

RRI Opportunities in Horizon 2020

Science with and for Society relevant topics in the
Horizon 2020 Work Programme 2016-17



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Introduction

This document follows the first edition of Opportunities E-Book for Work Programme 2014-2015 for Science with and for Society.

This e-book is meant to be a guideline of the different funding opportunities with relevance to Science with and for Society stakeholders in the different parts of the Work Programme 2016-2017. Thus it identifies topics with one or more SwafS dimension to guide SWAFS' stakeholders through the different H2020 Work Programmes. The analysis covers six SWAFS dimensions:

- Engagement
- Ethics
- Open Access
- Gender
- Science Education
- Responsible Research and Innovation (RRI)

The document compiles the information for each topic - the deadline for the submission of proposals, type of action and a direct link for each topic in the Participant Portal. Readers are encouraged to go through the whole Work Programme themselves to carefully identify all the opportunities available, and all its details and rules of participation. To ease this consultation, there is a direct link embedded in the title of each programme throughout the document.

Furthermore, and due to the extensive information included, we have dedicated the first pages to include tables of content by keyword. This allows the readers to identify the topic according to their area of interest and navigate throughout the document. To ease this navigation, each topic included in the table of contents has a link which takes the reader to its detailed description.

Please note that the SME Instrument, Co-Fund actions, and ERA-NETs were excluded from this analysis.

DISCLAIMER

Information on calls can change. Stakeholders should check the Participant Portal for the latest information on calls.

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SiS.Net² is the network of National Contact Points² for Science with and for Society in Horizon 2020.

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[REV-INEQUAL-10-2016: MULTI-STAKEHOLDER PLATFORM FOR ENHANCING YOUTH DIGITAL OPPORTUNITIES](#)

3.7 SECURE SOCIETIES - PROTECTING FREEDOM AND SECURITY OF EUROPE AND ITS CITIZENS

[DS-01-2016: ASSURANCE AND CERTIFICATION FOR TRUSTWORTHY AND SECURE ICT SYSTEMS, SERVICES AND COMPONENTS](#)

Science Education

1. HORIZON 2020 - PILLAR 1: EXCELLENT SCIENCE

1.1. FUTURE AND EMERGING TECHNOLOGIES

[FETOPEN-02-2016: FET-OPEN COORDINATION AND SUPPORT ACTIONS](#)

[FETOPEN-03-2017: FET-OPEN COORDINATION AND SUPPORT ACTIONS](#)

2. HORIZON 2020 - PILLAR 2: INDUSTRIAL LEADERSHIP

2.1. LEADERSHIP IN ENABLING AND INDUSTRIAL TECHNOLOGIES (LEIT)

2.1.2. NANOTECHNOLOGIES, ADVANCED MATERIALS, BIOTECHNOLOGY AND ADVANCED MANUFACTURING AND PROCESSING

[NMBP-34-2017: GOVERNING INNOVATION OF NANOTECHNOLOGY THROUGH ENHANCED SOCIETAL ENGAGEMENT](#)

3 HORIZON 2020 - PILLAR 3: SOCIETAL CHALLENGES

3.2 FOOD SECURITY, SUSTAINABLE AGRICULTURE AND FORESTRY, MARINE AND MARITIME AND INLAND WATER RESEARCH AND THE BIOECONOMY

[BG-13-2016 SUPPORT TO THE BLUEMED INITIATIVE: COORDINATION OF MARINE AND MARITIME RESEARCH AND INNOVATION ACTIVITIES IN THE MEDITERRANEAN](#)

[RUR-01-2016 CONSOLIDATED POLICY FRAMEWORK AND GOVERNANCE MODELS FOR SYNERGIES IN RURAL-URBAN LINKAGES](#)

[RUR-02-2017: COASTAL-RURAL INTERACTIONS: ENHANCING SYNERGIES BETWEEN LAND AND SEA-BASED ACTIVITIES](#)

[RUR-13-2017: BUILDING A FUTURE SCIENCE AND EDUCATION SYSTEM FIT TO DELIVER TO PRACTICE](#)

3.3 SECURE, CLEAN AND EFFICIENT ENERGY

[LCE-14-2017: DEMONSTRATION OF LARGE >10MW WIND TURBINE](#)

3.6 EUROPE IN A CHANGING WORLD - INCLUSIVE, INNOVATIVE AND REFLECTIVE SOCIETIES

[CO-CREATION-01-2017: EDUCATION AND SKILLS: EMPOWERING EUROPE'S YOUNG INNOVATORS](#)

Responsible Research and Innovation

1. HORIZON 2020 - PILLAR 1: EXCELLENT SCIENCE

1.1. FUTURE AND EMERGING TECHNOLOGIES

1.1.2. FET-PROACTIVE – BOOSTING EMERGING TECHNOLOGIES

[FETPROACT-01-2016 - FET PROACTIVE: EMERGING THEMES AND COMMUNITIES](#)

2. HORIZON 2020 - PILLAR 2: INDUSTRIAL LEADERSHIP

2.1. LEADERSHIP IN ENABLING AND INDUSTRIAL TECHNOLOGIES (LEIT)

2.1.1. ICT - INFORMATION AND COMMUNICATIONS TECHNOLOGIES

[ICT-18-2016: BIG DATA PPP: PRIVACY-PRESERVING BIG DATA TECHNOLOGIES](#)

[ICT-35-2016: ENABLING RESPONSIBLE ICT-RELATED RESEARCH AND INNOVATION](#)

2.1.2. NANOTECHNOLOGIES, ADVANCED MATERIALS, BIOTECHNOLOGY AND ADVANCED MANUFACTURING AND PROCESSING

[NMBP-34-2017: GOVERNING INNOVATION OF NANOTECHNOLOGY THROUGH ENHANCED SOCIETAL ENGAGEMENT](#)

3 HORIZON 2020 - PILLAR 3: SOCIETAL CHALLENGES

3.5 CLIMATE ACTION, ENVIRONMENT, RESOURCE EFFICIENCY AND RAW MATERIALS

[SC5-19-2017: COORDINATION OF CITIZENS' OBSERVATORIES INITIATIVES](#)

3.6 EUROPE IN A CHANGING WORLD - INCLUSIVE, INNOVATIVE AND REFLECTIVE SOCIETIES

[CO-CREATION-08-2016/2017: BETTER INTEGRATION OF EVIDENCE ON THE IMPACT OF RESEARCH AND INNOVATION IN POLICY MAKING](#)

[REV-INEQUAL-09-2016: BOOSTING INCLUSIVENESS OF ICT-ENABLED RESEARCH AND INNOVATION](#)

[REV-INEQUAL-10-2016: MULTI-STAKEHOLDER PLATFORM FOR ENHANCING YOUTH DIGITAL OPPORTUNITIES](#)

[ENG-GLOBALLY-09-2016: CENTRES/NETWORKS OF EUROPEAN RESEARCH AND INNOVATION](#)

1. Horizon 2020 - Pillar 1: Excellent Science

1.1. Future and Emerging Technologies

1.1.1. FET-Open – Novel Ideas for Radically New Technologies

Topic	FETOPEN-01-2016-2017: FET-Open research and innovation actions
Key words	Gender, engagement, open access
Type of Action	Research and Innovation action
Deadline	Multiple Cut-off: 11-05-2016 17-01-2017 27-09-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2229-fetopen-01-2016-2017.html

Specific Challenge:

The successful exploration of new foundations for radically new future technologies requires supporting a large set of early stage, high risk visionary science and technology projects to investigate new ideas. Here agile, risk-friendly and highly interdisciplinary research approaches are needed with collaborations that are open to all sciences and disciplines and that dissolve the traditional boundaries between them. The renewal of ideas is complemented by the renewal of actors taking these new ideas forward. Therefore, **this topic encourages the driving role of new high-potential actors in research and innovation, such as excellent young, both female and male, researchers and high-tech SMEs that may become the scientific and industrial leaders of the future.**

Scope:

This topic supports the early stages of research to establish a new technological possibility. Proposals are sought for collaborative research with all of the following characteristics ('FET gatekeepers'):

- Long-term vision: the research proposed must address a new and radical long-term vision of a science - and technology - enabled future that is far beyond the state of the art and not currently foreseen by technology roadmaps.
- Breakthrough scientific and technological target: research must target a scientifically ambitious and technologically concrete breakthrough, argued to be a crucial step towards achieving the long-term vision. The plausibility of the proposed breakthrough(s) to be attained within the life-time of the project must be argued in the proposal.

- **Novelty:** the research proposed for achieving the breakthrough must be based on cutting-edge knowledge, new ideas and concepts, rather than in the mere application or incremental refinement of existing ones.
- **Foundational:** the breakthroughs that are envisaged must be foundational in the sense that, if achieved, they would establish an essential basis for a new kind of technology and its future uses, not currently anticipated.
- **High-risk:** the inherently high risk of the research proposed will be reflected in a flexible but effective methodology for exploring alternative directions and options, supported by open and agile research and innovation practices.
- **Interdisciplinary:** the proposed collaborations are expected to go beyond 'waterfall' configurations in multi-disciplinary science - and technology research. Instead they should seek new solutions through genuine exchanges, mutual learning, cross-fertilisation and synergistic advances among distant disciplines in order to open unexplored areas of investigation and new directions for joint research.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Initiating or consolidating a baseline of feasibility or a radically new line of technology and its future uses by establishing the essential proofs-of-principle and their foundational scientific underpinnings.
- Strengthening European leadership in the early exploration of visionary, new and emerging technologies, beyond academic excellence and with global recognition. This impact can be reinforced by involving also new high-potential actors such as young, both female and male, researchers and high-tech SMEs that may become the European scientific and technological leaders and innovators of the future.

Impact is also sought in terms of the take up of new research and innovation practices for making leading-edge science and technology research more open, collaborative, creative and closer to society.

Topic	FETOPEN-02-2016: FET-Open Coordination and Support Actions
Key words	Engagement, Science Education
Type of Action	Coordination and support action
Deadline	11-05-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2228-fetopen-02-2016.html

Specific Challenge:

The challenge is to make Europe the best place in the world for collaborative research and innovation on future and emerging technologies that will secure and renew the basis for future European competitiveness and growth, and that will make a difference for society in the decades to come.

Scope:

Proposals should address only one of the following subtopics:

FET Communication [2016]: raising the visibility and impact of FET through novel and creative approaches **for reaching out to various stakeholders and well beyond the research communities. This may include, for example, collecting, aggregating and disseminating information from the entire range of FET projects and activities, and using an appropriate mix of channels and formats to engage with the target audiences, including scientists, students, media, policy makers, the business community and the general public. This subtopic should include public engagement processes as discussed in the introduction of this FET Work Programme.**

FET Exchange [2016]: actions for structuring and strengthening an emerging FET-relevant science and technology research and innovation topic and the interdisciplinary communities involved in this topic. **This may include, for example, research roadmapping, stimulating (formal and informal) learning and exchange, expanding the range of disciplines (including the life sciences and humanities where relevant), involving new actors such as young researchers, entrepreneurs and high-tech SMEs, and broadening stakeholder engagement (multi-actor or citizen).** One specific theme that may be addressed is the area of alternative metrics (so-called "altmetrics") to assess research outputs and researchers.

FET Conference [2016]: supporting the organisation of the fourth European Future and Emerging Technologies Conference and Exhibition (see for example <http://www.fet11.eu/>). The conference shall showcase progress and results from FET research, attract high-tech SMEs, investors and entrepreneurs that might take FET results forward, seed new ideas across disciplines, **foster a dialogue between science, policy and society on future and emerging technologies (through public engagement)**, explore new ways of combining research and innovation and involve high-potential actors that will make the difference. Proposals will address pre-conference communication activities, the local organisation, participant assistance and post-conference follow-up. The event shall take place in early 2018.

FET Innovation Greenhouse [2016]: actions for establishing a Europe-wide capacity for innovation, exploitation and entrepreneurship stemming from the visionary, high-risk interdisciplinary science and technology research supported by FET. Greenhouse provides innovation support services to help bridging the gap between FET research and its application in industry and for society. The focus should be on enabling the earlier creative and learning stages of innovation from FET research, for which the classical path of business plans and investors is still premature, many options are still open and a more exploratory, risk-friendly and tailored support is needed. A wide technological scope, a strong specificity to FET and complementarity with existing greenhouse initiatives and innovation services are of prime importance. This subtopic also welcomes support to the actions funded under the FET Innovation Launchpad (FETOPEN-04-2016-2017) and for networking and exchange among them.

For each of the scope items a) and c) at most one action will be funded.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.3 and 0.5 million for scope items a), b) and d), and up to EUR 1 million for the scope item c), would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Strengthening globally recognised European leadership in the early exploration of visionary, new and emerging technologies, beyond academic excellence and with a strong engagement of scientists, citizens, innovators and policy makers.
- Improved long-term innovation potential in Europe both from the abundance of novel ideas and the range of actors ready to take them forward.
- Improved understanding of the range of possible impact mechanisms for long-term science and technology research.
- Improved readiness across Europe to engage in silo-breaking research collaboration and to take up new research and innovation practices.

Topic	FETOPEN-03-2017: FET-Open Coordination and Support Actions
Key words	Engagement, Science Education
Type of Action	Coordination and support action
Deadline	17-01-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2227-fetopen-03-2017.html

Specific Challenge:

The challenge is to make Europe the best place in the world for collaborative research and innovation on future and emerging technologies that will renew the basis for future European

competitiveness and growth, and that will make a difference for society in the decades to come.

Scope:

Proposals should address one of the following topics:

FET Futures [2017]: identifying strategy options, challenges and opportunities to stimulate and organise interdisciplinary research and innovation towards new and visionary technologies of any kind. Actions should rely on evidence from FET activities (e.g., portfolio, constituency, results) and from other sources (including other funding bodies or private initiatives worldwide, like those using prize schemes or challenges). **They should aim at open and dynamic stakeholder participation using creative methods and on-line tools/social networks. This topic should include public engagement processes as discussed in the introduction of this FET Work Programme.**

FET Exchange [2017]: actions for structuring and strengthening an emerging FET-relevant science and technology research and innovation topic and the interdisciplinary communities involved in this topic. **This may include, for example, research roadmapping, stimulating (formal and informal) learning and exchange, expanding the range of disciplines (including the life sciences and humanities where relevant), involving new actors such as young researchers, entrepreneurs and high-tech SMEs, and broadening stakeholder engagement (multi-actor or citizen).**

For scope item a) at most one action will be funded.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.3 and 0.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Strengthening globally recognised European leadership in the early exploration of visionary, new and emerging technologies, beyond academic excellence and with a strong engagement of scientists, citizens, innovators and policy makers.
- Improved long-term innovation potential in Europe both from the abundance of novel ideas and the range of actors ready to take them forward.
- Improved understanding of the range of possible impact mechanisms for long-term science and technology research.

Improved readiness across Europe to engage in silo-breaking research collaboration and to take up new research and innovation practices.

1.1.2. FET-Proactive – Boosting emerging technologies

Topic	FETPROACT-01-2016 FET Proactive: emerging themes and communities
Key words	Engagement, gender, ethics, Responsible Research & Innovation
Type of Action	Research and Innovation action
Deadline	12-04-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2217-fetproact-01-2016.html

Specific Challenge:

To mature a number of novel areas and themes by working towards structuring emerging communities and supporting the design and development of transformative research themes. The main benefits of this structuring yet explorative approach are emerging novel areas that are not yet ready for inclusion in industry research roadmaps, and building up and structuring of new interdisciplinary research communities around them. It makes the step from collaborations between a small number of researchers, to larger collaborations addressing various aspects of a novel research theme to jointly explore possibilities for, and long-term implications of future technologies that matter.

Scope:

Proposals should address research and innovation activities, aimed at jointly exploring directions and options to establish a solid baseline of knowledge and skills, and to foster the emergence of a broader innovation ecosystem for a new technology as well as a fertile ground for its future take-up (e.g., through public engagement processes when relevant, or through formal and informal education). Proposals should address a single of the specific subtopics within one of the following areas:

Area 1: Future technologies for societal change

Being human in a technological world: critical interdisciplinary explorations of potentially game-changing impacts of future technologies on humanity, in plausible as well as in extreme scenarios. This can include individual, **gender, organisational, economic, cultural and societal impacts, for instance from changes to self- or social perception, to our narratives, or to human development (e.g., cognitive, physical) or evolution**. Visions being addressed should be radically forward looking and relatively unexplored, such as hyperconnectivity, human augmentation, hybridisation of nature, life extension, extra-sensorial perception or real/virtual blending. **The work should provide fresh perspectives that challenge current thinking, include ethical and social aspects**, reflecting on the purposes, impacts and motivations for the research and innovation activity, the associated uncertainties, areas of ignorance, assumptions, questions and dilemmas; **and by this crystalize through active stakeholder engagement concrete options for shaping a worthwhile and responsible future**.

New science for a globalised world: tools and methods (mathematical, technological, social/organisational,...) for the collaborative study, projection and engineering of large scale open socio-technological and ecological systems characterised by complexity and inherent uncertainty due to, among others, partial knowledge, ignorance and conflicting world-views by different actors. These tools and methods should include the study of informal opinion groups emerging on the Internet at a global level, and focusing on global topics such as Global Systems Science as a new integrative science approach, the emergence of global solutions as patchworks of local ones, non-rationality, the impact of open-data, the dynamics of social and cultural divides, of peace and conflict, and various incentives, drivers and enablers of change and innovation, including the arts.

Area 2: Biotech for better life

Intra and inter-cell bio-technologies: new technologies to enable the study and engineering of processes within and between biological cells, and their exploitation for purposes such as sensing, signalling, imaging, regulating, curing or for mimicking or re-engineering the intra- and inter-cell physics and dynamics. This can include the use of natural cells, optimised, therapeutic and compound, synthetic ones or combinations of these, as well as cell-free techniques. Where needed, multiscale mathematical modelling and computational simulation can be included. Proposals under this subtopic should also explore the paradigm-changing potential of these technologies, for instance in the bio-medical field.

Bio-electronic medicines and therapies: using adaptive nerve or brain stimulation for precise regulatory control of organs or other biological processes inside the human body, in order to restore or maintain healthy conditions. This includes technologies for bio-electronic medicines, drug-free therapies, adaptive drug release, closed-loop BNCI, more invasive stimulation, or development of neurotransmitter sensor/actuator systems, all within a setting of personalised and adaptive medicine and the tight integration of diagnostic and therapeutic capabilities (theranostics). **A Responsible Research and Innovation approach, including aspects of ethics, as well as social science and humanities should be taken into account.**

Cognitive neuro-technologies: integrated interdisciplinary approaches combining theory and novel technology-based experiments for understanding the circuits and pathways of higher-level cognitive functions (such as navigation, goal-oriented behaviour, motivation and reward, memory, knowledge and belief formation, reasoning and decision making, emotion, interaction, communication), the related principles of neural coding and operation within and between brain regions and the role of the physical and social/cultural environment in bringing them about. Proposals should focus on non-validated, leading-edge methodologies and technologies specifically relevant to cognitive neuroscience. Target applications could include, for example, adaptive human interfaces, specific brain interfaces and neuro-prosthetics to restore or support cognitive functions or to address unmet therapeutic needs.

Area 3: Disruptive information technologies

New computing paradigms and their technologies: new foundations for computing, including bio-, nature- and socio-inspired ones that can encompass also aspects of communication, interaction, mimicry or differentiation (adaptation, learning, evolution), as well as non-

technological aspects like organisational or physical/virtual architectural ones, and tailored to future and emerging challenges and requirements in highly interdisciplinary settings and for new kinds of mathematical and computational approaches in science.

Quantum engineering: reproducible, economical and scaleable approaches, architectures and techniques for designing and realising devices and systems that exploit quantum phenomena, such as superposition and entanglement, for achieving new or radically improved functionalities (for instance in sensing, precision measurement, transduction, secure communication, control, simulation and computation) and demonstrated in the context and boundary conditions of a specific application area (for example in the biological, medical, materials, process, energy or standards domain).

Hybrid opto-electro-mechanical devices at the nano-scale: new working principles and their first-time validation in nano-, molecular- or atomic-scale devices based on the interaction and mutual control of multiple physical degrees of freedom to achieve new or radically improved functionalities and application scenarios under plausible operating conditions. The interacting degrees of freedom are those involved in e.g. nano-optics, nano-scale electromagnetism, nano-mechanics and phonons and fluctuations.

Area 4: New technologies for energy and functional materials

Ecosystem engineering: new models, materials, processes, devices and systems going beyond a single dimension for extreme energy and resource efficiency and recovery, and footprint management into circular ecosystems (energy, raw materials, waste, water,...). New approaches and technologies for extremely efficient energy generation (e.g., artificial photosynthesis or microfluidic conversion), transfer, conversion, high-density storage and consumption. The targeted improvements with respect to the state of the art are to be stated in quantitative terms. Genuine cross-fertilisation and deep synergies between the broadest range of advanced sciences and cutting-edge engineering disciplines for emerging ecological technologies seeking holistic paradigms, striving to reduce or eliminate the environmental impact, and the replacement of toxic/pollutant substances by ecofriendly materials should be considered. First time validation and assessment of these results in the context of integrated synergetic circular economy solutions or other quasi self-sufficient environments.

Complex bottom-up construction: new technologies and methods for self-organisation, assembly and adaptation of materials and physical devices/systems with complex functionality (including for instance energy storage, conversion or recovery), complex composition and/or spanning a range of scales (nano, meso) and with superior properties on each of them. Energy and resource/material availability, ecofriendliness and efficiency are to be taken into account). Where needed, multiscale mathematical modelling and computational simulation of materials and related production or self-organisation processes can be included.

The Commission considers that proposals requesting a contribution from the EU of between EUR 4 and 10 million would allow this specific challenge to be addressed appropriately. When appropriate, this allows for proposals to provide financial support to third parties in line with the conditions set out in Part K of the General Annexes, for example to access specific

expertise, to enhance impacts or to award an inducement prize following a contest organised by the beneficiaries.

The Commission further considers that proposals with a duration up to 5 years would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals of different duration.

The funding budget per area is with a maximum of EUR 20 million for each of the areas 1 and 4, and a maximum of EUR 30 million for each of the areas 2 and 3.

Expected Impact:

Establish a solid baseline of knowledge and skills for a future technology in the theme addressed. **Goal oriented community structuring** and true interdisciplinary collaboration.

