ITALY - 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 the creation of the SRA, please go to www.jpi-culturalheritage.eu.

									Criteria				Ranked Priorities	
Main driver (as identified in the DoW)	**Additional drivers**	**Identifier**	**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**	**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.						
Use		**U.2**		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 CO_2 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					
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 stakeholdership, 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 immoveable heritage	Development of models and theoretical concepts.	Exploitation	Collaborative research	Improved management and preservation	Increased and better access	Resource conservation	Resource 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 footfall to exhibitions, sites etc		
Access		**A.2b**			Improving the intellectual, sensory and physical access to heritage through human-maching 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. Interactin9o design, 3D techniques, augmented reality, gaming).	Neutral		
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. Interactin9o design, 3D techniques, augmented reality, gaming).	Neutral	**5**	**5**
Access		**A.5**		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; artificla 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**		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	**12**	**12**

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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	**9**	**9**
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, vandal attacks	Development of systems for effective protection.		Collaborative and interdisciplinary research; industry involvement	Reduced risk related to fire, theft and vandal attack	Treasures of society better protected	Increased competitiveness of European industry; increased number of visitors; reduced cost of insurance of cultural heritage objects	Neutral	**10**	**10**
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.		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, mechanims 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	**11**	**11**
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.				New societal role of cultural heritage institutions	New economic role of cultural heritage institutions	Neutral		
Access		**A.13**		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**		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							
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						
Interpretation		**I.2**		Wisdom of the crowd, social tagging	Value proposition of social tagging	Better understanding of the knowledge of the crowd: automated decision of trustworthiness.	Provenance, dating, authentication, meaning; stories, context; legibility	Augmented interfaces	Added value of cultural heritage	Active involvement of users with cultural heritage	More objects will be described with less effort	Neutral		
Interpretation		**I.3**		Measurement instruments	Diagnosis, dating and comparative studies	Development of new instruments, methodologies and open source databases.		Interdisciplinary approach; involvement of industry	Raising awareness; new tools for investigations and linking of cultural heritage	Innovation in this area will be useful for other fields important for society e.g. health, forensic	Increase of innovation in industry; workplace creation in service sector	Neutral		
Interpretation		**I.4**		Research infrastructure	Coherent methods and instruments	Integration of research infrastructure accessible for cultural heritage sector.		Interdisciplinary approach; politician involvement	Raising awareness; new tools for investigations of cultural heritage	Innovation in this area will be useful for other fields important for society e.g. health, forensic	Neutral	Neutral		
Interpretation		**I.5**		Language technology	Development of language technologies for the interpretation of cultural heritage.	Integration of existing techniques and development of new methodolgies for language recognition (e.g. Text mining, sentiment mining, OCR augmentation, changes in diachronic corpora, speech recognition).			Improved access to cultural heritage	Innovation in this area will be useful for other fields important for society	Increase of innovation in industry.	Neutral		
Interpretation		**I.6**		Reference collections	Development and characterisation of reference heritage and art material libraries, systems for their cataloguing and data accessibility, including GIS	Development of databases.	Provenance	Collaborative research, knowledge transfer	Improved interpretation: dating, provenance determination, authentication	Improved understanding of heritage	Development of databases for commercial use	Neutral		
Interpretation		**I.7a**		Technical art history	Knowledge of art and heritage materials and forms	Development of databases.	Technical art history	Collaborative research, knowledge transfer	Improved interpretation: dating, provenance determination, authentication	Improved understanding of heritage	Better interpretation and resource conservation	Neutral		
Interpretation		**I.7b**			3D hyperspectral imaging (using various parts of the EM spectrum) of objects and works of art, with standardisation protocols	Development of technologies, protocols, databases.	Technical art history	Collaborative research, knowledge transfer	Improved interpretation: dating, provenance determination, authentication	Improved understanding of heritage	Better interpretation and resource conservation, content creation	Neutral		
Interpretation		**I.8**		Natural history	Development of genomic and metabolomic databases of natural history collections for better understanding of past environments, natural and social	Development of technologies, protocols, databases.	Archaeometry	Collaborative research, knowledge transfer	Improved interpretation: dating, provenance determination, authentication	Improved understanding of heritage	Better interpretation and resource conservation, content creation	Neutral		

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Interpretation		**I.9**		Digital collections	Development and standardisation of concepts of authentication for digitally born materials	Theoretical concepts and standards.	Authentication	Collaborative research, knowledge transfer	Improved interpretation: dating, provenance determination, authentication	Improved access to heritage	Development of new services and products; creative industries	Lower environmental impact of new products and services		
Interpretation		**I.10**		Historic integrity and modern use of art and objects	Improving our understanding of the artist's or maker's intent	Improving our understanding of the artist's or maker's intent and determining the effectiveness of modern application of traditional craft skills to cultural heritage?		All activities in header except SME/industry involvement.						
Interpretation		**I.11**		Historic integrity and modern use of built heritage and cultural landscapes	Balance between historic integrity and modern use of buildings, cultural landscape, including tourism and lifestyles	Improving our understanding of the origin and intention of the architects/planners and determining the effectiveness of modern application of traditional uses to cultural heritage.								
Interpretation		**I.12**		Balancing intervention with aesthetics	How might we relate the unknown impact of intervention to society's need to appreciate the aesthetic?	Development of methods.		Collaborative research, knowledge transfer	Increased quality of treatments, interventions. Understanding interactions between stakeholders and	Understanding societal benefits	Development of new services and products	Neutral		
Interpretation		**I.13**		Interdisciplinary approaches to cultural heritage	Developing an interdisciplinary approach to understanding cultural heritage	Development of research frameworks or methodologies that draw on a range of evidence on cultural heritage – oral, aural, visual and written.		Collaborative research, knowledge transfer, perception research	Better informed research.	Research that takes into account all aspects of available research	increase of innovation; better value for money	environmental impact of research is not repeated		
Protection		**P.1**		Risk assessment	Lack of integrated web-based risk assessment tools	Development of web-based software.		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; involvement 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 requirementscost of historic buildings and stimulation of new technologies.	Reduction of energy consumption; lower carbon footprint	**6**	**6**
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.			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		
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	**1**	**3**
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**		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.	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**	**8**
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		

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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		
Protection		**P.11a**		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.		Collaborative research;	rising awareness of potential threads	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	**7**	**7**
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 threads	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	Understanding of material transformation.		Interdisciplinary approach; involvement of industry	rising awareness of potential threads	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 immoveable and moveable cultural heritage	Development of models and technologies.	Conservation	Collaborative research, knowledge transfer	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		
Protection		**P.12b**			Development of non-invasive real-time condition monitoring technologies and software support systems for immoveable and moveable cultural heritage, including new photonic sensors integrating colour and 3D vision	Development of models and technologies.	Conservation	Collaborative research, knowledge transfer	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		
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		
Protection		**P.14**		Environmental sensing and dosimetry	Development of sensing systems to detect and control active bioodeterioration	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		
		P.15b			Understanding of rebound effects ('unintended consequences') of climate change mitigation and adaptation strategies		Climate							
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		
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**		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		

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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**		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 prepositions	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	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 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		
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.	Global and climate change	Collaborative research, knowledge transfer	Optimisation of the use of resources, development of new products; raising awareness of potential threads	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	**3**	**2**
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 threads	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.		Interdisciplinary approach; involvement of industry	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	**4**	**4**
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	**2**	**1**
Change		**C.5**		Global change adaptation	Opportunities for sites and cultural landscapes in reducing the effects of climate 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		