neutral | | | |
| Recognition | | R.4 | | | Cognitive-perceptual theory | Lack of knowledge in how we perceive aspects of cultural heritage | Application of existing and development of new knowledge and approaches to this area, perception research. | | Collaborative research; knowledge exchange; participatory and transdisciplinary research; end user involvement | understanding interactions between stakeholders and cultural heritage; understanding of decision making process of professionals managing cultural heritage field | Improvement of life quality due to understanding of esthetical needs of society | An important increase of competitiveness of industry due to better design based on improved theory | Neutral | | | |
| Recognition | | R.5 | | | Rights and responsibilities around cultural heritage | Individual rights, collective responsibilities and the balances between public and private domain. Property and exploitation rights of digital content. | Insights in the attitude to cultural heritage by different stakeholders. | | Collaborative research; participatory and transdisciplinary research; perception research | Raising awareness of the value of cultural heritage and the responsibilities of individuals and society | Enlarge the public support and consciousness for cultural heritage | Increasing employment and visitors | Neutral | | | |
| Recognition | | R.6a | | | Understanding values | Systematic research into value systems, including economic values and increased quality of life | Development of models, new theoretical concepts and understanding of non-financial benefits of cultural heritage. | Values | Collaborative research; knowledge exchange; participatory and transdisciplinary research; end user involvement | Increased recognition of heritage | Understanding societal benefits | Increase/decrease in visitors; better understanding of and hence investment in cultural heritage. | Neutral | | 11 | |
| Recognition | | R.6b | | | | Policy research into the added value of heritage science | Development of models. | Values | Knowledge exchange; participatory research | Increased recognition of heritage science | Understanding societal benefits | Increase/decrease in visitors | Neutral | | | |
| Recognition | | R.7 | | | Sustainability | Understanding embodied energy in heritage materials, structures and assemblies | Development of models, theoretical concepts. | Values | Collaborative research; knowledge exchange | Increased recognition of heritage science, policy development | Understanding societal benefits | Understanding economic benefits | Lower pressure on the environment through more sustainable use of heritage | | | |
| Change | | C.1 | | | Environmental assessment and monitoring (pollution, climate change, seismic risk) | Development of integrated resource and environmental management/monitoring systems based on optimally balanced environmental costs and conservation benefits. For example, development of new sensors and sensing systems for pollutants (including microbiological) of particular concern to cultural heritage: H2S, acetic acid, NOx, particulates, including smart (nano) sensors, lab-on-a-chip technology, nanorobotics etc. | Understanding of synergic interaction and influence of the pollutants with materials and environments. Development of tailored technologies and ICT-based solutions. | Global and climate change | Collaborative research, knowledge transfer | Optimisation of the use of resources, development of new products; raising awareness of potential threats | Improved access to heritage; Reduced risk of potential losses; improved safety at work | Development of new services and products; understanding of environmental interaction with materials can be used by other sectors of industry experiencing problems with product durability. In consequence competitiveness of European industry will increase. Reduced cost of potential losses | Lower environmental impact of new products and services; raising awareness of impact of environment, encompassing global climate change, on cultural heritage constituting large part of our living and working space will in long term cause pressure on environment and human health | 9 | 10 | |

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| Change | | C.2 | | | Mitigation of climate change | Mitigation of the negative effects of climate change on materials and structures | Development and implementation of adequate technologies. | climate change | Collaborative research, involvement of end user and politicians; policy implemented | Raising awareness of potential threats | Reduced risk of potential losses; improved safety at work | Understanding of environmental interaction with materials can be used by other sectors of industry experiencing problems with product durability. In consequence competitiveness of European industry will increase. Reduced cost of potential losses | Raising awareness of impact of environment, encompassing global climate change, on cultural heritage constituting large part of our living and working space will in long term cause pressure on environment and human health | | |
| Change | | C.3 | | | Measurement instruments | Non-invasive instruments and methodologies for diagnosis and monitoring | Development of new instruments. <i>Very large data management and editing (especially 3D). Clear definition of the ranges of application and usefulness of each instrument.</i> | | Interdisciplinary approach; involvement of industry (hardware manufacturers and software developers). | Raising awareness; new tools for investigations of cultural heritage | Innovation in this area will be useful for other fields important for society ex. health, forensic | Increase of innovation of industry; workplace creation in service sector | Neutral | | |
| Change | | C.4 | | | Climate change | Understanding of the effects of climate change on built, archaeological, coastal, submerged heritage | Development of models and concepts. | Climate | Collaborative research | Optimisation of future management in a changed climate | Improved access to heritage | Better use of resources | Neutral | | |
| Change | | C.5 | Too restricted to climate change, other aspects of global change not considered | | Global change adaptation | Opportunities for sites and cultural landscapes in reducing the effects of global change | Knowledge global/climate change and effects on local scale. | | Interdisciplinary approach; scenario building | See climate change as an chance for adaptive management of sites/landscapes | | | Reduction of effects climate change | | |
| Change | | C.5 | Alternative proposal for C.5 | Change | Global change adaptation | Opportunities for sites and cultural landscapes in reducing the effects of global change | Knowledge global change and effects on local scale. | | Interdisciplinary approach; scenario building | Preventing global change as a risk of alteration of tangible and specially intangible heritage. | | | Reduction of effects climate change | | |