Emergence of an innovation ecosystem around a future technology in the theme addressed from **outreach to and partnership with high potential actors in research and innovation, and from wider stakeholder/public engagement.**

1.2. Research Infrastructures

1.2.1. INFRADEV - Development and long-term sustainability of new pan-European research infrastructures

Topic	INFRADEV-04-2016: European Open Science Cloud for Research
Key words	Open Science
Type of Action	Research and Innovation action
Deadline	22-06-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2054-infradev-04-2016.html

Specific Challenge:

Research Infrastructures such as the ones on the ESFRI roadmap and others, are characterised by the very significant data volumes they generate and handle. These data are of interest to thousands of researchers across scientific disciplines and to other potential users via Open Access policies. **Effective data preservation and open access for immediate and future sharing and re-use is a fundamental component of today's research infrastructures and Horizon 2020 actions.** In this context, European research stakeholders make increasing use of cloud services to effectively handle such data.

Scope:

The aim of this topic is the launch of a pilot action that should demonstrate how wide availability of scientific data and data-analysis services for European researchers can be ensured through a cloud infrastructure.

Proposals should address the federation, networking and coordination of existing research infrastructures and scientific clouds **for the purpose of increasing data findability, accessibility and interoperability, improving the services provided to research communities, and facilitating re-use of data by a wider user community.** Trust, easy accessibility and use by researchers should be duly taken into account. Particular attention should be paid to storage, access and re-use needs for data and knowledge from Horizon 2020 projects, as well as to the needs of the 'long tail of science', including orphaned scientific communities.

The action should build on existing infrastructures and design a stakeholder driven governance framework, with the involvement of the research user community, the research infrastructures and the research funding bodies to ensure its sustainability. Links with related national and European initiatives should be established. Links should also be established with projects selected under topic EINFRA-12-2017, to collaborate, exploit potential synergies and ensure complementarity.

The Commission considers that proposals requesting a contribution from the EU of between EUR 5 and 10 million would allow this topic to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Facilitate access of researchers across all scientific disciplines to the broadest possible set of data and to other resources needed for data driven science to flourish.
- Provide a governance and business model that sets the rules for the use of data, deals with issues related to privacy, sensitivity, copyright and security and oversees the provision of services (business and governance layer).
- Create a cross-border and multi-disciplinary open innovation environment for research data, knowledge and services with engaged stakeholders and organisations.
- Foster the establishment of global standards, ontologies and interoperability for scientific data.

1.2.2. EINFRA – E-INFRASTRUCTURES

Topic	EINFRA-12-2017: Data and Distributed Computing e-infrastructures for Open Science
Key words	Open Access, Engagement
Type of Action	Research and Innovation action
Deadline	29-03-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2121-einfra-12-2017.html

Specific Challenge:

This topic covers two complementary areas of e-infrastructures very closely related with the objective **to make research data discoverable, accessible, assessable, intelligible, useable, and wherever possible interoperable** – c.f. G8 principles on research data:

(a) Secure and agile data and distributed computing e-infrastructures: fostering the integration of a secure, permanent, on-demand service-driven, privacy-compliant and sustainable e-infrastructure incorporating distributed databases, computing resources and software.

The European data and computing e-infrastructure landscape remains very fragmented which is an obstacle for research collaboration at European and global levels and introduces additional complexity for achieving sustainable governance. The challenge is to integrate at European level the geographically and disciplinary dispersed resources to achieve economies of scale and efficiency gains in providing the best data and computing capacity and services to

the research and education communities. This action is interrelated to INFRADEV-04-2016, “European Open Science Cloud for Research”.

(b) Access and preservation platforms for scientific information: **supporting the integration and consolidation of e-infrastructure for reliable and permanent open access to digital scientific records**, based on existing initiatives across Europe (institutional and thematic repositories, aggregators, etc.).

The European infrastructures need to respond to the emerging requirements for seamless and reliable access to publications, research data and software. These requirements are complemented by the need for long term preservation and curation of scientific information to fully support data and computing intensive science. The challenge is to support the integration at European level of a robust and sustainable e-infrastructure, based on existing initiatives across Europe (institutional and thematic publishing platforms, aggregators, etc.) and services supporting European Open Access policies. An additional challenge is the building of capacity to link all kinds of digital research objects in order to enable a more transparent evaluation of research and reproducibility of results, enabling trust and facilitating access by innovative business actors.

Scope:

Grants awarded under this topic will be complementary between them. The respective options of Article 2, Article 31.6 and Article 41.4 of the Model Grant Agreement will be applied. The main purpose of the collaboration agreements referred to in Article 41.4 of the Model Grant Agreement is to work on potential synergies, overlaps and gaps in the overall service offering. In addition, links should also be established with projects selected under topic INFRADEV-04-2016, to collaborate, exploit potential synergies and ensure complementarity.

Proposals will address part (a) or (b), but not both. At least one proposal for each part will be selected:

(a) Secure and agile data and distributed computing e-infrastructures (proposals should address all points below):

(1) integration of computing, software and storage resources exposing them through a dynamic registry and catalogue of services supporting European research and education communities in their tasks related with data and computing intensive science. This integration should be done by means of open and flexible architectures and include institutional, regional, national and European capabilities, packaging them in the optics of end-user needs

(2) seamless operation of highly scalable and agile data and computing platforms and services dedicated to analytics including hardware and software components, database, compilers, analytics software, supported to easy user entry points for the community of users

(3) reliably address the aspects of privacy, cybersecurity and information assurance supporting multiple compartments with private, public or industrial corpus of data, protected from unauthorized access by secure interfaces

(4) adoption of standards-based common interfaces, open source components enabling access and processing of underlying data collected/stored in different platforms and formats. Empowering users to customise application and services tailoring them to specific requirements, which will differ across disciplines, applications etc.

(5) **work closely with user communities (from different disciplines) to foster the use of digital infrastructures, promote the values of open science and support their data management plans. Engage and train users (researchers, educators and students)** to contribute to the dynamic registry and catalogue of services improving quality of data, software and computing infrastructure that become available for re-use

(6) foster interoperability of pan-European thematic/community-driven e-infrastructures providing cost-effective and interoperable solutions for data management. The data and computing e-infrastructure should be able to interoperate with resources based on different technologies which are operated/owned by public and or private organisations

(7) support the preservation and curation of data and associated software so that the reproducibility and accuracy of the data can be verified

(8) enable seamless transition and e-infrastructure upgrades, exploiting economies of scale and promoting interoperability with similar infrastructures across and beyond Europe and operate user-friendly and comprehensive repositories of software components for research and education

The Commission considers that proposals requesting a contribution from the EU of between EUR 10 and 15 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

(b) Access and preservation platforms for scientific information (proposals will address all points below):

(1) Deployment and maintenance of service-driven knowledge e-infrastructure responding to general and specific requirements of researchers and research organisations for open access to research digital objects, their registration and preservation. This e-infrastructure will further develop the research capacity through a coordinated and participatory architecture linking institutional and thematic repositories across Europe. It will support publishing platforms by providing essential services for scientific information that can be used by humans and machines. Such target platforms can be generic, specific for a research field or specialised on quality assurance, discoverability, archiving etc. Essential functions of this service-driven approach will include helpdesks, training and guidance to support producers and users of scientific information, community building to support research data sharing and management, as well as **implementation of Open Access policies in Europe**. Relevant indicators on the take-up of open access in Europe including publications and data should be elaborated and reported regularly. The project will promote a limited set of biblio- and webometrics that reflect open access policies. It will collect bibliometric data on publications, citations, data

citations, etc. on all Horizon 2020 scientific output (including on the Open Research Data Pilot) and produce both standard and on-demand statistics.

(2) Supporting global interoperability of open access data e-infrastructures and linking with similar initiatives across the globe to complement the physical access to research facilities with data access and to ensure that Europe plays a leading role in international collaborations.

The Commission considers that proposals requesting a contribution from the EU of between EUR 8 and 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. It is expected that one proposal will be selected.

Expected Impact:

(a) the operation of a federated European data and distributed computing infrastructure for research and education communities will optimise the access to IT equipment and services and will put all European researchers and educators in equal footing to access essential resources to express their talent and creativity. Establishing partnerships with industrial and private partners the e-infrastructure will train people in research and academic organisations preventing lack of skilled and specialised infrastructure operators. It will avoid the locking-in to particular hardware or software platforms that would jeopardise the long-term planning for capacity upgrades. With such an operational infrastructure more scientific communities will use storage and computing infrastructures with state-of-the-art services for their research and education activities. **The open nature of the infrastructure will allow scientists, educators and students to improve the service quality by interacting with data, software and computing resources.** It will increase the incentives for scientific discovery and collaboration across disciplinary and geographical boundaries, putting Europe in the driving seat at global level. It will further develop the European economic innovation capacity and provide stability to the e-infrastructure.

(b) a reliable operation of e-infrastructure services for access and preservation of scientific information will make the intellectual capital of Europe available to researchers, business and citizens at large. It will generate economic and scientific advances now and in the future as that capital is safely preserved for further exploitation by future generations. Open Access publications resulting from Horizon 2020 funded research are available and easily findable online. Data needed to validate published results is linked to the publications and publicly shared whenever possible. Accurate science metrics for Horizon 2020 can be produced with almost no effort. Most of the European institutional repositories (at least 95%) as well as the principal thematic repositories are part of the same interoperable repository network.

Topic	EINFRA-21-2017: Platform-driven e-infrastructure innovation
Key words	Open Access
Type of Action	Research and Innovation action Public Procurement of Innovative solution
Deadline	29-03-2017– RIA 20-09-2016 – PPI
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2122-einfra-21-2017.html

Specific Challenge:

Prepare the capacity required to future generations of e-infrastructure is the key challenge. e-Infrastructure platforms and services need to evolve through innovation actions to respond to the long-term needs of research and education communities (e.g. in case of large RIs entering in functions in a 5 to 10 years' timeframe). Platforms and services are first designed, prototyped and piloted with "supply and demand-side" approaches triggered by to the most demanding cases. The innovative developments bringing state-of-the-art technology need to evolve and mature to be integrated and offered as dependable e-infrastructures.

Scope:

Proposals will address parts (a) or (b), but not both:

(a) Support to Public Procurement of innovative HPC systems, PPI (proposals should address all points below):

(1) procurement of innovative HPC solutions supporting the deployment in Europe of world-leading HPC capability infrastructure

(2) ensuring and reinforcing European access to European leading-edge supercomputing Tier-0 infrastructures and services, by making available a substantial percentage of the new systems to European researchers in the frame of the Pan-European High Performance Computing infrastructure and services (see EINFRA-11-2016)

(3) diversify the available leading-class HPC capabilities through a rich set of HPC architectures featuring the most advanced technology made available by R&I (Research and Innovation) in Europe, in order to satisfy the needs of a wider range of users in very different key application areas

(4) contribute to the coordination of plans and procurements for the provision of leading-class HPC capabilities at European and national level in view of the implementation the European supercomputing strategy , encompassing funding and technical specifications

(b) Research and Innovation Actions for e-Infrastructure prototypes:

Proposals will address only one of the points below. At least one proposal for each point will be selected:

1. Universal discoverability of data objects and provenance (proposals should address all points below):

Prototyping an e-infrastructure service, based on standards and best-practices, for the uptake of a Digital Identifier e-infrastructure for digital objects (articles, datasets, collections, software, nomenclature, etc.), researchers and contributors, which cuts across geographical, temporal, disciplinary, cultural, organisational and technological boundaries, without relying on a single centralised system but rather federating locally operated systems to ensure interoperability. The requirements of all relevant stakeholder groups (researchers, libraries, data centres, publishers, etc.) should be addressed as well as global interoperability through agreed mechanisms (e.g. in consensus building through the Research Data Alliance).

The Commission considers that proposals requesting a contribution from the EU between EUR 4 and 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. It is expected that one proposal will be selected.

2. Computing e-infrastructure with extreme large datasets (proposals should address all points below):

Develop service prototypes to cope with very large data resources. It should include the basis software layers supporting applications such as modelling, simulation, pattern recognition, visualisation, etc. The developments should be supported by robust mathematical methods and tools. Prototypes should follow an open source approach and aim at common interfaces to access and analyse underlying data collected/stored in different platforms, formats, locations and e-infrastructures and be tested against requirements of very large or highly heterogeneous research data sets. Clean slate approaches to high-performance computing and data management (e.g. HPC-through-the cloud, support of most innovative server's architectures for distributed computing in particular high Memory/Cores ratios allowing "in memory" processing) targeting 2020+ 'data factory' requirements of research communities and large scale facilities (e.g. ESFRI projects) are encouraged.

The Commission considers that proposals requesting a contribution from the EU between EUR 2.5 and 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

(a) Support to Public Procurement of innovative HPC systems, PPI: This action will contribute to the European HPC strategy through the creation of a European procurement market for the benefit of the HPC actors in Europe (in particular technology suppliers) and catalysing the efforts to vitalise the European HPC ecosystem. It positions Europe as a world-class HPC hub with more leading-class HPC computing resources and services available at European level for

European academia and industry, independently of the location of users or HPC systems. It will foster adoption and use of innovative world-class HPC solutions featuring the most advanced results of the R&I in Europe, **widening the access to more users, in particular for and industry (including SMEs)**. It will improve effectiveness of public procurement in leading-class HPC systems through joint procurement and pooling of European and national resources, contributing to sustainability. Benefits will also translate in better coordination between demand and supply in the European HPC ecosystem, with improved collaboration of the users and procurers with technology suppliers.

(b) Research and Innovation Action for e-Infrastructure prototypes

Universal discoverability of data objects and provenance: the successful set up of such service based on standards and best-practices will support interoperability of e-infrastructure services. **The use of Digital Identifiers opens new prospects for advanced services for science and education and for encouraging openness and building trust. Data and other resources become discoverable and easy to use which will facilitate access to resources and collaboration between scientists.** It has the potential to be used as a core service across Europe and globally. Duplication of efforts for developing services common to many e-infrastructures is reduced.

Computing e-infrastructure with extreme large datasets: The successful prototyping of this action services will support the evolution of e-infrastructure services based on *exascale* data resources. It will prepare data and computing infrastructure to absorb needs of communities that push the envelope in terms of data and computing intensive science while softening the learning curve for scientific communities that will be using new services.

Topic	EINFRA-22-2016: User-driven e-infrastructure innovation
Key words	Open Access, Engagement
Type of Action	Research and Innovation action
Deadline	30-03-2016
Link	http://ec.europa.eu/research/participants/portal4/desktop/en/opportunities/h2020/topics/2120-einfra-22-2016.html

Specific Challenge:

There is a need to support user-driven design and prototyping of innovative e-infrastructure services and applications to meet the needs of those communities that push the envelope in scientific and technological domains requiring top-of-the range capacity in the long term. It is also important to promote multi-domain community-driven approaches to fully exploit core e-infrastructure services with high economic innovation potential. With the support of, for example, independent software vendors, engineering companies, innovation clusters and Research and technology organisations, **e-infrastructures should open up to innovative**

stakeholders, including researchers, citizens and SMEs, to exploit a wide range of technology developments, research results and data.

Opening e-infrastructures to develop and test innovative functionalities and advanced technology entails the support to Open Science and stairways for excellence to increase citizen's trust in science, bridging the gap between the leading research and education communities and the wider population.

Scope:

Proposals will address only one of the points below. At least one proposal for each point will be selected:

Exploitation of e-infrastructures for user-driven innovation and pilots responding to community specific challenges

(1) Proposals are expected to support, through open e-infrastructure resources, specific requirements of European initiatives addressing societal challenges (e.g. on environment and marine sustainability, agriculture and biodiversity, health and human brain etc.). e-Infrastructures should enable fast prototyping and development of innovative networking, data and computing intensive application and services promoting adaptation, extension and repurposing of basic services. Special attention should be devoted to standardisation to make data and software reusable across the board. The network, data and computing services should lead to economies of scale and facilitate access to resources by innovators.

The Commission considers that proposals requesting a contribution from the EU between EUR 2 and 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

(2) Proposals are expected to stimulate the innovation potential of innovative actors, SMEs in particular, either as suppliers of technologies and services for e-infrastructures or as users of e-infrastructures to improve their own product and service offering. The proposals shall involve actions led by innovative actors (notably SMEs) for which financial support will be granted (minimum 80% of the EU funding requested by the proposal)[[In line with the conditions set out in Part K of the General Annexes.]]. If the maximum financial support per innovative actor exceeds EUR 60.000 (it should however never go beyond EUR 150.000) the proposal should explain why this is necessary for the objectives of the action.

The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. It is expected that one proposal will be selected.

(3) Development of a pan-European identity federation services for researchers, educators and students, in compliance with existing identity inter-federation efforts (including *Eduroam* and *Edugain*). Stimulate AAI services supporting communities involved in the emerging data-rich science era to manage and share their resources. It shall respond to

requirements of cybersecurity and information assurance towards integrated identity management across-disciplines and be interoperable at global level.

The Commission considers that proposals requesting a contribution from the EU between EUR 2.5 and 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. It is expected that one proposal will be selected.

Innovation for Open Science e-infrastructures and services

(4) Reuse and improve (performance, quality, reputation, etc) the open access repository and publishing platform infrastructure for prototyping new infrastructure services in support of open science (e.g. new forms of publishing, machine-assisted knowledge extraction services from heterogeneous data resources and strengthening of machine readability and other discovery services). Prototyping of open review and research certification services engaging researchers, educators and students. Also registration and archiving services can be targeted. Developing further and widening the scope of the European Open Science e-infrastructure. Proposals should address an open scientific knowledge management infrastructure in which scientific and educational information repositories and publishing platforms form a visible part of an inter-connected and global knowledge system. Proposals can target any relevant parts of the scientific information ecosystem to enhance the links between literature, data, software, models and other digital objects. The proposed prototypes should have the potential to become part of an interoperable framework in order to enable more efficient digital science as well as transparent evaluation of research and reproducibility of results. Proposals should consider barriers (including legal) to data sharing in the context of these new services and assess the possibility of using pan-European authentication and authorization infrastructures.

The Commission considers that proposals requesting a contribution from the EU between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Exploitation of e-infrastructures for user-driven innovation and pilots responding to community specific challenges: These actions will accelerate the development of innovative data and computing intensive services in areas of social relevance such as Health, Environment monitoring and management. It will foster the use of open e-infrastructures eco-systems to innovative use promoting smooth collaboration among and between the large European Policy data intensive initiatives. **It will bridge the gap between adjacent but not connected scientific communities and promote wide dissemination of data including to the citizens engaged in science. It will support collaboration in data provision and exchange across regional and national related infrastructures allowing the integration of data from a myriad of resources and research communities.**

Successful proposals will increase the number of SMEs that are aware of available e-infrastructures resources and services and become active innovators as users and or suppliers of e-infrastructures. Stronger links between e-infrastructure operators and other actors in the

innovation chain, such as independent software vendors, innovation clusters and Research and technology organisations, will be put in place. The value of existing scientific information infrastructures will increase with the addition of new interoperable and/or integrated services. Successful proposals will have an impact in making European and global intellectual capital available to researchers, business and citizens. This will support scientific advances now and generate innovation with economic impact leveraging e-infrastructures such as GÉANT. The knowledge capital will be better preserved for further exploitation by future digital-born generations.

Innovation for Open Science e-infrastructures and services: successful proposals will support the objectives of Open Science and contribute, with innovative services, to the modernization of the underlying e-infrastructures and improve access to content and resources through federated management.

1.2.3. INFRASUPP - Support to policy and international cooperation

Topic	INFRASUPP-03-2016: Support to policies and international cooperation for e-infrastructures
Key words	Open Access, Engagement
Type of Action	Research and Innovation action Coordination and Support Action
Deadline	30-03-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2077-infrasupp-03-2016.html

Specific Challenge:

Fostering targeted international co-operation is essential to promote e-infrastructure interoperation at global level allowing European communities to link with third countries, contribute to standardisation activities in international *fora*, to align strategic developments and share best practices. To optimise e-infrastructure investments in Europe it is essential to coordinate European, national and/or regional policies and programmes for e-infrastructures in order to develop complementarities and promote cooperation between e-infrastructures and related EU policies.

Scope:

Proposals will address part (a) or (b), but not both:

(a) Research and Innovation Actions for International Co-operation on high-end e-infrastructure requirements

Together with other countries in the world, European Member States are leading partners in the construction of the forthcoming Square Kilometre Array (SKA) radio telescope. SKA will generate huge amounts of data and a significant part will be made available online. Efficient processing and computation of the large volume of data are significant challenges and global co-operation is essential. SKA has the potential to drive innovation in query and knowledge creation on large databases, high performance computing, and communications and networking technologies.

Proposals bringing together key international partners should address all of the following aspects:

- Define and test the high-speed networking e-infrastructure architecture, components and services to respond to the bandwidth requirements for SKA data dissemination channels.
- Define and test computational requirements and architectures in terms of High-Performance Computing, distributed computing, storage e-infrastructures and services in order for the scientific community to be able to exploit SKA data.
- Foster global co-operation on management e-infrastructure and services for the exploitation of SKA data through joint efforts on global interoperability in the context of the Research Data Alliance (RDA).

Further conditions and requirements that applicants should fulfil when drafting a proposal are given in part D of the section “Specific features for Research Infrastructures”. Compliance with these provisions will be taken into account during evaluation.

The Commission considers that proposals requesting a contribution from the EU between EUR 1.5 and 3 million would allow this activity to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

(b) Coordination and Support actions for international co-operation and policy development

Proposals will address only one of the points below. At least one proposal for each point will be selected:

1. International Co-operation on e-infrastructure supporting major societal challenges: International cooperation involving different third countries, to facilitate the development of globally interoperable e-infrastructures ensuring their global reach, innovation, skill development and sharing of lessons learned. Co-operation with third countries on interoperability of e-infrastructures for networking, computing and data in order to support joint-efforts on one or more major societal challenges (e.g.: health, agriculture, education/skills, etc.). Innovation and spin-off of technology for developing and developed countries and emerging economies to establish a platform for sharing information and best practices on e-infrastructure development, deployment and operation.

Proposals should address all the following aspects:

- Define one or more key societal challenge that has significant potential of maximising benefit of e-infrastructure across developing, developed and emerging economies,
- Organise a platform for sharing information and best practices,

- Identify and explore spin-off and innovation, in particular with the co-operation of developing and developed countries.

The Commission considers that proposals requesting a contribution from the EU between EUR 0.5 and 1 million would allow this activity to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

2. Policy support to e-infrastructure programme: Support the e-IRG[[e-Infrastructure Reflection Group]] secretariat. The activities should include the collection and aggregation of relevant policy information with impact on the development of EC-funded e-infrastructures, including KPIs and cost-related information, in coordination with the funded e-infrastructure initiatives and made available in open formats for reuse. The collected information will enable the e-IRG with the support of independent expert panels to provide strategic advice on the evolution of the European e-infrastructures landscape and associated costs.

The Commission considers that proposals requesting a contribution from the EU between EUR 0.5 and 1 million would allow this activity to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

3. Support to dissemination for the e-infrastructure programme: Develop and maintain dissemination and collaboration activities for information sharing among projects and stakeholders. They should include a web-portal to convey updated information related to the evolution of e-infrastructures at regional, national and European levels, with a special focus on e-infrastructure projects funded under Horizon 2020. **The portal will be a vehicle to present to experts and the wider public the catalogue of services offered by e-infrastructures as well as service-related KPIs and costs (see point above). It should support monitoring activities on take-up of open science and e-infrastructures policies (e.g. Horizon 2020 Open Research Data Pilot by research communities and citizens, per country, region and research domain).**

The Commission considers that proposals requesting a contribution from the EU between EUR 1 and 1.5 million would allow this activity to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

4. Support to small-size foresight roadmaps for the e-infrastructure programme: Support small-size foresight roadmaps for research and education communities and operators of e-infrastructure services to define long-term requirements, community-building and identification of potential collaboration from stakeholders across different geographic areas and scientific domains.

The Commission considers that proposals requesting a contribution from the EU between EUR 300 and 400 thousand would allow this activity to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

(a) Research and Innovation Actions for International Co-operation on high-end e-infrastructure requirements: The impact of successful proposals will lead to the improvement of co-operation on e-infrastructures with European partners that are joining efforts in major research

infrastructure undertakings. It will help the identification of benefits of joint technology development, standardisation and sharing risks.

(b) Coordination and Support Actions for International Co-operation and Policy Development:

International Co-operation on e-infrastructure supporting major societal challenges: will exploit the potential for further economic and educational co-operation between Europe and third countries. It will also improve the identification of areas for further co-operation on scientific development and innovation. The actions will provide mechanisms to assess measurable benefits of co-operation on major societal challenges in the developing countries.

Policy support to e-infrastructure programme: Support actions provide solid ground for future choices for a comprehensive European Research Infrastructure and especially e-infrastructure policy and enable decision making and deployment of e-infrastructures. Successful collaboration between all projects under the H2020 e-infrastructure funding brings together all key stakeholders, and enables finding further synergies towards a harmonised European e-infrastructure approach.

Support to dissemination for the e-infrastructure programme: improve awareness and knowledge about priorities of e-Infrastructures activities and strategies increasing the transparency and accountability of the workprogramme implementation.

Support to small-size foresight roadmaps for the e-infrastructure programme: improve the knowledge base for setting long-term e-infrastructure strategies and objectives.

2. Horizon 2020 - Pillar 2: Industrial Leadership

2.1. Leadership in enabling and industrial technologies (LEIT)

2.1.1. ICT - Information and Communications Technologies

Topic	ICT-11-2017: Collective Awareness Platforms for Sustainability and Social Innovation
Key words	Open Access, Engagement,
Type of Action	Innovation action Coordination and Support Action
Deadline	25-04-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5070-ict-11-2017.html

Specific Challenge:

Today Europe fails to capitalise fully on participatory innovation; more models and blueprints are needed to lead to new ways to produce collective intelligence in key sustainability areas, leveraging on open data, knowledge networks, open hardware and Internet of things. The challenge is to demonstrate that innovative combinations of existing or emerging network technologies enable new Digital Social Innovation which can better cope with emerging sustainability challenges, achieving mass adoption and measurable global impact.

Scope:

a. Innovation Actions: pilots of Collective Awareness Platforms (CAPs) demonstrating **new forms of bottom-up innovation and social collaboration exploiting digital hyper-connectivity and collaborative tools based on open data, open knowledge, open source software and open hardware, harnessing crowdsourcing or crowdfunding models**. Within this vision, target areas for pilots include:

- **New participatory innovation models for economy and society**, such as the collaborative or circular economy, collaborative public services and collaborative making;
- Solutions for sustainable lifestyles such as collaborative consumption and production, smart reuse and low carbon approaches;
- **Emerging ethics of digital innovation, such as social entrepreneurship, direct democracy, privacy preservation and digital rights.**

Proposals are expected to **leverage on fresh grassroots ideas and civil society participation in the broad digital social innovation domain, and should:**

- **Include in consortia an existing and motivated community of citizens, to drive platform development;**
- Base the platforms on an appropriate combination of existing or emerging network technologies (e.g. distributed social networks, wikis, sensors, blockchains);
- Demonstrate a durable multidisciplinary collaboration by including in the consortia at least two entities whose main focus of interest is beyond the ICT domain.

Proposers are encouraged to integrate different platforms, addressing several sustainability challenges at a time, in order to achieve critical mass and measurable global impact.

Preference will be given to proposals engaging civil society at large, for instance through NGOs, local communities, social enterprises, non-profit organisations, students and hackers.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Minimum one action per target area will be selected.

b. Coordination and support Actions, to coordinate and support the CAPs initiative and the underlying broader digital social innovation constituency, by identifying links and synergies among different projects, and ensuring visibility and contacts at European and international level.

The Commission considers that proposals requesting a contribution from the EU of between EUR 0.2 and 0.8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Proposals should address as many as possible of the following criteria, possibly defining appropriate metrics to measure impact

- Demonstrate increased effectiveness, compared to existing solutions to societal and sustainability challenges, of new bottom-up, open and distributed approaches exploiting network effects and based on open data and open hardware;
- **Capability to reach a critical mass of European citizens and to transpose the proposed approaches to other application areas related to sustainability;**
- **Achieve effective involvement of citizens and relevant new actors in decision making, collective governance, new democracy models, self-regulation, citizen science and citizens' observatories, new business and economic models.**
- **Achieve measurable improvement in cooperation among citizens**, (including elderly), researchers, public authorities, private companies and civil society organisation in the development of new sustainable and collaborative consumption patterns, new lifestyles, and innovative product and service creation and information delivery.
- Demonstrate the applicability of concrete and measurable indicators to assess the social impact and the "social return of investment" of the proposed solutions.

Topic	ICT-12-2016: Net Innovation Initiative
Key words	Open Access, Engagement,
Type of Action	Innovation action Coordination and Support Action Research and Innovation Action
Deadline	12-04-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5083-ict-12-2016.html

Specific Challenge:

Today the net is a place unlocking rapid innovation. This potential is too often left unexploited, i.e. Europe does not do enough to turn RTD & I outcomes into business success. In particular open platforms offer opportunities for the development of new services and applications. FIWARE, for example, is an open platform that demonstrates the capacity to become a preferred service platform, but its potential is currently underused.

Current centralised platforms for big and social data management consolidate the dominance of existing incumbent actors, stifling innovation and allowing less and less control over the data by citizens. Distributed architectures and decentralised platforms have a huge potential to enable the creation of viable alternatives to current dominant models.

More generally, key players and ecosystems, startups and SMEs often do not have sufficiently innovative technology in their hands to innovate on the net. Outcomes of Future Internet RTD & I need to be transferred faster into real life.

Scope:

Innovation Actions

Multi-vendor Open Service Platforms will allow increased competition and avoid vendor lock-in. They should have royalty-free open specifications, **open source reference implementations**, and be offered by multiple vendors. The Seventh Framework Programme for Research and Technology Development (FP7) has developed the FIWARE platform which has demonstrated its potential of becoming a service platform of choice, as well as other research results with a lot of potential for usage by SMEs and startups. For such potential to be realised, the following three innovation activities are needed. In addition, a fourth activity develops applications and services on top of any Future Internet research results.

- i. Among lead sectors, smart cities have emerged as a viable vector for FIWARE adoption. The activities will focus on the take-up of FIWARE in cities and the evolution of the FIWARE platform with new context-aware services addressing the needs of cities.
- ii. The ecosystem creation consists of building and supporting an open community of FIWARE innovators and users. A professional online and open engagement strategy may include hackathons and challenges, building community programmes for startups and SMEs and link to related national and regional programmes. Activities will incentivise

- entrepreneurs and users to explore FIWARE, by building on previous community achievements and contributing to an evolving ecosystem.
- iii. FIWARE sustainability and evolution will be supported by the further evolution of the service platform by an open community. Activities include supporting the execution of a roadmap with a full set of supported enablers, with a reference implementation in open source, maintained and made available to third parties for use, with high quality and clear terms and conditions. Furthermore, a public sandbox environment for experimentation of all supported enablers by any third party interested is made available. **Activities contribute to building an open source community to manage the integrity and evolution of the FIWARE technology, and to ensure a real multi-vendor approach.**
 - iv. Future Internet research results will be transferred into innovation via acceleration activities. They will support SMEs and startups taking research results of completed or ongoing projects in the domain of Future Internet and develop applications and services on top of these research results in order to achieve concrete business and market take-up. The action will involve financial support to third parties in line with the conditions set out in Part K of the General Annexes. The consortium will define the process of selecting SMEs and startups for which financial support will be granted (typically in the order of EUR 25 000-75 000[[In line with Article 23 (7) of the Rules for Participation the amounts referred to in Article 137 of the Financial Regulation may be exceeded, and if this is the case proposals should explain why this is necessary to achieve the objectives of the action.]]). At least 60% of the EU funding should be allocated to financial support for these third parties. However, the selected SME and startups ideally bring additional resources, i.e. additional private and/or public funds. Any IPR generated by the SMEs and startups shall rest with them[[It is recommended to also use established networks reaching out to SMEs like the Enterprise Europe Network and the NCP network for calls publications and awareness raising towards SME's.]].

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Minimum one action per innovation activity will be selected.

Research and Innovation Actions

Distributed architectures for decentralized data governance aims at demonstrating a distributed open hardware and software platform (for communications, cloud computing or Internet of Things) capable of supporting decentralised data and identity management and bottom-up participatory innovation.

The goal is to provide SMEs, social enterprises, industries, researchers, communities and individuals with a new development platform, which is intrinsically protective of the digital sovereignty of European citizens. The key characteristic of such a platform is to be fully distributed (e.g. using decentralised algorithms based on blockchains), in order to be more resilient, intrinsically resistant to malware and hacking, preventing any possible centralisation of data storage or data management, and able to provide federated identity management.

Proposals are expected to design, develop and demonstrate an architecture for such a platform, with the involvement of relevant technological actors (P2P and open source developers, open hardware manufacturers, experts in security, encryption, anonymity, blockchains and linked data) **as well as of civil society organisations** (citizens' organisations, digital rights advocacies, artists, social scientists) **and interested developers of the overlying social applications and systems** (creative industries, SMEs, social entrepreneurs, software developers).

A strong focus is expected on the creation of robust open standards for such distributed and decentralised architectures, in coordination with industry and academia.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Coordination and Support Actions.

Support for collaboration and networking in the domain of Future Internet including the organisation of the Net Futures conference.

The Commission considers that proposals requesting a contribution from the EU of EUR 0.2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Proposals should address one or more of the following impact criteria, providing metrics to measure success when appropriate:

Innovation Actions: Open Service Platform

- The outcomes of the **Future Internet PPP are handed over to an open, multi-stakeholder community to ensure the evolution of FIWARE and its take-up among industry, small business and notably establishing FIWARE as the open service platform of choice for cities.** This will allow them to develop and integrate smart cities applications more easily and faster, but also to achieve economies of scale through easy sharing of applications between cities;
- Increased take-up of Future Internet technologies by SMEs and web entrepreneurs;
- Significant increase of the effectiveness of business processes and applications of high economic and/or societal value.

Research and Innovation Actions: Distributed architectures

- To demonstrate how a distributed architecture can enable new data services and disruptive (e.g. commons-based) economic models, and become a viable decentralised alternative to the current dominant data management platforms which are gathering big data at global scale in a centralised manner;

- **To demonstrate that citizens' generated data can be made available as part of a common distributed and decentralised architecture, open to all, so to allow new entrants to aggregate data on demand, bringing unanticipated features and innovative services;**
- **To develop an architecture and open standards allowing European citizens to retain full control over their digital identities,** and to move their personal profiles between different platforms, for distributed or centralised (data portability);
- To create a level playing field for the development of new collaborative applications and services based on emerging participatory innovation models that are intrinsically respectful of privacy and ethics.

Coordination and Support Actions

- Increased multi-disciplinary collaboration among Future Internet communities.

Topic	ICT-18-2016: Big data PPP: privacy-preserving big data technologies
Key words	Engagement, Ethics, Responsible Research & Innovation
Type of Action	Coordination and Support Action Research and Innovation Action
Deadline	12-04-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5087-ict-18-2016.html

Specific Challenge:

In view of privacy considerations, businesses are often unsure about how to deal with the data collected through their operations. This data is of particularly high value to companies for offering personalised services or developing new business models. Data subjects (citizens, consumers) often feel that they have no control over the use of their personal data. This is aggravated by uncontrolled exploitation, aggregation and linking of personal data by large corporations and advertisers. The resulting lack of confidence undermines efficient and legitimate data sharing and value creation for agreed purposes. The challenge is to develop technologies that are inherently privacy-preserving and offer the basis for empowering the data subjects to understand and be informed of (and, where appropriate, control) the use of their personal data, and the entrepreneurs to develop and run their data driven business.

Scope:

- a. Research and Innovation actions will advance the state of the art in the definition of methods that will support protection of personal data for harvesting, sharing and querying data assets. The personal data protection methods shall be implemented in secure and robust software modules and be exposed to publicly administered penetration/hacking challenges, open to participants the world over. Cross-disciplinary consortia are required to conduct legally and methodologically sound field work and coordinate with the CSA to determine i) if the various formal notions of personal data

protection implemented are consistent with EU legislation and with the ethical intuitions of the EU citizens such methods are designed to protect; ii) to what extent privacy protection measures can be personalised in a way that remains intelligible to the data subject while remaining consistent with EU legislation. **The diversity (e.g. in terms of age, sex, gender, socio-economic class) of data subjects should be taken into account, as appropriate.** The data experimentation and integration projects (ICT-14) are likely to provide real-world challenges and data to validate the privacy-preserving technologies. The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 4 million would allow this area to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

- b. Coordination and Support Actions will complement the research **by exploring the societal and ethical implications and provide a broad basis and wider context to validate privacy-preserving technologies. The CSA is expected to liaise with a broad and multidisciplinary community of stakeholders (including public administrations, research community, companies, civil society, citizens) to advise the research and innovation in privacy-preserving (Big) Data technologies, promoting an integrated societally and ethically valid approach.** Another task is to observe, **map and report on ethical and Responsible Research and Innovation (RRI) issues in the field of Big Data, including technology, research, markets and education.** The action is expected to organise networking, awareness-raising and consultation among its communities, connect with the technical RIAs to inform their thinking and issue reports, analyses and recommendations. The Commission considers that proposals requesting a contribution from the EU of about EUR 1 million would allow this area to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. No more than one action will be funded.

Expected Impact:

Research and Innovation actions

- Substantial improvement of technologies for data access, processing and analysis to better protect consumer and personal data and respect security in line with existing and future EU rules on the protection of personal data, and as measured in terms of improved confidence and satisfaction of data subjects by the end of 2020;
- Substantial improvements towards creating a secure environment for data access, process and analysis, demonstrated in the use situations that arise in the data experimentation/integration projects (ICT-14).

Coordination and Support action

- Appropriate consideration and attention towards an ethically sound approach to big data processing, and effective involvement of the relevant actors and stakeholders;
- Improving the dialogue between data subjects and Big Data communities (industry, research, policy makers, regulators), thereby improving the confidence of citizens towards Big Data technologies and data markets.

Topic	ICT-35-2016: Enabling responsible ICT-related research and innovation
Key words	Responsible Research & Innovation
Type of Action	Research and Innovation Action
Deadline	12-04-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5084-ict-35-2016.html

Specific Challenge:

The development and deployment of digital technologies and services induces pervasive and radical changes in our lives and in the societal system. The explosion of the number of devices, their increased "intelligence", autonomous behavior and connectivity are changing significantly the life conditions of Europeans. Beyond the benefits brought about by technological innovations, there are also challenges, and sometimes threats, that need to be addressed to ensure that technological innovations go hand in hand with societal needs and expectations. Including SSH (social sciences and humanities) expertise provides a constructive and critical accompaniment of the scientific and technological developments for the projects funded under LEIT-ICT, and enables responsible research and innovation in the digital age.

SSH engagement in ICT research can both address proactively the impacts of the take-up of novel technologies, and contribute to innovation by proposing alternative approaches. For example, considering that there is a trade-off between privacy and security refers to conceptions that can be challenged. Reconsidering underlying assumptions or taking a new and broader view to ICT related research and innovation can lead to other options that inspire different and more responsible technological R&I, with new benefits for the society.

Scope:

Research and Innovation Actions should take a fresh look on the relationship between information and communication technologies, on the one hand, and social phenomena, on the other hand. They should contribute to ongoing ICT-driven research and innovation by providing best practice in collaborative research between SSH and ICT communities. The projects are expected to have direct relevance to ongoing ICT-related research and innovation, in particular in the area of robotics, cyber-physical systems, internet of things, big data and cybersecurity.

From this wide range of issues, proposals are expected to focus on one or both of the following clusters:

- How can we avoid the traps of ICTs ending up in isolating humans behind their screen, or harnessing them in a passive role? In the forthcoming hyperconnected era, it is essential to acknowledge the dual human aspirations for relationships and for freedom, and the dynamic nature of the relationships between humans and artefacts.

- What are the conditions for ICT-enabled innovations to generate interesting and rewarding jobs, and reduce the risk of excluding sections of society from the labour market? What economic models can ensure a fair sharing of the created added value?

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this area to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Smaller short-term Research and Innovation Actions are expected to engage SSH expertise and, potentially other actors, to reflect and challenge the way ICT-related research and innovation is currently approached in a specific area and/or reflected in the call text. This approach opens new ways for interactions between SSH and ICT. **SSH expertise is called for to unveil and challenge the implicit assumptions underlying broader technological research agendas, with a view to propose constructive alternative framings which enhance considerations for responsible ICT research and innovation.** These so called "*sister projects*" should clearly describe how they intend to bring an innovative research perspective for one or more LEIT ICT topic areas. These projects are expected to have a light project structure, accommodating for its exploratory experimental nature and its relevance beyond disciplinary boundaries.

The Commission considers that proposals requesting a contribution from the EU of between EUR 300.000 and 500.000 and running for 12 months would allow this area to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts and/or proposing other durations.

Minimum one action will be selected for each of the areas (a, b) described above.

Expected Impact:

- Alternative approaches and new perspectives for future societal relevant ICT research and innovation activities.
- Increased research collaboration and common agenda between ICT and RRI-SSH communities.
- Improved take-up of responsible ICT research and innovation that takes into account human and societal concerns and expectations under new technological conditions
- Increased relevance and usability of SSH knowledge for ICT R&I processes in order to align ICT R&I with human needs and societal expectations.
- Increased societal relevance of future research agendas in ICT-related areas.

2.1.2. Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing

Topic	NMBP-09-2016: Biomaterials for diagnosis and treatment of demyelination disorders of the Central Nervous System
Key words	Gender, engagement
Type of Action	Research and Innovation Action
Deadline	Two Stage: 1 st stage: 08-12-2015 2 nd stage: 24-05-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2406-nmbp-09-2016.html

Specific Challenge:

The aim of this topic is to develop innovative approaches for biomaterials for health that are easily transferable from industry to the clinic and based on new methodologies directed to the improvement of the treatment and prognosis of demyelination disorders (one specific disorder to be chosen), where regrowth and regeneration of affected areas of the nervous system is the key to successful therapy. These disorders are often of chronic duration and associated with increasing levels of disability. In the European Union, at least 1 000 000 people are affected with these disorders and many more times than that world-wide. They are often diagnosed between the ages of 20 and 40 when families and careers are developing and can represent the most common cause of disability affecting young adults, thereby having a strong economic impact for society in terms of healthcare costs.

Scope:

Proposals should focus on the development of new multifunctional biomaterials, as part of eventual Medical Devices[[As defined by Council Directive of 20 June 1990 on the approximation of the laws of the Member States relating to Active Implantable Medical Devices (90/385/EEC) (OJ L 189, 20.7.1990, p. 17) (as amended), Council Directive 93/42/EEC of 14 June 1993 concerning Medical Devices (OJ L 169, 12.7.1993, p. 1) (as amended) and Directive 98/79/EC of the European Parliament and of the Council of 27 October 1998 on In Vitro Diagnostic Medical Devices (OJ L 331, 7.12.1998, p. 1) (as amended) and with the relevant Implementing Measures and all succeeding measures.]] or Advanced Therapies[[As defined by Regulation (EC) No 1394/2007 on advanced therapy medicinal products (gene therapy, stem cell therapy and tissue engineering)]]], so that they can function as effective eventual therapeutic interventions. They can include biocompatible and biodegradable biomaterials as part of minimally invasive treatments and the diagnostic materials. Funding for the development of new drug candidates for these conditions or for any form of clinical trial will not be considered.

The development of new integrated experimental and computational approaches aimed to describe interface processes and their determinants should be considered as key step for the design of safe and performing biomaterials. Experimental protocols should be planned taking due account of current good laboratory practice (GLP) and ISO guidelines. Manufacturing processes will need to be addressed, including up scaling, good manufacturing practice (GMP), process analytical technology (PAT), technology transfer and regulatory work in respect of relevant regulations as appropriate[[As defined by Council Directive of 20 June 1990 on the approximation of the laws of the Member States relating to Active Implantable Medical Devices (90/385/EEC) (OJ L 189, 20.7.1990, p. 17) (as amended), Council Directive 93/42/EEC of 14 June 1993 concerning Medical Devices (OJ L 169, 12.7.1993, p. 1) (as amended) and Directive 98/79/EC of the European Parliament and of the Council of 27 October 1998 on In Vitro Diagnostic Medical Devices (OJ L 331, 7.12.1998, p. 1) (as amended) and with the relevant Implementing Measures and all succeeding measures.]][[As defined by Regulation (EC) No 1394/2007 on advanced therapy medicinal products (gene therapy, stem cell therapy and tissue engineering)]]]. At least one type of tissue engineering construct should be delivered at the end of the research project together with a proof of concept of its therapeutic potential and preclinical validation.

In order to ensure relevance and impacts of the research efforts, the active participation of industrial partners and clinicians represents an added value to the proposals and this will be reflected in the evaluation under the criterion "Impact". A multidisciplinary approach is preferred; taking into account both surgical, minimally invasive and pharmacological approaches, as well as prevention and rehabilitation strategies, including robotics if necessary. The expected results should improve the quality of life of the affected population and their careers. They should be measurable even for optimising research costs of the enterprises and for reducing time-to-market of new products. **The project should include training and dissemination activities. As relevant, the proposed activities should address sex and gender specific aspects.**

The implementation of this topic is intended to start at TRL 3 and target TRL 5.

This topic is particularly suitable for SMEs.

The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Innovative bio/nano-materials for the treatment of patients with demyelination disorders of the Central Nervous System, improving their quality of life due to minimally invasive action and/or longer duration of implants and devices;
- reduced direct and indirect costs linked to these diseases and their treatment;
- enhance competitiveness of the biomaterials and biomedical industries in the EU, in particular through technology transfer effects on biotechnology companies, with particular regard to SMEs and new forms of cooperation between academia, research centres and the private sectors. Such effects should be balanced to match sustainability

principles and values, and to enforce competitiveness in terms of reducing time-to-market and trial costs for European industries;

- **Dissemination of results, contributing to increase social awareness** about more efficient and less costly therapies – based upon innovative approaches and broader accessibility – with improved patient compliance.

Proposals should include a business case and exploitation strategy, as outlined in the Introduction to the LEIT part of this Work Programme.

Topic	NMBP-10-2016: Nanoformulation of biologicals
Key words	Gender
Type of Action	Research and Innovation Action
Deadline	Two Stage: 1 st stage: 08-12-2015 2 nd stage: 24-05-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2407-nmbp-10-2016.html

Specific Challenge:

Many biomolecules (e.g. proteins, peptides, nucleic acid, enzymes), in opposition to classical small molecules, have demonstrated interesting therapeutic activities in vitro. However, they are too often not druggable because once in pre-clinical in vivo development, they show disappointing loss of efficacy and/or unacceptable toxicity. For example, a high in vitro efficacy of a therapeutic biomolecule can disappointingly become low in vivo, because the biomolecule is processed by the immune system or by enzymes of the host before reaching its targeted tissue. Nanotechnology represents a promising opportunity to overcome these drawbacks. Indeed, the formulation of nanocarriers containing biomolecules ('biologicals') for drug/vaccine delivery can greatly improve their in vivo efficacy and/or decrease their toxicity and provide the capability to cross biological barriers (e.g. intestinal, blood-brain barrier, nasal, ocular, pulmonary, skin).

Scope:

This call addresses nanoformulation of biologicals (like proteins, peptides, nucleic acids and enzymes). With an appropriate formulation the biologicals can be effectively transported through the relevant biological barriers to the targeted organs, tissues and cells. Formulation of nanomedicines has in general been empirical and often produced in an amorphous or undefined structure, which produces regulatory and manufacturing control issues. The aim of the research is to achieve excellent quality control of the assembly by using self-assembling systems. The resulting processes should provide a high degree of control over the physico-chemical parameters like shape, size and chemical composition while incorporating non-lipinski molecules such as nucleic acids, proteins or peptides. Characterisation aspects of the nanoformulations therefore have to be properly addressed. The benefit will be easier

manufacturing and process control, as well as optimised nanoformulation of biologicals with tailored transport through biological barriers.

Projects will develop a nanoformulation of biomolecules to provide a solid pre-clinical proof of concept, address scale-up to the quantities needed for late pre-clinical and clinical study and prepare for future clinical testing. Partners will also have to describe how the various barriers for advancing their new therapy to clinical application will be overcome; they will especially take into account the medical regulatory requirements and the scale-up production for clinical study. **As relevant, the proposed activities should address sex and gender specific aspects[[See definition of the 'gender dimension approach' in the introduction of this Work Programme part.]].**

The clinical focus should be notably on age related diseases, neglected diseases and rare diseases or inflammatory diseases, but excluding cancer and infectious diseases. Activities are expected to commence at Technology Readiness Levels 3 /4 and reach 5/6.

This topic is particularly suitable for SMEs.

The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Developments of new solutions for the particularly needed delivery of biologicals;
- Radical improvement of therapy through the development of new nanoformulation solutions for the delivery of biologicals;
- Foster the translation of nanoformulation of biomolecules towards clinical development / application;
- Improvement of the competitiveness of the European healthcare industry through accelerated introduction of new nanotechnology enabled therapies;
- Improved understanding by academics and research organisations of the requirements of the pharmaceutical and medical devices industry and of medical regulators.

Proposals should include a business case and exploitation strategy, as outlined in the Introduction to the LEIT part of this Work Programme.

Topic	NMBP-14-2017: Regulatory Science Framework for assessment of risk benefit ratio of Nanomedicines and Biomaterials
Key words	Gender, engagement
Type of Action	Research and Innovation Action
Deadline	Two Stage: 1 st stage: 27-10-2016 2 nd stage: 04-05-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2403-nmbp-14-2017.html

Specific Challenge:

The application of nanotechnology and nanobiomaterials has great potential to advance medicine for the benefit of citizens. However, the use of these new technologies poses considerable challenges for assessing the quality, safety and efficacy of the novel nanomedicines and medical devices.

Scope:

Proposals should advance the field of medical regulatory science and practice through the development and validation of science based regulatory knowledge and standardisation of innovative technical tools and methods. The intention is to lead to a new and better methodology for pre-clinical and clinical evaluation and help to take appropriate stock of and to apply innovative scientific advances as and when they occur. **As relevant, the proposed activities should address sex and gender specific aspects[[See definition of the 'gender dimension approach' in the introduction of this Work Programme part.]].**

Proposals should focus on the development of new regulatory standards and tools that are based on scientific principles that already have a Proof-of-Concept at the laboratory scale.

Where appropriate, proposals should make use of the opportunities for obtaining scientific advice from medical regulatory bodies to support the qualification of innovative development methods.

International cooperation and participation of Member States funding programmes with complementary funding is encouraged to facilitate development of new regulatory science on the global scale.

Established methods, including related equipment, should be brought to Technology Readiness Level 6 and beyond, whereas those based on new concepts are expected to reach TRL 5.

This topic is suitable for international cooperation.

The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. No more than one action will be funded.

Expected Impact:

- To reduce the cost of pre-clinical and clinical development for new medical products and therapies, that are based on the application of nanotechnology and nanobiomaterials;
- To reduce the time for innovations to reach the patients;
- To provide a set of tools for more informed risk assessment and decision making;
- To improve standardisation of regulatory practice at the European and international level;
- **To establish a close collaboration among regulators, industry, science and patients with regard to the knowledge required for appropriate risk management, and create the basis for common approaches, mutually acceptable datasets and risk management practices;**
- To establish a European Consortium for the Advancement of Regulatory Science in Biomaterials and Nanomedicines, involving industrial, medical, academic, regulatory and patient representative stakeholders;
- To identify within the consortium critical issues for innovative products and establishment of an action plan for further studies;
- To establish links with existing European Infrastructures active in the field, along with relevant European Research Networks;

To elaborate an action plan for a better integration of the European Union with other regions of the world.

Topic	NMBP-16-2017: Mobilising the European nano-biomedical ecosystem
Key words	Engagement
Type of Action	Coordination and Support Actions
Deadline	19-01-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2383-nmbp-16-2017.html

Specific Challenge:

Developing innovative nanomedical products for a more personalized, predictive and efficient medicine requires further integration of nanotechnologies aiming at applications in human health notably with further Key Enabling Technologies. It also needs a functioning ecosystem of actors, in which the research, translation, regulation, standardization and take-up of innovative nanomedicines by the different European healthcare systems is stimulated. End-of-life/disposal and recyclability issues should also be addressed as appropriate.

Scope:

Supporting the development of an ecosystem for nanomedicine in Europe, including activities such as coordinating national platforms and regional clusters; developing common training material and services; international cooperation related to community building, road-mapping, regulation, manufacturing, reimbursement and pricing, standardization and recyclability; **and reaching out to attract the interest of citizens, young talents and young entrepreneurs.**

Collaborations with relevant technology platforms or similar initiatives in Europe or worldwide will allow deeper and more effective cross-KETs activities for innovative integrated solution and well as a consolidated international strategy for the sector.

Attention should be paid to achieve a cross-regional, cross-sectoral and cross-technological approach, based on the analysis of relevant roadmaps, strategic research agendas or smart specialisation strategies which have listed nanomedicine or personalised Medicine as one of their priorities. These different approaches might for instance be united into one “meta” roadmap.

The Commission considers that proposals requesting a contribution from the EU between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Increased take-up of innovative Nanomedicine solutions by industry and SMEs, end-users, regulatory and public authorities, healthcare insurances, doctors and patients, research organisations and academia;
- Improvement of cross-KETs activities to provide better integrated healthcare solutions;
- Increased international networking with new potential market opportunities;
- Improvement of the competitiveness of the European healthcare sector.

Topic	NMBP-22-2017: Business models and industrial strategies supporting novel supply chains for innovative product-services
Key words	Engagement
Type of Action	Research and Innovation Actions
Deadline	Two Stage: 1 st stage: 27-10-2016 2 nd stage: 04-05-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2398-nmbp-22-2017.html

Specific Challenge:

The current lack of stability in the markets does not create strong incentives for industry for long term investments in tangible fixed assets, and a quick response to market demand is crucial to market success. At the same a new generation of highly flexible production and process technologies and equipment, such as 3D-printing, has become available, enabling industry to adapt faster to the market demand and to produce in smaller series.

All European companies, especially SMEs, need to have access to technology infrastructure with appropriate manufacturing facilities to help them develop their innovative product-services from the early stage of feasibility assessment up to the fabrication of first series of prototype's products. Purchasing is not always the best option.

It is also important to develop value systems that take into account the new extended supply chain from the early stage of the design process up to the end-of-life activities. In addition, the real production can nowadays take place anywhere in the world and leave Europe with unused or outdated production capacities. The current overall process does not necessarily take into account economic, social and environmental benefits for Europe.

Scope:

Business models supporting the novel supply chains for innovative product-services would need to facilitate the flow of information on free utilisation capacity among service providers, which could be dedicated business set-ups for that kind of product-services, or just existing manufacturers with free production capacity at certain moments in time and business companies seeking short term solutions for their capacity shortages.

New equipment, internet, digital technologies and social media have the potential to support new supply chain models that are focused on business-to-business (B2B) as well as business-to-consumer (B2C) relationships, on improving the use of manufacturing capacity in Europe.

Solutions should facilitate the flow of information on free manufacturing capacity among service providers (which could be dedicated businesses or existing manufacturers with spare capacity).

The research activities should focus on all of the following areas:

- New, adaptive business models, networks and configurations to optimise the integration of KETs in industrial contexts, in order to increase the leadership of EU industry in the global markets. The approaches to integrate KETs should lead to a new model for European industrial production and consumption, based on more sustainable and efficient production and consumption patterns, supporting increasingly customised sustainable products.
- New business solutions for extended supply chains and the integrated sustainable European framework, which would take into account the needs of design, production, utilisation and end-of-life and overcome the risk of under-utilised capacity.
- Solutions that would enable businesses in the supply chain to use new flexible production and processing systems tailored to their needs; to increase connectivity and interoperability to rapidly coordinate; and to react to market demand as a whole system.
- Solutions for local cooperation and supply, which can reduce the environmental footprint. These solutions should converge into high value-added production capable of responding dynamically to competing global economies demonstrating how the EU could benefit from international cooperation.

Project activities will focus on new concepts and methodologies for knowledge-based, specialised product-service, which can fulfil the requirements of fast changing markets for innovative product-services. The service could be supplemented by after-sale services and extended guarantees provided by any entity from the supply chain base on common agreement.

Social Sciences and Humanities (SSH) elements should be considered, such as economics and business administration. **In particular, proposals should address the role of consumers and**

users as active participants in the innovation process. Activities are expected to focus on Technology Readiness Levels 4 to 6. This topic addresses cross-KET activities. *This topic is particularly suitable for SMEs.*

The Commission considers that proposals requesting a contribution from the EU between EUR 2 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Decreased production costs in Europe, through a better use of the available manufacturing capacity;
- Increased investment in the manufacturing industry in Europe;
- Reduced environmental footprint compared to products produced in traditional value chains, by the use of local and regional product-services capacity;
- Development of novel supply networks for organisations, and of solutions that could be also applied by other industrial sectors;
- Creation of new embedded services supporting the business-to-business supply chain;
- Possibility for further development of the new supply chains for other business scenarios;
- Creation of novel models of work organisation and sustainability-driven networks/clusters, able to integrate the product-service life-cycle stages in the same industry, as well as across industries.
- Creation of sustainable networks and clusters, by integrating the various suppliers devoted to the collection, disposal, recycling and reuse of critical materials and components into a perspective of sustainability and corporate social responsibility

Proposals should include a business case and exploitation strategy, as outlined in the Introduction to the LEIT part of this Work Programme.

Topic	NMBP-23-2016: Advancing the integration of Materials Modelling in Business Processes to enhance effective industrial decision making and increase competitiveness
Key words	Open Access
Type of Action	Research and Innovation Actions
Deadline	Two Stage: 1 st stage: 08-12-2015 2 nd stage: 24-05-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2410-nmbp-23-2016.html

Specific Challenge:

Sustaining and growing businesses requires continuous product innovation. Making meaningful business strategy decisions is an ever more challenging task in a global context. The combination of materials and business modelling to explore what technical solutions are

economically viable is not yet exploited to the extent it could. The sheer volume of data and information combined with its dynamic nature demands an ever better understanding of possible options. There is a need for a Business Decision Support System that supports the selection of the optimal material and process taking into account the implementation costs but also the associated risks, uncertainties and costs related to the modelling and simulation; a priority, especially for SMEs.

Scope:

The proposals should develop an integrated Business Decision Support System (BDSS) that can support decisions on new materials and new processes by calculating through hypothetical scenarios. The BDSS should enable the integration of materials modelling and business tools and databases into a single work-flow, allowing for flexibility of application to different industrial sectors.

Proposals should create a framework that allows the flexible integration of existing or future discrete and continuum materials models with structured and unstructured data from multiple data bases containing materials data, commercial data and information on market trends, pricing, customer needs and demands.

The BDSS should enable a multi-criteria optimisation over all stages of product development by allowing the end-user to mirror the operational framework of their company. The structure of the BDSS should allow back-engineering from the end-goal. BDSS should be designed such as to optimise the integration of humans in new more complex industrial environments. The tool should be available to and usable by decision makers in manufacturing companies in the form of a platform which can be confidentially applied by a company. The tool should be validated against measurements, existing data and real financial arguments. Validation of the developed systems on public case studies and training of translators on the system is required.

Development of innovative methodologies should be included addressing innovative ways to connect existing and future models and how to use them in varying contexts (adaptive systems and networks). If appropriate, model development in terms of accuracy, robustness, uncertainty qualification and speed to allow a large design space to be explored may be included in order to enable exchange of modules and to prove flexibility of the framework. The consortium is expected to provide expertise on multiple discrete and continuum materials models[[http://ec.europa.eu/research/industrial_technologies/modelling-materials_en.html]], business decision support systems, data search technology (incl. optimisation, genetic algorithms, symbolic regression, machine learning and cognitive learning).

Activities are expected to target Technology Readiness Level 5.

This topic is part of the open data pilot.

Funded proposals will be invited to participate in a cluster, to agree on standards to achieve seamless integration of their frameworks and of the modules to be linked into the framework. Projects are expected to contribute actively to on-going activities e.g. in the EMMC (European Materials Modelling Council), and EU funded clusters.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Reduction of company costs and increased performance and commercial impact based on effective materials models driven business decisions;
- Guidance to companies in developing their strategies with an effective, user friendly materials models driven business decision system;
- Increased industrial use of existing materials knowledge and effective materials models;
- Improved trust of industrial decision makers in materials modelling and their commercial advantage;
- Essential company savings in time and money, especially via the elimination of the need for (some) plant trials.

Topic	NMBP-24-2016: Network to capitalise on strong European position in materials modelling and to allow industry to reap the benefits
Key words	Open Access, Engagement
Type of Action	Coordination and support action
Deadline	21-01-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2379-nmbp-24-2016.html

Specific Challenge:

Predictive multi-scale material modelling has the potential to enable economic advantages for all manufacturing industries. There is a need for enhanced and effective interaction between all stakeholders, in particular between those engaged in different types of materials modelling (electronic, atomistic, mesoscopic and continuum materials, process and device modelling) and between translators, who translate industrial problems into materials modelling and manufacturers. In addition a lack has been identified for clear road maps for research on the application and use of materials modelling in industry. Moreover, there is a need to collate different methodologies and support further development of standards for efficient and effective implementation and use of materials modelling tools. Also there is a need to increase the interoperability of software to facilitate integration of various tools in processing and product design.

Scope:

The proposed coordination and support action should network the stakeholders and a platform is to be established to advance the use of materials models by industry and to agree on open tools with the wide stakeholder community.

Road Maps for materials and related product and process modelling in industry with a focus on how discrete (electronic, atomistic and mesoscopic) models can be further developed and coupled or linked to continuum models are to be elaborated. The proposers should support the elaboration of methodologies and workflows.

A materials modelling data repository of validated sources should be designed with coherent and concerted connections. Existing communication standards between models and databases should be further developed, alleviating the language gap between different vocabularies. An open simulation platform based on these standards should be designed to allow the flexible use of software components of different vendors. Provision of validated data by third parties should be stimulated. Benchmarking of tools and experimental data should be supported.

A jointly agreed guidance on software development for academics is to be established and promoted so that such software can be used by industry. Technology Readiness Levels for software, which could help in selecting the right model/software for the end user, should be agreed with the wide community. The translation of industrial problems into material problems that can be solved by computational simulation should be facilitated.

Training and dissemination should be stimulated across Europe to make the different stakeholders aware of the technical and economic benefits of active use of discrete and continuum materials modelling throughout company operations.

Networking activities such as developing interest groups, workshops, training events, market studies and engaging with regulatory and benchmarking authorities if appropriate can be included.

This topic is part of the open data pilot.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

No more than one action will be funded.

Expected Impact:

- Improved accessibility of materials modelling and related databases by manufacturing end-users;
- Increased integration of discrete (electronic, atomistic, mesoscopic) and continuum materials models and databases for industrial use;
- Increased efficiency and industrial effectiveness of materials models in industry and research;
- Establishment of technical and business-related quality attributes (Key Performance Indicators) that inspire trust in materials modelling;
- Industrial best practice (methodologies) for end-users increasing speed of development in industries.

Topic	NMBP-25-2017: Next generation system integrating tangible and intangible materials model components to support innovation in industry
Key words	Open Access, Engagement
Type of Action	Innovation action
Deadline	Two Stage 1 st stage: 27-10-2016 2 nd stage: 04-05-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2400-nmbp-25-2017.html

Specific Challenge:

Innovation in manufacturing industries can be much faster, if materials modelling is used to focus experimental efforts. Novel modelling solutions need all determining components to be interwoven and available to the entire European community allowing the quick development and market deployment of new materials. Industry wants to know the risks and gains of materials modelling and the resources necessary to use the models efficiently. The industry needs education and/or support by translators analysing the industrial problems and proposing modelling solutions to the companies requesting this, supported by benchmarking. The above services need to be accompanied by tangible components like models, software packages, data, state of the art and connections to key actors. An open simulation platform providing interoperability between discrete and continuum models based on widely agreed communication standards would facilitate the use of materials modelling.

Scope:

The project should establish a web based marketplace linking various activities and databases on models, information on simulation tools, communities, expertise, course materials, lectures, seminars and tutorials for at least two manufacturing sectors of the European industry.

Projects should address sectors that in the design of materials and their manufacturing processes have common problems with models describing phenomena at, and ranging over, time and space scales spanning from femto-, pico-, nano- to the meso-scale.

The project should aim at agreement with the wide European scientific and industrial community a standard for organizing modeling data needed to make search and linking between different databases effective and easy. Strategies and test rules pertaining to data integrity and quality, e.g., by user and analytic feedback mechanisms should be established. The proposal should develop practical solutions for the ownership, control and management of distributed databases. **The project should ensure wide spread participation.**

The project should provide novel tangible avenues for integrating multiple materials models that can address industry relevant challenges. The project should establish methods for software interoperability that can later on be used for the integration of materials models (discrete and continuum applied at nanoscale) and databases in open simulation platforms.

The development of homogenisation models and the elaboration of wrappers should be stimulated.

The proposal should establish a validation system to provide reliability and accuracy of models and for the comparison of results of simulations between materials models and for comparison with experiments.

The project should stimulate the exploitation of existing software via advice on modelling, education of companies and the stimulation of the provision of translation services especially for SMEs.

The proposal should present a credible business plan for the maintenance of the hub after the project duration.

Activities are expected to target Technology Readiness Level 6.

This topic is part of the open data pilot.

Funded proposals will be invited to participate in a cluster, to agree on metadata for the description of software and measurement tools and databases; to agree on software development standards; and to achieve seamless integration of their platforms across the different manufacturing-targeted application areas to achieve a true common marketplace. Projects are expected to contribute actively to on-going activities e.g. in the EMMC (European Materials Modelling Council), and EU funded clusters.

The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Increased innovation in industry based on materials modelling;
- Awareness of industry in general and SMEs in particular of the rapid progress of contemporary computational materials modelling tools, and increased use of materials modelling by the manufacturing companies (end-users);
- Broad, fast, and easy information management and exchange both between the modelling community and industry and within the modelling community;
- Ability for manufacturing companies (end-users) to do an effective search of numerical tools and/or providers of numerical simulations who could best suit their needs;
- Supply of software developers with comprehensive information about the potential clients and industrial tasks where numerical simulations would be highly desirable;
- Effective information exchange within the academic simulation community to enable faster general progress of material modelling methods;
- Speed up the use of materials modelling by standards and requirements of modelling data repositories including possibly data, modelling codes and validation repositories;
- Increased demand for data and materials models;
- Increase the use of materials simulation to comply with regulations;
- Rapid deployment of novel materials modelling solutions in particular manufacturing-targeted domains.

Topic	NMBP-26-2016: Analytical techniques and tools in support of nanomaterial risk assessment
Key words	Open Access
Type of Action	Research and Innovation action
Deadline	Two Stage 08-12-2015 24-05-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2413-nmbp-26-2016.html

Specific Challenge:

Nanomaterials are very diverse groups of materials with greatly varying properties. Thorough physico-chemical characterisation of nanomaterials, in their pristine forms but also in the tested environment, is nowadays being recognised as essential for sound assessment of their biological and environmental properties. In order to enable prediction of impacts, itself nowadays a pre-requirement for insuring industrial activity, a classification based on key parameters or biological interactions should be established and scientific foundations established on very well defined and characterised systems. Yet, suitable analytical techniques, instrumentation and equipment for the testing of nanomaterials properties, skilful operators, and inter-laboratory studies that would establish confidence are still lacking, even in the “simple”, and most addressed, case of particle size distribution measurements which many laboratories struggle to tackle adequately when confronted with poly-dispersed materials. At the lower limits of the nano-scale these same problems aggravate further. An additional factor is the high cost of the available techniques something that hinders smaller laboratories, innovation oriented SMEs, and discourages start-ups.

Scope:

The objective is to develop new, or further improve, relevant analytical methods and corresponding equipment, relevant to hazard and exposure testing strategies, that enable characterisation of ensembles of nanomaterials particle sizes, complex shapes, surface area and surface chemistry, coating stability or multiple composition (multicomposites engineered nanomaterials), including the necessary building up of confidence through benchmarking. The analytics could also enable studying the longer term fate of particles following their interactions with in complex matrices, i.e. in living systems, or longer term environmental fate, e.g. after wear and tear or weathering.

Established methods, including related equipment, should be brought to Technology Readiness Level 6 and beyond, whereas those based on new concepts are expected to reach TRL 5.

This topic is part of the open data pilot.

This topic is particularly suitable for SMEs and for international cooperation.

The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Enable the identification of key descriptors that can be used to reveal correlations associated with health and environmental impacts and meaningful basis for grouping, read-across and QSARs purposes;
- Increased confidence in nanosafety studies and findings through sound physico-chemical characterisation methods and standard operating procedures;
- Reduced costs related to the physico-chemical characterisation of nanomaterials in relevant environments;

On top of safety related objectives, proposals should seek synergies with applications of the methods in other areas such as quality control, product traceability, labelling and counterfeiting.

Topic	NMBP-27-2016: Promoting safe innovation through global consolidation and networking of nanosafety centres and strengthening the European industry through cooperation in nanosafety
Key words	Open Access, Engagement
Type of Action	Coordination and support action
Deadline	21-01-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2375-nmbp-27-2016.html

Specific Challenge:

The rapid expansion of nanotechnology has brought the question of the safety of the emerging applications and the risk management measures. Considerable effort has been put by FP6 and FP7 projects for answering basic scientific and technical questions and will continue under H2020. There is a need to support regulatory aspects by providing the technology, skills and conventions necessary for implementation of existing rules and consistent development of new ones. This supposes developing the capacity to routinely assess and reduce risks in regulatory terms, both for toxicity and exposure, and the capacity to develop and implement safe-by-design processes and products with the aim of keeping risk level below pre-defined values.

Scope:

The objective of this topic is to support safe innovation related aspects by providing the technology, skills, and processes, necessary for science-based best NanoSafety practices in industrial and commercial activities.

This objective is being addressed by nano-risk excellence centres currently being established in several EU member states and globally. A wide variety of national and (EU) regional platforms and centres can be observed which are dedicated to research, market follow-up, dissemination of nanosafety. There is the need to consolidate and further develop these first initiatives so as to make available to industry and other stakeholders concerned a European-wide, up-to-date, science-based, organisational structure capable of managing risks and supporting safe innovation. It should also ensure providing scientific support to more general questions on product quality, technical approvals, counterfeiting, training and certification system for nanosafety at work and providing reliable information for the public.

The proposed CSA should aim at networking these platforms, including the nanosafety cluster, at European level and cooperate with third countries. The foundation and basis for the development of the European nano-network will be based on the interaction and adequate communication to generate a step-change in the risk management process. It may include work and resources specific to the participants or other public and private sources. The CSA can be used to pool resources and organise calls for market oriented activities which are of common interest for the platforms.

To ensure fast transfer of knowledge from basic research to market implementation, the proposed CSA should strengthen and support the Nanosafety Cluster activities, in particular those aiming at communication and outreach. *This topic is part of the open data pilot.*

In line with the objectives of the Union's strategy for international cooperation in research and innovation (COM(2012) 497), international cooperation according to the current rules of participation is encouraged, in particular with Brazil, South Korea and the United States of America. The quality of the international cooperation will be reflected in the evaluation of the proposal, under the criteria 'Excellence' and 'Impact'.

The Commission considers that proposals requesting a contribution from the EU between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. No more than one action will be funded.

Expected Impact:

- An **independent science based EU nanosafety reference platform for all stakeholders in nanotechnology that collates information into a comprehensive and accessible European network portal and providing a solution to the problem of data accessibility and transferability, by removing barriers which currently limit knowledge distribution;**
- The CSA should mark progress for Guidance to market actors (industry, safety service providers, and public authorities), best practice, standards, technical approvals, environment protection, and operational certification systems;
- The platforms network should prepare a European Hub to provide services and support for stakeholders (e.g. industry, governments, researchers etc.) to create in a sustainable way marketable, societal approved products and goods;
- Involvement of highly renowned actors in the research field and from leading stakeholders from regulatory bodies, standardization bodies, into a seedless dialogue;

- **Significant research outputs efficiently disseminated to national and international communities.**

Topic	NMBP-28-2017: Framework and strategies for nanomaterial characterisation, classification, grouping and read-across for risk analysis
Key words	Open Access, Engagement
Type of Action	Research and Innovation action
Deadline	Two Stage: 1 st stage: 27-10-2016 2 nd stage: 04-05-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2397-nmbp-28-2017.html

Specific Challenge:

The number of available nanomaterials is growing rapidly and testing each material thoroughly is virtually impossible. For convincingly managing eventual risk, precise quantification of hazards and exposure would be necessary for all cases and engineering-out or reducing risk must follow in cases of non-acceptable risks. All engineered nanomaterials (ENMs) would need characterising along all value chains and all used media and physiological chemistries. It is therefore essential to set the basis for an appropriate and sustainable framework and define strategies towards ENMs classification, grouping (categorisation for further purposes) and read-across for risk analysis in a regulatory perspective.

Scope:

The existing and rapidly progressing knowledge in this domain, in terms of characterisation of material properties and of possible adverse effects from their applications, is expected to allow for classification of ENMs based on morphology, composition, complexity/functionality, and by bio or eco-interactions. The classification approaches should aim to support grouping of ENMs for further risk analysis, to help in developing intelligent testing strategies and identifying "ENMs properties of concern" that need to be tested more thoroughly. Methods for grouping and for read-across within or between groups, should be defined to reduce unnecessary efforts in testing. Grouping can take into account quantification of possible adverse effects depending on the use on ENMs in specific applications. Results from these studies should be collected and combined in a consistent and progressive system enabling both the integration of newer data and the use of raw and aggregated data for regulatory purposes. Particular attention should be paid to supporting safer-by-design practices, so that novel products containing ENMs provide the benefits originally claimed by maintaining fullest possible intended functionality and at the same time pose the least possibly risks to humans, the environment and ecosystem services. The proposed projects should include appropriate data curation expertise, modelling (including development of theoretical models if appropriate) and input into the possible development of Q(n)SP/AR approaches in order to develop user friendly interfaces to enable data driven predictions from other ENMs with similar properties or behaviour, and predictive risk assessment tools.

Activities are expected to focus on Technology Readiness Levels 5 to 7

This topic is part of the open data pilot.

This topic is particularly suitable for international cooperation.

The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

No more than one action will be funded.

Expected Impact:

- The research approach should be innovative and represent a significant advance beyond the current state-of-the-art in the whole area of nanomaterials hazard and exposure assessment;
- Sustainable solutions to the long-term challenge of nanosafety at a level that will allow both consistent integration of newer data and regulatory application of scientifically sound concepts;
- Cutting-edge progress towards a framework and methods for groupings and read-across useable in a regulatory environment;
- Demonstration of consistent, applicable and scientifically sound grouping and read-across strategies in specific value chains, ready for use by industry and regulators, enabling predictive hazard and exposure modelling for risk analysis, and including the input towards safer-by-design guidance;
- **Outputs should be tailored to address the needs of each of the stakeholder communities, including the modelling community. Delivered predictive models and tools should be disseminated through publically available, ready-to-use applications.**

Topic	NMBP-29-2017: Advanced and realistic models and assays for nanomaterial hazard assessment
Key words	Open Access
Type of Action	Research and Innovation action
Deadline	Two Stage: 1 st stage: 27-10-2016 2 nd stage: 04-05-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2399-nmbp-29-2017.html

Specific Challenge:

Risk assessment is often largely based on the toxicological profile of the material in question. The reason is that the costs related to hazard assessment are usually not in balance with the costs for exposure monitoring, let alone risk containment or risk mitigation. However with the very big number of new material likely to enter production and use, the usually short period

between development and marketing and the increase in societal risk aversion, the classical toxicological testing paradigm so far focusing on in vivo testing is gradually but steadily shifting towards in-vitro and in-silico testing approaches. This is particularly true in the field of nanosafety where, in front of potentially thousands of different nanomaterials, economic constraints make it essential to develop and establish robust, fast and yet reliable and realistic methods that should be applied in figuring out "nanomaterials of concern".

Significant progresses have been made in assessing nanomaterial hazard. Yet, knowledge gaps remain on long-term effects (low doses, chronic exposure), both for human health and the environment. Questions also arise on the adequacy of the models used in existing in-vitro and in-silico testing and on the relevance of the exposure conditions (e.g. linked to the current understanding of the nanomaterial-biomolecule-cell interface) to correctly assess and predict real-life hazards. It is also necessary to prepare the ground for the next challenge, defining hazard profiles based on in-silico testing alone.

Scope:

With a view to intelligent testing strategies (ITS) for nanomaterials, it is of high priority to develop and adopt realistic and advanced in vitro tests which have the potential to substantially improve the relevance of in-vitro approaches. Current in-vitro experiments mostly rely on established immortalized single cell lines, which often do not reflect the in-vivo situation. Therefore, new or advanced models, such as co-culture models, 3D cultures or primary cell models should be developed for relevant endpoints lacking, or having inadequate, in-vitro models. Transport through biological barriers could also be addressed, for instance with the objective of assessing the true internal dose of the materials to which living organisms are being exposed, as well as disease models or models with impaired barriers.

Low-level chronic exposure is a likely scenario as many ENMs will probably exist at very low concentrations in the environment and potentially be persistent. Thus, assays and models with low chronic exposure, elucidating toxicokinetics, different mechanisms of action and adverse outcome pathways, as well as specific disease models, should be developed and assessed against appropriate animal studies and could include for instance effects on kinetics, growth, reproduction, metabolism, and behaviour. Research could also focus on long-term, ecologically relevant, effects in realistic environmental concentrations of ENMs.

The transformations in biological or environmental matrices have been demonstrated as having potentially significant effect on the ENM tests results. Therefore, dosing with realistic exposure levels and conditions should be an integral part of the developments, taking into consideration the dynamic and complex nature of environmentally induced transformations with realistic external and internal forms and levels of exposure.

For validation purposes and to ensure that the experimental results can form a solid and meaningful basis for grouping, read-across, and modelling purposes, the testing should be performed on sets of well-defined and characterised libraries of nanomaterials and, when possible, on nanomaterials for which high-quality in-vivo data are already existing (to minimize animal testing).

Activities are expected to focus on Technology Readiness Levels 4 to 6.

This topic is part of the open data pilot.

This topic is particularly suitable for international cooperation.

The Commission considers that proposals requesting a contribution from the EU between EUR 10 and 13 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

No more than one action will be funded.

Expected Impact:

- The research approach should be innovative and represent a significant advance beyond the current state-of-the-art. Research should focus on provision of solutions to the long-term challenge of nanosafety and nanoregulation;
- New models and assays for use in in-vitro and in-silico testing improving prediction of chronic effects in a broad array of representative organisms and changes in ecosystem function;
- Improved predictive power of in-vitro and in-silico approaches for in vivo systems to support acceptance in a regulatory framework;
- Developed test guidelines for further standardisation, and ring testing (including guidance on design of the ring testing).

Topic	NMBP-33-2016: Networking and sharing best experiences in using regional clusters strategies with a focus on supporting innovation in the NMBP thematic area
Key words	Engagement
Type of Action	Coordination and support action
Deadline	21-01-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2378-nmbp-33-2016.html

Specific Challenge:

The development of the smart specialisation strategies has put in place a more structured framework for programme and project implementation regarding regional/ sector specialisations. This can help improve the knowledge that can be provided regarding NMBP related actions. Many Member States already identified the need to improve the articulation between NMBP and ESIF.

Regions find it still difficult to mobilise their internal resources in combining technology and regional development. Regional public private partnerships or regional clusters play a key role in this approach to connect EU-wide entrepreneurship and innovation (in particular in SMEs) to the European agenda.

The partners should show the EU innovation and industrial policy for new growth in NMBP needs to build on regional resources and potentials. Interlinking the regional eco-systems and clusters into new innovation driven cross-EU value chains could be the key to articulate competitive positions, meet global challenges and achieve a balanced and sustainable growth.

The proposal should bring together and integrate representatives from: higher education institutions; research centres; large companies; SMEs; relevant European organisations and associations; as well as national, regional and local authorities from Europe which are involved in preparing regional cluster strategies in the NMBP area.

Scope:

The aim is to jointly identify good initiative and novel approaches, key success factors in driving actions forward and to shape strategic priorities for future regional cluster policies at European level in NMBP. Regional clusters or regional innovation hubs are a fertile field where synergies can be achieved.

Regional clusters have been active in the Smart Specialisation Strategy (RIS3) and KETs prioritisation process and can continue to play an important part in these processes, for example by acting as a resources channel towards SMEs and help structure KET based industrial value chains. Regional clusters or regional innovation hubs can be key delivery instruments for national and regional smart specialisation strategies, re-industrialisation and SME policy.

The proposal should take into consideration and build on existing or ended coordination actions in the NMBP area that tackled the issue of programming synergetic actions between EU and MS in the NMP Programme and generated results and recommendations for specific co-investment opportunities, linked to global market needs.

The Commission considers that proposals requesting a contribution from the EU between EUR 250 000 and 500 000 would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting another amount.

No more than one action will be funded.

Expected Impact:

- Boosting regional structural change through modern regional cluster policies;
- Identify and develop regional cluster, regional innovation hubs and business networks collaboration across borders and sectoral boundaries in the field of NMBP;
- Identification of best regional cluster strategies in the NMBP area;
- Identifying priorities for future regional cluster actions in NMBP; New trends, new models, challenges and visions for cluster policy;
- Defining the role of clusters for regional smart specialization (e.g. cluster mapping, strategic roadmaps, public procurement instruments).

Topic	NMBP-34-2017: Governing innovation of nanotechnology through enhanced societal engagement
Key words	Engagement, Responsible Research and Innovation, Science Education
Type of Action	Coordination and support action
Deadline	19-01-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2384-nmbp-34-2017.html

Specific Challenge:

In order to foster responsible research and innovation (RRI) in nanotechnologies, innovative processes are needed to improve the responsiveness of research & innovation processes to public values and concerns, and to ensure that research & innovation truly respond to societal challenges and take into account the social and environmental consequences from the outset.

Scope:

The proposed action should build on previous EU and national projects in the field of public engagement by addressing the governance and implementation of responsible nanotechnology research and innovation. It will launch a participatory multi-actor engagement process (i.e. deliberations, workshops and/or working groups) focusing on early-stage product development in order to explore ways in which nanotechnologies can help address societal challenges while considering the needs and concerns of society. This multiactor engagement process should include researchers, producers, professional users, relevant civil society organisations and consumers/citizens. The proposed action should take into account the diversity of cultural contexts of processes and communication within Europe and should demonstrate state of the art public engagement concepts. The proposed project should also include an ex-post evaluation of the mutual learning process between stakeholders in previous relevant nanotechnology projects as well as societal debates on emerging technologies. **Furthermore it will contribute to the concrete realisation of RRI conditions in nanotechnologies, and produce policy recommendations on how to govern research & innovation in nanotechnologies (and other emerging technologies) in a responsible way.** The project must ensure a strong degree of policy alignment and be designed to deliver useful outcomes to relevant policy initiatives and innovation partnerships, such as European Technology Platforms.

Supporting activities to be undertaken in the project could include the empowering of stakeholders to co-create nanotechnology research and innovation by enabling them to formulate and communicate their needs and concerns, and designing ways to give them a voice in R&I processes. **Additional activities could also include the development of: teaching material and the training of researchers and engineers in ways to include societal considerations in their work; training of researchers/scientists in science communication; establishing a 'journalist in the lab' exchange scheme; the development of balanced, reliable and easily accessible information on how nanotechnology is contributing to solving specific societal challenges and is used in daily life, e.g. published by the mass media with supplements and media micro sites or using existing multimedia and other relevant**

technology; guidance on how to bring about institutional changes that may contribute to a better engagement of civil society in nanotechnology-relevant R&I organisations; and policy recommendations on how best to integrate societal considerations in nanotechnology research & innovation.

This action is to be based on the concept of Mobilisation & Mutual Learning (MML) platforms. Proposals should include the appropriate disciplines of Social Sciences and Humanities (SSH). Gender aspects should be taken into account.

The Commission considers that proposals requesting a contribution from the EU between EUR 1.5 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. No more than one action will be funded.

Expected Impact:

- The **early and continuous engagement of all stakeholders will be essential** for sustainable, desirable and acceptable innovation in nanotechnologies, where R&I is aligned to the values, needs and expectations of society;
- The **outcomes of the project are to be fed back into policy making and innovation partnerships** such as European Technology Platforms, aiming to achieve a responsive R&I system and co-production of knowledge;
- The **project will lead to enhanced public understanding of nanotechnology**, will build trust and **foster mutual understanding between citizens, and public and private institutions, leading to co-creation of new R&I and increased confidence of companies to invest in new technologies.**

Topic	NMBP-35-2017: Innovative solutions for the conservation of 20th century cultural heritage
Key words	Engagement, Open Access
Type of Action	Research and Innovation action
Deadline	Two Stage 1 st stage: 27-10-2016 2 nd stage: 04-05-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2396-nmbp-35-2017.html

Specific Challenge:

Europe's highly diverse and rich cultural heritage (CH) is seen as a powerful common background that provides a sense of belonging amongst and between European citizens. Next to this societal impact, CH has also significant economic impact through activities such as tourism, restoration, maintenance, and cultural industry. However, tangible CH is endangered by significant deterioration of voluntary or involuntary anthropogenic origin and by other threats.

20th century cultural heritage is often confronted with different deterioration mechanisms than more ancient cultural heritage for reasons such as the use of modern materials. This requires additional research efforts regarding material composition, ageing processes, and the development of appropriate conservation technologies. While modelling and simulation based approaches in the development of advanced materials and devices play nowadays an important role, there is a need for development in the area of CH conservation.

Scope:

Two main elements should be addressed:

- Projects should develop one or more innovative solutions (functional materials or techniques) for the conservation of tangible 20th century cultural heritage. To maximise the impact, the most relevant issues and objects should be identified and addressed. For this purpose, convergent contributions from relevant Social Sciences and Humanities (SSH) disciplines should be considered;
- Developments should be based on multi-scale modelling (in the sense of linking different types of models such as electronic, atomistic, mesoscopic and continuum etc.) approaches. Key issues such as compatibility, durability, ageing, and reversibility of interventions should be addressed by the modelling approaches. Modelling modules should be further developed if necessary.

The proposed materials/techniques are expected to ensure long term protection and security of cultural heritage, taking into account environmental and human risk factors. An environmental impact assessment of the proposed solutions is to be included to ensure the development of sustainable and compatible materials and methods. Focus on innovative and long-lasting solutions in the conservation of cultural assets is expected.

Projects are encouraged to base their modelling software development on on-going efforts in the development of open simulation platforms and to use to a large extent existing models. Projects should have an element of model validation based on experimental data. The majority of resources is expected to be invested in the actual material/technology development and testing, rather than the development of new models. Standardisation and/or the production of (certified) reference materials and/or pre-normative research should be an integral part of the project.

The projects should present clearly measurable objectives for the proposed developments. The core activities regarding the materials/techniques are expected to reach TRL 6 by the end of the project.

A participation of relevant SSH disciplines is expected. SSH research should contribute criteria for targeting specific cultural heritage and analyse the expected long-term societal spill-over effects of the project.

Projects are expected to contribute actively to on-going activities e.g. in the EMMC (European Materials Modelling Council), and EU funded clusters.

The implementation of this topic is intended to start at TRL 4 and target TRL 6.

A significant participation of SMEs with R&D capacities is encouraged.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Practical and affordable materials/technique solutions in terms of cost and/or complexity of operation by those who will use them;
- Increased quantified efficiency of materials/technique development for CH conservation, also beyond the specific cases selected by the proposers;
- Increased use of multi-scale modelling in the development of solutions for CH conservation;
- Improved modelling-based decision making regarding conservation interventions;
- Clear prospect for quantified socio-economic gains from the proposed solutions;
- Effective market uptake of the developed solutions within five years after the end of the project;
- **Contribution to open repository of simulation and/or experimental data;**
- **Contribution to increased citizens' awareness of 20th century tangible CH.**

Proposals should include a business case and exploitation strategy, as outlined in the Introduction to the LEIT part of this Work Programme.

Topic	NMBP-36-2016: Policy support for Industry 2020 in the circular economy
Key words	Engagement, Open Access
Type of Action	Coordination and support action
Deadline	21-01-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2380-nmbp-36-2016.html

Specific Challenge:

Following the recent crisis, a key European priority is re-industrialisation, that is, the re-introduction and expansion of industry. Industry, and the manufacturing sector in particular, is important for Europe because it can create sustainable growth and jobs.

New digital technologies and advances in key enabling technologies provide unique opportunities for productivity gains as well as addressing new markets. A key feature in the latest industrial revolution is the linking of the physical and digital worlds through 'cyber-physical systems', which has the potential of making European industrial system truly flexible, resilient, resource efficient, human centred and highly competitive. Europe has to build on its strong capacities in all key enabling technologies (KETs); capitalise on digital technologies and systems; and bring smart manufacturing to innovative enterprises as well as traditional industries, including SMEs.

A re-industrialisation of Europe will have positive effects also in the context of the circular economy. New technologies help to make products, services, manufacturing and processing cleaner, safer, and more flexible in responding to customers' needs; and they help to use materials and energy as efficiently as possible and to reduce waste and emissions. Europe has stringent legislation for clean industry, including rules to reduce greenhouse gas emissions and to foster energy efficiency. The more production is transferred back to Europe, the cleaner industry becomes.

At the same time, a fit-for-purpose eco-system needs to be created around these innovative technologies, to allow industry to be globally competitive and sustainable.

Scope:

Proposals should assess the contribution of relevant EU projects in the area of KETs, e.g. pilot lines and demonstrators, to the vision of re-industrialisation in the context of the circular economy, as outlined in the specific challenge.

Proposals should build on the roadmaps of relevant European initiatives, such as the Factories of the Future and Sustainable Process Industries cPPPs, as well as relevant EU, national and regional initiatives supporting the transformation towards a more sustainable and competitive EU manufacturing industry.

Proposals should provide the evidence for the impact of R&I on industrial innovation and investments, growth and jobs, identifying also appropriate policy and public actions to further foster private investment into industrial and manufacturing.

Deliverables are expected in all of the following specific areas:

- A new vision for the EU industry-related to the circular economy in an international context, taking into account the SMEs dimension;
- An insight into high value-added production in competing economies, and the competitive position of European R&D&I in the NMBP areas, which can help EU industry benefit from international cooperation;
- **An understanding of the interdependencies between science, technology, the economy and society, which are associated to the technology driven paradigm change in production and consumption;**
- Concrete evidence and cases for the needs and framework conditions for industry and SMEs to invest and expand in Europe;
- An inventory of strategies for potential large-scale industrial investments in Europe to deploy technological advances in new products and services on the market, taking into account public and private funding and financing possibilities including through Important Projects of Common European Interest and the European Fund for Strategic Investments;
- An assessment of the contribution to this vision of relevant EU projects in the area of KETs, e.g. pilot lines and demonstrators; and
- Promotion of the results of NMBP projects in this context.

The analysis and strategy work should also take into account "future of work" and social aspects as well as managers' and consumer behaviour aspects. Appropriate contributions from Social Sciences and Humanities (SSH) are therefore essential to the success of these activities.

Complementarity should be sought between this work and the work in the ICT part of Factories of the Future (notably topic FoF-12-2017 on ICT Innovation for Manufacturing SMEs (I4MS)) in the effort of supporting the transformation of the EU's industrial fabric.

The Commission considers that proposals requesting a contribution from the EU between EUR 1000000 and 1500000, and having a duration not exceeding 18 months, would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

No more than one action will be funded.

Expected Impact:

- Improved understanding of the current situation and future perspectives for integrating key enabling technologies, in order to shape the future of the EU industry ensuring sustainable growth and jobs;
- Significant increases in public and private investments in Europe's manufacturing industry;
- Evidence for policy and other measures needed to improve the eco-system around the key enabling technologies, to help EU industry re-invest in Europe.

3. Horizon 2020 - Pillar 3: Societal Challenges

3.1. Health, demographic change and wellbeing

3.1.1. Personalised Medicine

Topic	SC1-PM-01-2016: Multi omics for personalised therapies addressing diseases of the immune system
Key words	Ethics, Gender
Type of Action	Research and Innovation actions
Deadline	13-04-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/3055-sc1-pm-01-2016.html

Specific Challenge:

Despite much progress in 'omics' and epidemiological research in recent years, the knowledge on the combined role of genetic and non-genetic factors in health and disease is still limited, thus hampering the full development potential of personalised medicine[[Personalised medicine refers to a medical model using characterization of individuals' phenotypes and genotypes (e.g. molecular profiling, medical imaging, lifestyle data) for tailoring the right therapeutic strategy for the right person at the right time, and/or to determine the predisposition to disease and/or to deliver timely and targeted prevention. The term "personalised medicine" is used throughout this Work Programme with this definition in mind.]].

There is increasing evidence that interactions with the environment, as reflected in genome-epigenome-proteome-metabolome-microbiome crosstalk, play an important role in disease development and progression. International initiatives such as the International Cancer Genome Consortium (ICGC), the International Human Epigenome Consortium (IHEC) and the International Human Microbiome Consortium have generated high quality comprehensive large scale data catalogues and maps. The challenge is to build on the existing high quality data deposited in relevant databases (e.g. but not limited to: <http://epigenomesportal.ca/ihec/>, <http://docs.icgc.org/data-portal>) and combine these data and knowledge with lifestyle and environmental data, thus accelerating the translation into novel targeted or personalized interventions. These objectives cannot be accomplished on an individual country level which calls for broad transnational collaboration.

Scope:

The scope of this topic is to integrate and use high quality genome, epigenome, proteome, metabolome, microbiome data produced by large scale international initiatives with innovative imaging, functional, structural and lifestyle/environmental data, and combine these with

disease-oriented functional analysis to contribute to the understanding of health and disease with the final objective of selecting relevant biomarkers for clinical validation that will lead to the development of new targeted therapies for diseases of the immune system. Proposals must build on data from IHEC and, as appropriate, on data from other international initiatives. **Proposals should address relevant ethical implications, take into account sex and gender differences and include a section on research data management. International cooperation is requested. Proposals addressing rare diseases of the immune system are not in scope of this action.**

The Commission considers that proposals requesting a contribution from the EU of between EUR 12 and 15 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Translate big data and basic research results into clinical applications.
- Contribute to exploiting data from IHEC and, as appropriate, data from other international initiatives.
- Identify and select new biomarkers for clinical validation in stratified patient populations
- Develop new targeted therapies for diseases of the immune system with high prevalence.
- In line with the Union's strategy for international cooperation in research and innovation proposals should create strategic synergies between scientists across disciplines, sectors and around the globe.

Topic	SC1-PM-02-2017: New concepts in patient stratification
Key words	Engagement
Type of Action	Research and Innovation actions
Deadline	Two Stage 1 st stage: 04-10-2016 2 nd stage: 11-04-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2434-sc1-pm-02-2017.html

Specific Challenge:

Despite the major advances in understanding disease in the post-genomic era, still a majority of all drugs are effective in only a limited number of patients. From a clinical perspective, implementing knowledge-based decisions on what therapeutics to use for which patients and, if relevant, in which combinations, are extremely challenging. The aspiration to provide more effective therapeutic interventions tailored to the individual or groups of individuals with common molecular phenotypes remains unfulfilled because of the variable response of individuals to such interventions.

Patient stratification aims at grouping patients into disease sub-groups, where the specific pathological processes involved are better defined (clinical/molecular phenotypes). This will lead to the development of targeted therapies, optimizing the intervention to individual patients, thus achieving greater success in treating or curing the patient.

Scope:

Proposals should deliver novel concepts for disease-mechanism based patient stratification to address the needs for stratified or personalised therapeutic interventions. The proposals should integrate multidimensional and longitudinal data and harness the power of -omics, including pharmacogenomics, systems biomedicine approaches, network analysis and of computational modelling. The new concepts of stratification should be validated in pre-clinical and clinical studies taking into account sex and gender differences. **Applicants are encouraged to actively involve patient associations.** The proposals should consider regulatory aspects of clinical practice and commercialisation opportunities. Proposals should focus on complex diseases having high prevalence and high economic impact.

The Commission considers that proposals requesting a contribution from the EU of between EUR 4 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- New models for patient stratification to inform clinical decision making.
- Accelerate the translation of biomedical and clinical research results to medical use.
- Increased cost-effectiveness of the novel concepts in comparison to already established practices.
- Increased research and innovation opportunities in this innovative industries-driven field, particularly small or medium-sized enterprises (SMEs).

3.1.2. Coordination Activities

Topic	SC1-HCO-12–2016: Digital health literacy Health, demographic change and wellbeing
Key words	Engagement
Type of Action	Coordination and support action
Deadline	16-02-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2439-sc1-hco-12-2016.html

Specific Challenge:

Citizens' digital health literacy is an essential element for successful eHealth deployment. However, citizens often do not have the necessary skills to understand and appraise online

health information and apply their knowledge to make health decisions. Digitally health literate citizens are empowered to play a more active role in their health management (improved self-management) and will be better informed about health issues. Digital health literacy can also help improve prevention and adherence to a healthy lifestyle, improve the use of pharmaceutical products enhance the safe and proper use of medicines, **strengthen the patient involvement and empowerment, and finally improve health outcomes.**

Scope:

Proposals should provide support for the improvement of digital health literacy of citizens. In particular, proposals should design open access online courses ("MOOCs") for different population cohorts including children and the elderly and other high-risk patient groups, supporting an interactive learning environment. **These courses should ensure user-friendliness and involve citizens to co-design, test and implement learning modules that would help them improve their digital health literacy skills.** The courses should be designed **tailored to users' needs based on a strong understanding and projections of key factors, drivers, barriers and trends of the future that affect digital health literacy, be targeted specifically to citizens with low levels of digital health literacy and take into account and quantifying demographic, social, cultural and gender differences and address critical and/or interactive skills and competencies**, as well as support peer learning. The work should also articulate a roadmap roll-out, simulate system level changes and detail the most appropriate policy actions for ongoing enablement.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Increased awareness of the opportunities of eHealth tools and enhanced skills on how to use ICT for health-related purposes in order to obtain better health outcomes and safer care;
- A better understanding for citizens of online information on health-related topics and a better understanding of health, disease and their own capacity of intervention, including how to decrease the risks of self-medication and self-treatment;
- Positive impact at the personal level (knowledge, motivation, self-confidence, stronger feelings of control), involvement and empowerment;
- Strengthened evidence base on health outcomes, quality of life, safety of care, care efficiency gains from a more digitally health literate population;
- Improved adherence to a healthy lifestyle, to a preventive approach and to more empowered lifestyle choices.

3.2. Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy

3.2.1. Sustainable Food Security – Resilient and Resource-Efficient Value Chains.

Topic	SFS-04-2017: New partnerships and tools to enhance European capacities for in-situ conservation
Key words	Engagement
Type of Action	Coordination and support action
Deadline	14-02-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/6064-sfs-04-2017.html

Specific Challenge:

In situ (including on-farm) conservation is an important complement to *ex situ* conservation efforts and particularly relevant for tackling Crop Wild Relatives (CWR) and landraces. Unlike the more static conservation of genetic material in gene banks, *in situ* conservation is seen as a means of capturing the evolutionary adaptation of plants exposed to changing environmental and management conditions, thereby providing a reservoir of valuable traits for crop adaptation (including to climatic changes). **To be effective, *in situ* conservation strategies require a complex multi-actor approach** and need to be embedded into overall strategies to preserve plant genetic resources.

Scope:

Activities will help to build (a) network(s) of *in situ* (including on-farm and on-garden) conservation sites and stakeholders in order to develop new partnerships between the conservation, farming, gardening and breeding sectors and with the wider public. This will expand capacities to manage genetic resources in more dynamic and participatory ways and to support their use in breeding, farming and the food chain. **Cooperation between conservation stakeholders will enhance knowledge of available resources, support the demonstration of *in situ* genetic resources to the wider public and improve access to this genetic reservoir.** Exchanges with the breeding sector will provide openings to identify promising traits from landraces and CWRs and increase their use in breeding. Activities will also contribute to developing and showcasing strategies for *in situ* conservation and to linking *ex situ* and *in situ* conservation efforts more effectively. While targeting in particular European capacities, projects are encouraged to draw on good examples from elsewhere. The work is expected to benefit from the contribution of social sciences. Proposals should fall under the concept of the 'multi-actor approach'.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

Activities will significantly strengthen European capacities for the conservation, management and use of *in situ* genetic resources. They will contribute to

- greater knowledge of the status and characteristics of *in situ* genetic resources in Europe
- establishing more durable partnerships between *in situ* conservation stakeholders and thus to more dynamic transfer of plant material and good practice on conservation and management issues
- the creation of a platform for national and European in-situ conservation strategies
- diminishing the divide between *in situ* and *ex situ* conservation efforts
- **increased awareness of the wider public as regards the wealth and importance of genetic resources for agriculture and consumers**
- increased use of genetic material from *in situ* sources in breeding activities and in the food chain

In the longer term outputs will support competitiveness of the farming and breeding sectors, trigger product innovation and foster healthy diets through provision of more diverse food.

Topic	SFS-17-2017: Innovations in plant protection
Key words	Engagement, Gender
Type of Action	Research and Innovation actions
Deadline	Two stage 1 st stage: 14-02-2017 2 nd stage: 13-09-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/6061-sfs-17-2017.html

Specific Challenge:

Pesticides are a crucial input in agriculture used to combat plant pests and diseases and secure quality and yield in plant production. At the same time, concerns are mounting over the effects of plant protection products on the environment, non-target organisms and human health. Consumers and the food chain alike are increasingly demanding food products that are residue-low or residue-free and produced in more sustainable ways. This applies particularly to fruit and vegetables, which are often consumed fresh without prior processing.

Member States and EU policies seek to reduce reliance on pesticides for crop protection through the design and implementation of more integrated approaches and restrictions on the use of several active substances currently used in pesticides. The escalation of evolved resistance is putting further strains on the availability and use of plant protection products. Significant effort is required to develop alternatives to current disease and pest control

products. Similarly, a better understand of genetic, evolutionary and agronomic drivers of the evolution of pesticide resistance is required to develop more durable and environmentally sustainable plant protection strategies.

Scope:

Activities will foster the development and testing of new products, tools and strategies for integrated pest and disease management to reduce the use of pesticides in the fruit and vegetable sectors (including herbs and medical plants). Work will improve current cultural practices so as to increase the resilience of fruit and vegetable crops against biotic stresses. It will tackle the development and testing of novel, more sustainable products and tools for their application, taking due account of the potential of nature-based compounds. Activities will enhance knowledge of the mechanisms whereby plants develop resistance and help understand how evolution and spread of resistance lead to control failures across farming systems. **Projects should fall under the concept of the 'multi-actor approach' bringing together contributions from a wide range of stakeholders including research, farming, advisory services, industry as well as consumers and civil society.** They should also seek contributions from social and economic sciences to cover the broader economic, social, behavioural and environmental issues associated with the adoption of novel pest management strategies. **Gender issues will be addressed as appropriate.**

The Commission considers that proposals requesting a contribution from the EU of around EUR 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

Proposed activities will broaden the armoury of tools available for integrated pest management in the fruit and vegetable sectors. They will help to:

- reduce reliance on plant production products;
- introduce novel products with increased specificity and improved environmental performance (e.g. reduced effects on non-target organisms and natural resources);
- decrease residue concentrations in fruit and vegetables;
- increase food safety and contribute to human health (consumers and applicators);
- support innovations in the field of plant protection.

In the longer-term results will contribute to reducing pesticide residues in terrestrial and aquatic ecosystems, drinking water and the food chain. They will also strengthen the European fruit and vegetable sectors by supporting productivity and product quality. This is expected to increase consumer trust and fruit and vegetable consumption. Results will support product innovation and the competitiveness of European industries including SMEs.

Topic	SFS-20-2017 Towards a science-based regionalisation of the Common Fisheries Policy
Key words	Open Access, Engagement
Type of Action	Research and Innovation actions
Deadline	Two stage 1 st stage: 14-02-2017 2 nd stage: 13-09-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/6054-sfs-20-2017.html

Specific Challenge:

The new Common Fisheries Policy (CFP) envisages a regionalised ecosystem-based approach relying on detailed measures proposed jointly by Member States under the umbrella of common principles and benchmarks set up in EU legislation. This will require choosing appropriate management units (fisheries, fishing gears, sea basins, fish stocks, stock assemblages, target fleets, geographical units, etc.) and combining in an innovative manner management instruments and new governance mechanisms adapted to specific regional needs. Implementing this new approach to fisheries management is already a serious challenge for fisheries in European Atlantic waters. For Mediterranean fisheries, the challenge of regionalisation is exacerbated by the legal situation (narrow bands of EU waters with larger areas outside national jurisdictions), generally poor state of fish stocks (or lack of knowledge thereof), narrow continental shelves and the high number of small fishing vessels.

Scope:

Future approaches to fisheries management must take much closer account of regional fisheries practices, the specificities of regional ecosystems, and of the diverse "multi-actor" interests as a basis for implementing an ecosystem-based approach, without disregarding the likely interconnections with large marine ecosystems. On a regional basis, projects should identify potential biological, technical, economic, administrative, social and societal barriers to achieving the CFP's fisheries management objectives, through regionalisation instituted by Article 18 of the new Regulation (EU) No 1380/2013. Projects should identify potential social and economic imbalances arising from changes allowing the fishing industry and fisheries managers to adapt to new knowledge and new governance arrangements. Highlighting strengths and weaknesses of the emerging regionalisation process and structures, research projects should also develop and propose ways of resolving or circumventing barriers that have been identified and the means to evaluate how effective these ways are, especially in the Mediterranean Sea. Projects should consider work being carried-out in regional seas conventions (RSCs) and explore how RSCs and regional fisheries management structures can work better together.

In line with the objective of the EU Strategy for international cooperation in research and innovation (COM (2012) 497), proposals addressing the Mediterranean should contribute to implement the Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area (The BLUEMED Initiative)[[The "Research and Innovation Initiative for

Blue Jobs and Growth in the Mediterranean Area (The BLUEMED Initiative)" aims to advance a shared vision of a Mediterranean Sea that is healthy, productive, resilient, understood and valued so as to promote the well-being and prosperity of our citizens and future generations and boost socio-economic growth and jobs. It was jointly developed by Cyprus, Croatia, Greece, France, Italy, Malta, Portugal, Slovenia and Spain and presented by the Italian Presidency during the Competitiveness Council of 04-05 December 2014.]].

The Commission considers that proposals requesting a contribution from the EU of up to EUR 6 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction.

Expected Impact:

To improve regional implementation of the CFP and make progress on meeting the objective of maximum sustainable yield, proposals should:

- Improve the biological, economic, technical, social and environmental knowledge base for regionalised management decisions taking into account the relevant specific issues when dealing with Mediterranean fisheries.
- **Share the project's results with relevant stakeholders and promote uptake by relevant end-users to improve social and societal acceptance of fisheries management measures.**
- Ensure that conservation measures are agreed at the regional level.
- Improve the professional skills and competences of those working and being trained to work within the blue economy.

Topic	SFS-21-2016/2017 Advancing basic biological knowledge and improving management tools for commercially important fish and other seafood species
Key words	Open Access, Engagement
Type of Action	Research and Innovation actions
Deadline	Two stage In 2016: 1 st stage: 17-02-2016 2 nd stage: 13-09-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5136-sfs-21-2016-2017.html

Specific Challenge:

More efficient fisheries management, based on science, is needed to support the continued need to manage European fisheries, the global rise in seafood demand and the need to maximise fish production sustainably. Our understanding of the biology and ecology of several fish and other seafood species is far from complete for stocks fished in European seas and in

particular for multi-species fisheries. This also applies in some areas outside EU waters where EU fleets fish. Relevant stocks include species in international waters or in the waters of third countries with which the EU has signed sustainable fisheries partnership agreements. For species fished outside EU waters, the challenge often extends beyond gathering knowledge of biological characteristics to include research on management tools and appropriate stock assessment models.

Scope:

Proposals should focus on an identified number of fisheries that are important for the fishing fleets of multiple EU countries and should respond to the priorities of Regional Fisheries Management Organisations (RFMOs) and of the Common Fisheries Policy (CFP). The proposals should review existing knowledge and perform multidisciplinary research to help close important knowledge gaps that have a significant impact on the management of key target and by-catch species and that currently limit the advice that relevant bodies can give. Research results should be able to be applied immediately to provide a more solid knowledge base and advice on fisheries management.

Proposals should cover one of the following geographical scopes:

1 [2016] Knowledge base and management tools for resilient and resource-efficient fisheries in waters of third countries with which the EU has signed sustainable fisheries partnership agreements and in international waters covered by regional fisheries management organisations other than the North-East Atlantic Fisheries Commission and the General Fisheries Commission for the Mediterranean.

2 [2017] Strengthening the knowledge base for resilient and resource-efficient fisheries in EU waters and in international waters covered by the North-East Atlantic Fisheries Commission and the General Fisheries Commission for the Mediterranean.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction.

Expected Impact:

To improve fisheries management under the Common Fisheries Policy, including outside of EU waters, proposals should:

- **Increase the knowledge base, share new findings, provide new tools and promote their uptake by end-users to more efficiently manage fish stocks of interest to the EU, both inside and outside EU waters.**
- Increase the long-term profitability of the EU fleet and increase the number of jobs in the fishing sector.
- Improve market supply and food security in Europe through a significant, predictable and sustainable provision of seafood from all areas in which EU vessels operate.

- Contribute to adjusting fishing exploitation to levels that ensure the maximum sustainable yield.
- **Improve the professional skills and competences of those working and being trained to work within the blue economy.**

Topic	SFS-23-2016 Improving technical performance of the Mediterranean aquaculture
Key words	Open Access, Engagement
Type of Action	Research and Innovation actions
Deadline	Two stage 1 st stage: 17-02-2016 2 nd stage: 13-09-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5135-sfs-23-2016.html

Specific Challenge:

Mediterranean aquaculture contributes to food security, employment and trade in the region. Its competitiveness can be increased by improving its technical performance together with a shift from production-oriented growth to market-oriented and consumer responsive approach. To ensure sustainable growth of the Mediterranean aquaculture industry, farms must operate not only in ideal economic and environmental conditions but also in a socially and culturally responsible manner.

Scope:

Proposals should integrate and improve the technical viability of the current production systems for Mediterranean aquaculture, including biological and operational aspects, using new and cost-effective innovative technologies and practices to ensure the sector's sustainability and growth. In particular, proposals should substantially improve current key performance indicators (KPI) used for the principal Mediterranean species: growth rates, mortality and feed efficiency. They should also develop tools for marker-assisted selection and look at Mediterranean aquaculture market development, to develop strategic marketing plans for the promotion, product development and commercialisation of Mediterranean aquaculture production in new and existing markets. Where appropriate, proposals should make use of national and international research infrastructure programmes and services such as the Copernicus Marine Environment Monitoring Service, to better support a regional management approach. The participation of SMEs that will benefit from the intellectual property and/or from the commercial use of the project outcomes is encouraged.

In line with the objective of the EU Strategy for international cooperation in research and innovation (COM (2012) 497), proposals should contribute to implementing the Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 7 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction.

Expected Impact:

To improve the competitiveness of EU Mediterranean aquaculture production, proposals will have to:

- Consolidate Mediterranean aquaculture production for key species towards a commercial scale through sustainable fish farming and valuable seafood production.
- Draw up solid marketing plans for local and regional production which will boost jobs and trade in the region.
- Develop a code of conduct and good practices and harmonised standards across the Mediterranean to promote responsible aquaculture practices in the region.
- Improve the image of aquaculture production systems and products supported by market-oriented production and a consumer responsive approach.
- **Increase consumer awareness of high quality and safe products from Mediterranean aquaculture that certify freshness, traceability, animal welfare**[[In line with the Council Directive 98/58/EC that lays down minimum standards for the protection of animals bred or kept for farming purposes, including fish and also with international organisations such as the Council of Europe and the World Organisation for Animal Health (OIE) which have also issued recommendations and guidelines concerning fish welfare.]] **and the sustainability of the systems.**
- Support the implementation of the EU Common Fisheries Policy (CFP).
- **Improve the professional skills and competences of those working and being trained to work within the blue economy.**

Topic	SFS-24-2016: Reinforcing international cooperation on sustainable aquaculture production with countries from South-East Asia
Key words	Open Access
Type of Action	Coordination and Support actions
Deadline	17-02-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/6076-sfs-24-2016.html

Specific Challenge:

With 90% of all world aquaculture production based in Asia, and with Europe importing close to 70% of its seafood (in particular from South-East Asia[[South-East Asian countries: Indonesia, East Malaysia, Singapore, Philippines, East Timor, Brunei, Christmas Island, Cambodia, Laos, Myanmar (Burma), Thailand, West Malaysia, and Vietnam.]]), both regions

have an interest in working together to develop sustainable solutions, since production has to nearly double in the next decade to meet the increasing seafood market demand. Sustainable aquaculture production is a major challenge for global seafood security and safety. In order to provide greater benefits for the EU and South-East Asian countries and to make future aquaculture sustainable, more work is needed on technology innovation, resource efficiency, reduced environmental impact, harmonised standards and marketing.

Scope:

Proposals should draw up a plan to launch a multi-stakeholder platform to reinforce international cooperation between Europe and South-East Asian countries on food security and safety with specific emphasis on sustainable aquaculture production and contributing to European competitiveness. The multi-stakeholder platform should support structuring new networks and partnerships between industrial players aiming to enhance business opportunities and the up-take of innovations in promising aquaculture domains. Those participating in the platform should also contribute to the development of common standards for appropriate environmental planning/zoning, increased food safety, and improved farming governance. Additionally, there should be particular focus on reinforcing capacity building by aligning European training programmes, including through industrial apprenticeship opportunities and networking with South-East Asian partners.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 2 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction.

Expected Impact:

To contribute to the creation of a long-term partnership between Europe and South-East Asian countries on sustainable aquaculture and to reinforce the mutual benefits of science diplomacy between the regions, proposals will have to:

- Contribute to common standard setting and legislation, particularly around ecosystem-based farming.
- Facilitate the creation of business opportunities for industrial partnerships between Europe and South-East Asian countries.
- Reduce risks to animal and human health and thus increase EU consumer's confidence in seafood products.
- Consolidate EU-South-East Asian education and training networks.
- Contribute to reinforce targeted international cooperation on sustainable aquaculture production between EU and South East-Asian countries, supporting the EU-ASEAN Partnership[[In 2007, the Nuremberg Declaration on an Enhanced EU-ASEAN Partnership was signed at the 16th Ministerial Meeting, in Nuremberg. In 2012, Foreign Ministers of ASEAN and the EU adopted the Bandar Seri Begawan Plan of Action 2013-2017, defining ASEAN-EU cooperation in the next five years.]] and the underlying EU-ASEAN High-level Policy Dialogue on science, technology and innovation.

- Improve the professional skills and competences for those working and being trained to work within the blue economy.

Topic	SFS-29-2017 Socio-Eco-Economics – Socio economics in ecological approaches
Key words	Engagement, Gender
Type of Action	Research and Innovation actions
Deadline	Two Stage 1 st stage: 14-02-2017 2 nd stage: 13-09-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/6053-sfs-29-2017.html

Specific Challenge:

Ecological or ecosystem-based approaches have emerged as an alternative to farming based on chemical inputs. Farming systems implementing such approaches (eco-functional intensification) are often defined as "low-input", but they generally require more knowledge and labour per hectare than those based on chemical inputs. To deliver agricultural products for the market and public goods for the society, **there is a need for a better understanding of the socio-economic and policy factors that hinder or enhance the development of such systems by identifying the trends and drivers encouraging the involvement of farmers, actors in the value chain, consumers, educators and policy makers.**

Scope:

Based on case studies and representative farm typologies, proposals will involve drawing up an economic, environmental and social comparison of identified production systems implementing ecological approaches and conventional farms in the same sectors of production. A wide range of systems will be considered, e.g. organic and other low chemical input systems, systems implementing biological control, and diversified *versus* specialised systems. Various sectors will be covered, e.g. arable crops, livestock, vegetables and fruits, vineyards, agro-forestry, mixed farming integrating crop and livestock systems and/or multipurpose breeds. Different strategies will be compared, e.g. pursuing economies of scale in the conventional systems *versus* the economies of scope proposed for some ecological approaches. Economic performance and delivery of public goods will be evaluated on the basis of different indicators at farm, farm-group and territorial levels. Specific emphasis will be placed on analysis of the labour productivity in terms of the amount and value of private and public goods produced. Incomes in the different systems will be analysed on the basis of market and public payments. **Issues related to gender differences** and demographic characteristics and patterns in farming communities **should be investigated if relevant.**

The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

- improved integrated capacity and method to assess the sustainability of different agro-ecological approaches;
- increases in productivity, delivery of public goods and job creation through improved agro-ecological approaches and market and policy incentives; and strengthened transdisciplinary research and integrated scientific support for relevant EU policies and priorities (Common Agricultural Policy, Water Framework Directive, climate change objectives, jobs, etc.).

Topic	SFS-31-2016 Farming for tomorrow: developing an enabling environment for resilient and sustainable agricultural systems
Key words	Engagement, Gender
Type of Action	Research and Innovation actions
Deadline	Two Stage 1 st stage: 17-02-2016 2 nd stage: 13-09-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5137-sfs-31-2016.html

Specific Challenge:

The European farming sector is facing constant economic, environmental and social challenges in rapidly changing economic and policy environments. It is increasingly affected by factors external to farming which make it more vulnerable to external shocks. As a consequence, it has undergone considerable changes in recent decades: farm size and investment have increased steadily to maintain farming income. In some sectors (e.g. livestock), production is becoming more concentrated in specialised regions, potentially increasing pressure on the environment. Risks in agriculture have increased as a result *inter alia* of the abolition of price policies, globalisation, more frequent extreme weather events in a changing and more variable climate, and pest and disease outbreaks/epidemic diseases. These and other factors have a strong bearing on the farm demographics of farmers and the attractiveness of the sector. Generation renewal in agriculture plays a crucial role in maintaining viable food production and contributing to the sustainability of the sector and rural areas generally. For example, a rapid decline of farming communities in many areas in Europe is expected to compromise the long-term provision of public goods. There is a need to analyse these issues thoroughly in order to understand long-term dynamics in the sector and develop an environment conducive to the delivery of private and public goods.

Scope:

Activities should provide a thorough investigation of the main factors driving farm demographics along with their implications for the agricultural sector, rural development, the environment and the provision of public goods. Proposals should develop long-term projections and modelling and measure the impact and effectiveness of relevant policies.

Work should identify further measures to facilitate entry to the sector. **The impact of consumer preferences on the farming sector is also to be taken into account.** Investigations will cover a wide range of sub-sectors (including commodities and value-added products). Investigations will also aim at understanding farmers' risk management strategies and behaviours as regards the adoption and use of risk-management tools, their behaviours in market-crisis situations, the conditions and availability of information necessary for the effective management of risks at farm level and the role of policy tools. **Gender-related aspects will be investigated as relevant.** Research will extend to strategies at meso/macro levels to cope with the risks associated with an increased occurrence of extreme weather events.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

The project results are expected to:

- improve the delivery of the policy framework to agricultural activity thus fostering its sustainability. Particular attention will be paid to the delivery of the EU's Common Agricultural Policy (CAP);
- provide farmers with better risk-management tools; and improve the resilience of the agricultural sector in coping with the risks it faces.

Topic	SFS-32-2017 Promoting and supporting eco-intensification of aquaculture production systems: inland (including fresh water), coastal zone and offshore
Key words	Open Access
Type of Action	Research and Innovation actions
Deadline	Two Stage 1 st stage: 14-02-2017 2 nd stage: 13-09-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/6050-sfs-32-2017.html

Specific Challenge:

Aquaculture is an attractive and important component of rural and coastal livelihoods providing employment and facilitating a sustainable economy by means of business development and diversification. The opportunities for growth of the aquaculture industry in the EU remain substantial given the potential for innovation with respect to culture techniques, technological advances, species and product diversification. European aquaculture production is expected to sustainably increase by continuously pursuing ways and means of improving production practices, to make them more efficient and cost-effective while improving resource use and environmental management. This sustainable eco-

intensification of the European aquaculture industry has been identified as a major challenge ahead in order to meet global fish and seafood security needs for future generations.

Scope:

Proposals should support aquaculture production and communities with cost-effective innovative solutions and technologies that ensure sustainable offshore, coastal and inland development and growth. They should look at strengthening integrated aquaculture activities (species and systems) in a sustainable way, by implementing new/emerging technologies and innovations in monitoring and management systems and focusing on sound economic reduction of operational costs related to innovative aquaculture production systems. The participation of SMEs that will benefit from the intellectual property and/or from the commercial use of the project outcomes is encouraged.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 6 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction.

Expected Impact:

To contribute to the eco-intensification of European aquaculture, proposals should:

- Bring to the market new and cost effective commercial applications to assist aquaculture producers in their activity.
- Secure EU markets by increasing the offer of high quality fish and seafood products from a continuous supply of EU aquaculture products that meet EU consumers' demands and contributing to reducing the dependency of the EU on imports of fish and seafood products from international markets.
- Improve the sustainability of the European aquaculture industry by optimising production systems and profitability while ensuring optimal resource use and minimising environmental impact
- Consolidate eco-efficient aquaculture practices to ensure access to high-value niche markets while minimising the environmental impact of the activity.
- Improve the professional skills and competences of those working and being trained to work within the blue economy.

Topic	SFS-34-2017 Innovative agro-food chains: unlocking the competitiveness and sustainability potential
Key words	Engagement
Type of Action	Research and Innovation actions
Deadline	Two Stage 1 st stage: 14-02-2017 2 nd stage: 13-09-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5149-sfs-34-2017.html

Specific Challenge:

The sustainability of food systems is challenged by various interrelated factors, such as the changing socio-economic and political context, the scarcity of natural resources, environmental degradation and climate change. These challenges cannot be met by individual action, but require multi-stakeholder action and coordinated initiatives along the value chain. A new holistic, systemic approach to the design of processes within agro-food chains is needed to unlock their full potential and deliver economic, social and environmental benefits.

Scope:

The research will provide in-depth insight into linkages and interactions between agri-food chain stakeholders, including understanding of their perception and behaviour with respect to sustainability objectives and cooperation, potentially resulting in the design of new processes leading to new business models and better performing value chains. **A holistic approach to improving mutual understanding and cooperation between value chain stakeholders (identifying incentives and barriers, and strategies and tools, e.g. technologies to overcome them) is to be explored, helping to create favourable conditions for cooperation, co-creation and innovation within value chains. The concept of social innovation and ways of measuring it throughout the value chain should be explored, taking into account the engagement of society.** A plethora of policies and regulatory requirements influencing food production and consumption should be explored, and their implications as regards creating favourable overall conditions for cooperation and innovation along the food chain. Proposals should fall under the concept of the multi-actor approach.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

The project results are expected to:

- enhance the capacity of actors within agri-food chains to design new processes leading to new business models and more efficient, equitable, sustainable and better performing value chains;

- enhance the innovation potential of the European agri-food chains in terms of adapting to change and increase their competitiveness, sustainability and resilience;
- strengthen farmers' position in value chains through innovative approaches that enhance transparency, information flow and management capacity; and limit the negative impacts of agri-food chains on the environment, climate and health.

Topic	SFS-35-2017 Innovative solutions for sustainable food packaging
Key words	Engagement, gender
Type of Action	Innovation actions
Deadline	14-02-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/6065-sfs-35-2017.html

Specific Challenge:

In recent decades, there has been much research into innovative food packaging technologies and solutions (e.g. active, intelligent, recyclable, easy-to-use, organic, antibacterial). This includes research aimed at reducing the environmental footprint of packaging material, increasing the shelf-life of food and developing food spoilage indicators, improving product design, optimising process efficiency, and reducing the need for chemical preservatives while maintaining the nutritional and sensorial properties of food. In spite of the progress made, much remains to be done to overcome the barriers to market uptake of many promising technologies.

Scope:

Proposals should clearly address the problems associated with the scaling-up and commercialisation of eco-innovative solutions to packaging in a developing framework of social, economic and environmental conditions. Activities should aim to produce plans and arrangements or designs for new, modified or improved products, processes or services. For this purpose they may include prototyping, testing, demonstrating, pilot projects, large-scale product validation and market replication. Proposals may, if necessary, include limited research and development activities. If there are clear market failures or cultural or behavioural barriers to overcome, proposals may comprise activities such as validating the benefits for users/buyers, validating technical and economic performance at system level, validating standards, and activities to prepare market uptake, ensure consumer acceptance and optimise access to and the dissemination of results. **Work is expected to benefit from contribution of social sciences and a gender approach. Participation of all relevant stakeholders in the food production and supply chains is encouraged. Demonstration activities will require the involvement of packaging and food processing companies, retailers and civil society organisations to bridge the gap between ideas that have been developed and their practical implementation.**

The Commission considers that proposals requesting a contribution from the EU of up to EUR 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

With a view to supporting the transition from a linear to a circular economy, proposals should show how some, or all, of the following impacts will be achieved:

- wider and faster deployment of innovative, user-driven, packaging solutions resulting from greater industry and consumer acceptance, and higher visibility of innovative solutions, overcoming the barriers to market uptake.
- reduced waste in both food and packaging materials, and its negative impacts on the environment (e.g. resource utilisation, greenhouse gas emissions, pollution).
- strengthening of the EU's position in manufacturing, improving competitiveness as well as opportunities for growth, diversification and job creation for the EU food and packaging sector in general, and SMEs in particular.
- strengthening the European food value chain through continued support to product quality, contributing to consumer trust and increased consumption.
- support for the transition from a linear to a circular economy.

Topic	SFS-37-2016 The impact of consumer practices in food safety: risks and mitigation strategies
Key words	Engagement, gender
Type of Action	Research and Innovation actions
Deadline	Two stage 1 st stage: 17-02-2016 2 nd stage: 13-09-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5139-sfs-37-2016.html

Specific Challenge:

Food safety policy is constantly reviewed in the light of new scientific evidence. There have been significant advances in consumer protection brought about by food safety legislation in the farm-to-retail part of the food chain. Examples include controlling the occurrence of certain food-borne pathogens at farm and retail level using microbiological targets and criteria, or of contaminants and other harmful chemicals by setting maximum residue limits and levels. The retail-to-fork part of the food chain, in the private consumer setting, cannot be legislated but may benefit from science-based policy initiatives. As regards food handling, logistics and preparation, both in-retail and post-retail consumer behaviour can substantially contribute to the risk from, and exposure to, certain food-borne hazards. This is the case in particular to those which are not effectively or easily managed earlier in the food chain, or that arise as a result of consumer practices.

An improved, consumer-driven, food safety approach requires scientific data on the impact of consumer practices on the risks of food-borne hazards. It also needs innovative strategies, technologies and tools to help consumers manage these risks and their exposure to food-borne hazards, while taking account of food sustainability. This should, in return, reduce food-borne disease and exposure to food-borne hazards. At the same time, it should contribute to the sustainability of the food chain and to improving the holistic "farm-to-fork" food safety framework.

Scope:

Proposals should cover food-borne hazards and risks where consumer actions can help reduce risk and/or exposure.

Proposals should identify and consider different consumer risk-groups, taking into account socio-economic backgrounds and culture-based food handling practices in the EU. Where relevant, **proposals should address gender-specific aspects, and the gender dimension in the research content shall be taken into account.** Proposals should develop, test and implement novel and innovative strategies, technologies and tools to help consumers mitigate risks from food-borne hazards.

Interdisciplinary and multi-actor approaches are required. **There should be input from the social sciences and humanities to engage with consumers in general. Civil society, consumer associations, the food industry and market actors should also be involved.** Innovative and strategic food safety policy models, aimed at addressing and supporting the role of the consumer in food safety, should be proposed and analysed. Proposals should fall under the concept of the 'multi-actor approach'.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 9.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

In order to reduce food-borne diseases and exposure to hazards, improve the sustainability of the food chain and improve the holistic "farm-to-fork" food safety framework, proposals should:

- help consumers mitigate risks from, and exposure to, food-borne hazards with the aim of reducing the occurrence of food-borne diseases;
- scientifically characterise the contribution of in-retail and post-retail private consumer behaviour (up to the point of consumption) to risks from, and exposure to, food-borne hazards, including due to logistical and food handling and food preparation practices;
- develop and stimulate market uptake using scientific evidence based approaches, tried-and-tested technologies and tools that enhance consumer-driven food safety;
- **strengthen interdisciplinary research approaches and foster an inclusive and participatory multi-actor approach for long-lasting implementation of the results obtained.**

Topic	SFS-38-2016 Impulsivity and compulsivity and the link with nutrition, lifestyle and the socio-economic environment
Key words	Engagement, gender
Type of Action	Research and Innovation actions
Deadline	Two stage 1 st stage: 17-02-2016 2 nd stage: 13-09-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5140-sfs-38-2016.html

Specific Challenge:

Impulsivity (including hyperactivity, attention deficit, unplanned reactions, aggressiveness and other antisocial behaviours) and compulsivity disorders (including addictive behaviour) lead to individuals no longer being able to integrate into their social environment. As such, these disorders are a growing threat to individuals, families and societies as a whole. Antisocial and addictive behaviour can have a significant negative impact, e.g. in schools, at work, in families, in homes for the elderly, in prisons and in public places.

Many factors that may influence such behaviours are still not fully understood. These include the risks and protective factors, the extent to which inherited factors and nutritional habits may play a role, and the impact of these factors on the gut-microbiota-brain axis.

Recent studies have suggested that a change in diet and lifestyle can result in a significant reduction in impulsive, compulsive, aggressive or other antisocial behaviours.

Scope:

Proposals shall include new insights into the influence of diet, including sugar, fat and protein content and metabolism, vitamin and mineral balance, amino-acids and food additives, and their impact on the gut-microbiota-brain axis. They shall also look at the influence of lifestyle, socio-economic environment and variations in food culture on these behavioural disorders in various population groups (including children, teenagers and the elderly) and suggest possible solutions. In addition, consideration shall be given to the influence of these factors in the development of addictive behaviour. **The gender dimension of these behavioural disorders must be taken into account and gender differences must be clearly investigated.** An innovative research approach, including linked social innovation aspects, is needed and many stakeholders from a variety of disciplines shall be involved. This call does not envisage pharmaceutical treatment.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 12 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

In order to find ways to improve impulsive, compulsive, aggressive or other antisocial behaviours through a change in diet and lifestyle, proposals should show how some, or all, of the following impacts could be achieved:

- Foster social innovation and public health by bridging knowledge gaps in the understanding of the influence of nutrition, lifestyle and the socio-economic environment, and their complex interdependencies, on the occurrence of impulsivity and compulsivity disorders.
- **Deliver a list of scientific evidence-based remedial actions for this challenge that can be used by policy makers, politicians, practitioners, stakeholder groups, employers and the families or individuals concerned.**

Topic	SFS-39-2017 How to tackle the childhood obesity epidemic?
Key words	Engagement, gender
Type of Action	Research and Innovation actions
Deadline	Two stage 1 st stage: 14-02-2017 2 nd stage: 13-09-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/6060-sfs-39-2017.html

Specific Challenge:

Childhood obesity is one of the most serious public health challenges of the 21st century and its prevalence has increased at an alarming rate in the last decades. The main problem is that overweight and obese children are likely to remain obese in adulthood and more likely to develop noncommunicable diseases like diabetes and cardiovascular diseases at a younger age. An integrated EU approach to help reduce the impact on health of poor nutrition, excess weight and obesity is a political objective. A wide range of factors interacting at various levels are known to be associated with obesity. Overweight and obesity, as well as their related diseases, are largely preventable. Starting from an early age, diet and lifestyle have a strong impact on health throughout life. Therefore, the prevention of childhood obesity needs to be given a high priority.

Scope:

Within the context of improving the health of citizens and promoting sustainable economic growth, the main objective is to reduce childhood obesity and its comorbidities effectively. Proposals should focus primarily on specific target groups in the young (e.g., during pregnancy and foetal development, in infants, toddlers, most vulnerable groups in children, adolescents). To better understand the complex interactions between the factors influencing obesity in individuals and populations, it is necessary to combine the approaches and expertise from different disciplines (e.g. (epi)genetics, molecular biology, microbiome, gut-brain signalling,

physiology, nutrition, physical activity sciences, information and communication technology, social sciences and humanities, education, environment, architectural and urban design, psychology). Proposals should consider a range of geographic, socio-economic, behavioural and cultural factors. Proposals should aim at innovative and efficient strategies, tools and/or programmes for promoting sustainable and healthy dietary behaviours and lifestyles. Proposals should reflect and build on existing initiatives and platforms and should provide a robust science-based impact assessment of the tools, strategies and/or programmes delivered for further consideration by policy makers. **Tackling this societal challenge requires both interdisciplinary and multi-actor approaches engaging academics, policy makers, civil society and relevant industry and market actors. The gender dimension in the research content shall also be taken in account.** In line with the strategy for EU international cooperation in research and innovation, international cooperation is encouraged, in particular with the US, Australia, New Zealand and Canada. Proposals should fall under the concept of the 'multi-actor approach'.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

In the effort to tackle the childhood obesity epidemic, proposals should show how some, or all, of the following impacts will be achieved:

- Provide an understanding of which factors are involved and how they influence the childhood obesity epidemic.
- Provide innovative, efficient, effective, scientific evidence-based and ready-to-use tools, strategies and/or programmes to improve sustainable and healthy dietary behaviour and lifestyles in children.
- **Transfer the generated knowledge and innovation to relevant stakeholders.**
- Strengthen interdisciplinary research approaches and foster participatory and inclusive multi-actor approaches for long-lasting implementation of the results obtained.

Topic	SFS-40-2017 Sweeteners and sweetness enhancers
Key words	Gender
Type of Action	Research and Innovation actions
Deadline	Two stage 1 st stage: 14-02-2017 2 nd stage: 13-09-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/6055-sfs-40-2017.html

Specific Challenge:

In recent decades, sweeteners and sweetness (flavour) enhancers (S&SEs) have become key ingredients in food produced and consumed in the EU, and exported to and from it. Because of

their diversity (natural/artificial, geographical origin, processing, caloric content, etc.), S&SEs are used in different foodstuffs and food processes and in different dosages. However, information is lacking about new and emerging S&SEs throughout the agri-food chain, (e.g. their potential use in single or multiple food (ingredient) production chains, traceability, production and/or processing (cost) efficiency, safety and quality risks/benefits (for single or combined use), allergenicity and sustainability). The interaction of all these factors influences the role of S&SEs in a healthy diet and the fight against obesity. In addition, the toxicological impact of high doses, combined effects and the prolonged use of S&SEs are still unknown and the health-related aspects need further investigation.

Scope:

Proposals should focus on health, obesity and safety aspects (including combined/prolonged use, metabolic effects and gut brain signalling, neuro-behaviour, and effects on the microbiota) associated with S&SEs. Activities indicated in the proposals should explore the sustainability of the whole value chain (ingredient sourcing, production/processing, market opportunities for new and emerging S&SEs). They should investigate consumer perceptions and preferences giving proper consideration to the underlying physiological, psychological and socio-economic drivers. The approach should be interdisciplinary and should give careful and detailed consideration to the regulatory framework. **Proposals should also include dissemination to all stakeholders as well as the food industry, including small and medium-sized enterprises (SMEs). Where relevant, proposals should address gender-specific aspects and the gender dimension in the research content shall be taken into account.**

The Commission considers that proposals requesting a contribution from the EU of up to EUR 9 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

With the objective of combating obesity, while improving sustainable food security in the EU, proposals should show how some, or all, of the following impacts will be achieved:

- Promote healthy diets and contribute to combating obesity while improving sustainable food security in the EU.
- Stimulate market uptake (with a specific focus on small and medium-sized enterprises) of new, healthy and sustainable S&SEs.
- Strengthen the EU economy with a move towards more sustainable and future-oriented business practices.
- **Dissemination to EU food, health and food ingredient stakeholders, especially to food-related SMEs.**
- Evidence-based policy inputs on health, environmental and food safety issues.

Topic	SFS-43-2017: Earth observation services for the monitoring of agricultural production in Africa
Key words	Gender, Engagement
Type of Action	Research and Innovation actions
Deadline	14-02-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/6068-sfs-43-2017.html

Specific Challenge:

The Fourth EU-Africa Summit of 2-3 April 2014 agreed on a roadmap for 2014-2017[[<http://www.africa-eu-partnership.org/sites/default/files/documents/>]] including actions specifically targeted at delivering Earth observation services in priority domains for Africa such as food security. This topic aims to contribute to this roadmap by providing food supply projection and agricultural risk assessment for Africa. These kinds of projection remain very challenging tasks, requiring a lot of information on environmental and weather conditions, climate change, crops and livestock. This information is usually derived from both remote and in-situ Earth observation systems. The challenge is therefore to make agricultural production in Africa more predictable by using Earth observation assets, including – but not limited to – those made available through the Global Earth Observation System of Systems (GEOSS) and Copernicus programmes.

Scope:

The action should lead to substantially increasing the use of Earth observing capabilities and supporting application systems to produce timely, objective, reliable, and transparent crop and livestock production projection at the national and regional level for the African continent. It should support the GEOGLAM[[<http://www.geoglam-crop-monitor.org/>]] and AfriGEOSS[[<http://www.earthobservations.org/afrigeoss.php>]] initiatives and relevant aspects of the EU's development policy. Moreover, it should design and develop methods to assess/monitor agricultural production in Africa, taking into account its main drivers and the longer term impacts of its dynamics. Building on the outcomes of existing EU projects stimulating innovation for global agricultural monitoring – such as SIGMA[[<http://www.geoglam-sigma.info/>]] –, the research and innovation activities should cover as a minimum all the following domains: crop and livestock identification and crop and livestock area estimation, crop and livestock condition and stress, yield prediction and forecasting, crop cover mapping, and the impact of extreme events on food production.

The action should foster participatory approaches to collecting relevant information and data, taking advantage of the growing number of mobile communication devices owned by African citizens. The participatory approaches should also take into account, and build on, widespread women's engagement in agricultural production and food supply. There should be an emphasis on 'consensus of evidence approaches', integrating data from multiple sources including Earth observations, crop models, weather forecast, climate predictions and projections, surveys and ground observations to reach evidence-based assessments using repeatable and scientifically sound methods.

Large proof-of-concept actions, showing the capacity to deliver food supply prediction and agriculture risk assessment beyond the current state-of-the art at regional/pan-African level should be performed by the action. Proposals should contribute to supporting the implementation of an EU-Africa partnership on Food and Nutrition Security and Sustainable Agriculture and should include partners clearly representing the diversity of African countries.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged, in particular with African countries. The action should establish cooperation with institutions/networks engaged in the development of climate services in Africa and with agencies which have developed mapping and assessment tools used in humanitarian decision making.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

Proposals are expected to:

- move projection of food supply and agricultural risk assessment at the level of the African continent beyond the current capability;
- improve decision making capacity regarding food supply and management in Africa;
- contribute to independent and neutral evaluation of agricultural production in Africa;
- strengthen collaboration between EU and African organisations in the domain of food projection;
- **increased involvement of citizens and stakeholders in food production and food supply chain management in Africa, taking into account the gender dimension and women's role in food production and supply;**
- provide a strong Earth observation building blocks for an EU-Africa Research and Innovation Partnership focusing on food and nutrition security and sustainable agriculture;
- improve participation of African organisations in GEO and Copernicus (GMES & Africa initiative);
- foster cooperation with initiatives developing the Global Framework for Climate Services (GFCS)[[www.gfcs-climate.org/]] in African countries.

3.2.2. Blue Growth – Demonstrating an ocean of opportunities

Topic	BG-03-2016 Multi-use of the oceans marine space, offshore and near-shore: compatibility, regulations, environmental and legal issues
Key words	Open Access, Engagement
Type of Action	Coordination and Support actions
Deadline	17-02-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5117-bg-03-2016.html

Specific Challenge:

Combining several activities such as renewable energy, aquaculture, maritime transport and related services in the same marine space, as well as the introduction of multi-use platforms, has the possibility to dividing the infrastructure overhead and reducing the costs of offshore operations, and the demand on the space needed for different activities. One barrier to multi use of the oceans is that different environmental, safety and regulatory regimes and practices apply to different sectors and to different national jurisdictions. Furthermore, there is a lack of common understanding of the nature of operations within different sectors and the feasibility of combining these in a way that provides mutual benefits. The challenge is to identify the real and perceived barriers to integration. There is a need for a clear overview of compatibility, regulatory, environmental, safety, societal and legal issues within the context of the maritime spatial planning directive and how they impact on the combining of different marine and maritime activities.

Scope:

The environmental, spatial, economic and societal benefits of co-location of offshore and near-shore activities can be hindered by potentially inappropriate regulatory, operational, environmental, health and safety, societal and legal barriers. An overview of all barriers both real and perceived is required as well as an action plan to overcome these challenges. **It is expected that stakeholders (industry, NGOs, governmental organisations, research organisations and representatives of concerned local communities) are actively engaged in work within this action. Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction.**

The Commission considers that proposals requesting a contribution from the EU up to EUR 2 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

In order to reduce costs of offshore and near-shore operations and the marine space needed for different activities, the project will:

- Enable a full understanding of barriers and possibilities associated with combining marine activities.
- Reduce risks associated with the commercial development of combined activities offshore as well as near-shore.
- Concentrate marine activities to enable the more efficient use of the marine space with reduced environmental impact.
- Enhance social acceptance of these new developments by local communities and society-at-large.
- Increase development of European offshore activities that support the Blue Growth agenda.
- Better harmonise regulations.

Topic	BG-06-2017 Interaction between humans, oceans and seas: a strategic approach towards healthcare and wellbeing
Key words	Open Access, Engagement, Gender
Type of Action	Coordination and Support actions
Deadline	14-02-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5124-bg-06-2017.html

Specific Challenge:

The interaction between people, oceans, seas and coasts is a broad domain with significant impacts on human health and well-being. However, it remains fragmented, poorly understood and underexploited. As coastal populations grow worldwide, not only due to permanent dwellers but also due to increasingly larger number of tourists, the determinants and impacts of this link between oceans and people become more relevant. On the one hand, the seas provide benefits namely through food, feed and positive impacts on overall wellness. On the other hand, the risks associated with the marine environment include chemical and physical pollutants of anthropogenic origin, harmful algal blooms, and countless marine microorganisms that lead to a still poorly assessed proportion of human morbidity and mortality. Therefore, the challenge is to coordinate the existing multidisciplinary research knowledge and resources, including distributed infrastructures, across Europe. This would make it easier to take advantage of the benefits and to better manage the risks of the interaction between oceans and people using an ecosystem-based approach and to formulate evidence-based policies that can benefit citizens as well as achieving good environmental status.

Scope:

Proposals should include a plan for the creation of a multi-stakeholder forum that would make it possible to better understand the potential health benefits of marine and coastal ecosystems including in economic terms, anticipate new threats to public health more effectively, identify ways of improving ecosystem services that the marine environment can provide and contribute to reducing the burden of diseases caused by the interplay between marine-

degraded environments and human behaviour. This forum is expected to issue a strategic research agenda based on data covering the biological, cultural and socio-economic dimensions of the interaction between oceans and human health that can ultimately impact morbidity and mortality in the general population. **Data should encompass sex and gender differences in the populations studied. Data should be assessed through an active involvement of diverse stakeholders across Europe, including local marine communities, civil society, industry, and public authorities.**

The Commission considers that proposals requesting a contribution from the EU of up to EUR 2 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction.

Expected Impact:

In order to support key EU policies, in particular those directly related to the marine and maritime sectors, such as the EU Blue Growth Agenda, the Blue Tourism Communication and the Marine Strategy Framework Directive, proposals are expected to:

- Create a multi-stakeholder forum that issues a strategic research agenda for oceans and human health, based on new scientific and/or technological evidence and best practices across different geographical locations and climates.
- Highlight novel, cost-effective solutions or interventions that enable effective policy making that aims to maximise health benefits and minimising risks derived from exposure to marine and coastal ecosystems.
- **Actively involve local communities across different European maritime regions, comprising civil society, industry, public authorities in data supply, knowledge generation and solution implementation processes.**
- Improve global cooperation around oceans and human health.
- Improve the professional skills and competences for those working and being trained to work within the blue economy.

Topic	BG-07-2017: Blue green innovation for clean coasts and seas
Key words	Engagement
Type of Action	Innovation actions
Deadline	14-02-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5125-bg-07-2017.html

Specific Challenge:

Debris, chemical and microbial pollution and algae jellyfish blooms are huge and increasing problems in the oceans, seas and coasts. For plastics alone, the economic and ecological cost is

considerable when including beach clean-ups, tourism losses, and damages to the fishing and aquaculture industries. In spite of strong legislation such as EU directives, sea and coastal pollution remains high, and prevention and innovative coast and sea clean-up schemes remain a challenge. Many solutions are available to tackle these sources of pollution, including recycling, waste water treatment, teams of collectors, and specific equipment such as skimmer boats, beach cleaning machines or algae harvesting devices. However, there is a pressing need to develop powerful innovative methods and processes to clean coasts and oceans and to restore the ecosystems to a healthy and clean state. The foremost challenge is not only to remove litter and pollution, but to transform the collected waste into a resource stream in line with the concept of the circular economy.

Scope:

The proposals should be for demonstration projects to clean and lay the ground for a healthy ocean or sea and its coasts in any given large geographic area(s), including regional seas or semi-closed sea basins such as the Mediterranean. The demonstration projects should develop and scale-up innovative processes and measures to clean the selected site[[Each site should be substantial in size and include or be adjacent to different activities.]] from visible (for example floating plastics or abandoned fishing gear) and invisible litter (micro-plastics) and pollutants. [the exact selection of pollutants and litter will depend on the area selected. **However, the choice of the area must be such that several sources of pollution are addressed, involving local communities and actors.** Collected waste materials should be adequately processed so as to enable a subsequent usage/ exploitation/ re-usage. The proposals should apply an ecosystem approach, developing forecasting tools and models to identify areas where the proposed intervention is likely to be most effective in ecological and economic terms. **Social acceptance and economic impact of the envisaged measures must also be considered and promoted, for example by disseminating the project results to relevant stakeholders.**

In line with the objective of the EU Strategy for international cooperation in research and innovation (COM (2012) 497), proposals addressing the Mediterranean should contribute to implement the Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area (The BLUEMED Initiative).

The Commission considers that proposals requesting a contribution from the EU of up to EUR 6 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

To contribute to the implementation of EU Policies such as the Marine Strategy Framework Directive and its aim to achieve a good environment status for Europe's seas and oceans by 2020, proposals are expected to:

- Develop innovative technological methods or processes for cleaning coasts and seas and transforming waste into a resource.
- Reduce cleaning up/restoration costs through cost-effective solutions, in particular through enhanced resource efficiency.

- **Increase awareness and acceptance of civil society about the importance of healthy oceans and seas, devoid of litter and pollutants, in civil society.**
- Progress towards reducing pollution and debris (macro, micro and nano) in regional sea basins and beyond, and towards restoring marine ecosystems.
- Improve the professional skills and competences for those working and being trained to work within the blue economy.

Topic	BG-08-2017 Innovative sustainable solutions for improving the safety and dietary properties of seafood
Key words	Open Access, Gender
Type of Action	Innovation actions
Deadline	14-02-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5128-bg-08-2017.html

Specific Challenge:

The seafood production and processing industry contributes substantially to food security, employment and trade in regions where the activity takes place. To safeguard and strengthen this and make the activity more sustainable, seafood production should be market-driven and consumer-responsive, addressing challenges such as increasing consumer awareness of food quality and safety traceability and animal welfare. Ensuring the sustainability of the seafood processing industry involves not only innovative technologies that could mitigate environmental damage but also securing its economic viability and taking account of the consumer imperatives behind them. One way of ensuring the sustainable production and processing of nutritious and safe seafood products is through the demonstration and first application in the market of eco-innovative, sustainable processing solutions of marine and aquaculture-derived food products and nutrients.

Scope:

Proposals should build on state-of-the-art research insights from EU and other funded projects in this field, with a specific focus on food safety (from harvesting to the final products). They should aim to generate new knowledge to develop commercial solutions for improving the socio-economic and environmental sustainability of the seafood production and processing industry, while also contributing to product quality and safety. Activities should directly aim to produce plans and arrangements or designs for new, altered or improved products, processes or services. For this purpose they may include prototyping, testing, demonstrating, piloting, and large-scale product validation, all with a view to paving the way for subsequent market replication and uptake by consumers. Proposals may take into account impacts across different locations and population segments, as well as the specificities of different types of seafood, also in terms of nutrition. Work is expected to benefit from the contribution of social sciences wherever applicable. **Where relevant, proposals should address gender-specific aspects, and the gender dimension in the research content shall be taken into account.** Aspects of traceability, authentication and certification of EU seafood products and labels of

quality should be conveniently addressed. The participation of SMEs that will benefit from the intellectual property and/or from the commercial use of the project outcomes is encouraged.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 7 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction.

Expected Impact:

To contribute to EU food safety common standards and legislation for seafood products and nutrients, proposals are expected to:

- Ensure that eco-innovative solutions for the sustainable production and processing of marine and aquaculture-derived food products and nutrients are used more widely, as a result of greater user acceptance, higher visibility of innovative solutions and the creation of scalable markets.
- Improve the competitiveness of the EU seafood sector, and increase opportunities for growth, diversification and job creation for the sector in general and SMEs in particular.
- Benefit consumers by allowing them to make better-informed seafood choices.
- Increase the availability of healthier seafood, which will improve consumers' diet and health.
- Improve the professional skills and competences of those working and being trained to work within the blue economy.

Topic	BG-09-2016 An integrated Arctic observing system
Key words	Open Access, Engagement
Type of Action	Research and Innovation actions
Deadline	17-02-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5122-bg-09-2016.html

Specific Challenge:

The Arctic is a theatre of profound transformation. Climate change is significantly affecting the extent and thickness of sea-ice, on snow cover on ice-sheet melting, on permafrost thawing, and on marine and land ecosystems. These changes are bringing with them both risks and opportunities, and an integrated and multi-disciplinary Arctic observation system is becoming essential for studying, forecasting and assessing changes that support the region's sustainable development. Improving and coordinating current capabilities for assessing and predicting Arctic environmental change requires the provision of data on a number of key variables of Arctic meteorology, climatology, oceanography, ecosystems and pollution at various scales. Monitoring and improved understanding of the Arctic climate system and its teleconnections, as well as of ecosystem change and the socio-economic impacts on offshore operations, new

shipping routes, mining activities, tourism etc. are important prerequisites for effectively assessing climate change adaptation and mitigation strategies in the Arctic and elsewhere.

Scope:

An integrated Arctic observation system should close critical gaps with innovative solutions, as well as improve the integration and inter-operability of existing observation systems, also in view of data assimilation into models. **The activity shall be based on co-operation between the existing European and international infrastructures (in-situ and remote including space-based) and the modelling communities, with the active participation of relevant stakeholder groups.** In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), the action should contribute to implementing the Transatlantic Ocean Research Alliance, the Sustaining Arctic Observation Networks (SAON) and the Cold Region Initiative of the Group on Earth Observation (GEO). It should have links to the relevant Copernicus and European Space Agency (ESA) programmes and infrastructure in order to maximise the synergies other European efforts to develop an integrated Arctic observation system. In particular, strong coordination with the on-going Horizon 2020 project which aims to develop an Integrated Atlantic Ocean Observation System [[AlantOS,www.atlantos-h2020.eu/]] should be sought and with the relevant ESFRI research infrastructures. The activity shall support and promote the integrated use of Arctic land, ocean, ice and atmosphere *in-situ* and space-based observations from Europe, the USA, Canada and other international partners. **Community-based observation programmes that draw on indigenous and local knowledge should be included and should form the basis for participatory research and capacity-building within Arctic communities. The action should ensure data interoperability through internationally recognised standardisation and quality assurance/quality control (QA/QC) processes, promote database integration and allow free and open access to all data and data products, following the GEO data sharing principles.** It should make best use of reference sites (supersites) and should contribute to filling *in-situ* observational gaps through novel technology development, with particular attention to the gaps that may help improve the accuracy of predictive models. In line with the strategy for EU international cooperation in research and innovation, actions will contribute to implementing the Transatlantic Ocean Research Alliance. Due to the specific challenge of this topic, in addition to the minimum number of participants set out in the General Annexes, proposals should benefit from the inclusion of partners from the USA and from Canada. International cooperation with partners from other Arctic and non-Arctic third countries would add further value.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 15 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction[[Beneficiaries of projects participating in the pilot on open research data are should follow the Global Earth Observation System of Systems (GEOSS) Data Sharing Principles and to register in GEOSS the geospatial data, metadata and information generated as part of the project. Further information on GEOSS can be found from: <http://www.earthobservations.org.>]].

Expected Impact:

- Increase temporal and geographic coverage and usefulness of observational data in the Arctic with a view to improving the assessment and prediction capacity of Arctic and planetary changes;
- Support standardisation and calibration/validation activities, and improve the interoperability of Arctic observational data;
- Improve the sustained integration of space-based and *in-situ* Arctic observations into process models and forecast systems showing benefit to the Copernicus monitoring services;
- Contribute to the long-term improvement of Arctic observation systems and related services;
- Integrate with existing pan-Arctic monitoring networks by building additional capacity and adding monitoring parameters to current programmes;
- Improve the cost-effectiveness of data collection in support of Arctic-related economic and societal activities;
- Lead to better-informed decisions and better-documented processes within key sectors (e.g. local communities, shipping, tourism, fishing);
- Support international assessments of global challenges such as climate change, scarcity of natural resources and global scale hazards;
- Strengthen the societal and economic role of the Arctic region and support the EU strategy for the Arctic and related maritime and environmental policies[[COM(2008) 763 of 20 November 2008; JOIN(2012) 19 of 26 June 2012]];]
- Contribute to the GEO Cold Region Initiative and to the Transatlantic Ocean Research Alliance;
- Contribute to the ongoing and possible future OSPAR actions in Arctic waters;
- Contribute to the Sustaining Arctic Observation Networks (SAON) process;
- Contribute to the WMO Programme Year of Polar Prediction (YOPP)[[<http://www.polarprediction.net/yopp.html>]].
- Improve the professional skills and competences for those working and being trained to work within this subject area.

Topic	BG-10-2016 Impact of Arctic changes on the weather and climate of the Northern Hemisphere
Key words	Open Access
Type of Action	Research and Innovation actions
Deadline	17-02-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5123-bg-10-2016.html

Specific Challenge:

The climate is changing more rapidly in the Arctic than in any other region. There is evidence that these changes strongly affect ecosystems, people and communities inside and outside of the Arctic, including in Europe and North America. A better representation of processes specific to the Arctic (e.g. related to sea-ice formation and melting) in weather and climate models is required to better constrain the role of the Arctic in the global climate system and in the generation of extreme weather events. In connection with improved observations in the Arctic (see topic BG-09), this is necessary to improve the predictability of weather and climate in the Northern Hemisphere, and of related risks.

Scope:

Proposals should develop innovative approaches to improving the descriptions and modelling of the mechanisms, processes and feedback affecting Arctic climate change and its impacts on the weather and climate of the Northern Hemisphere, to further develop state-of-the-art climate models and predictions. Model performance should be assessed, and their ability to represent the links between polar and lower latitudes should be evaluated through coordinated model experiments. Actions should also explore the potential that an improved Arctic observation system – the subject of another topic in this call – would have on the accuracy of weather, and climate forecasts in the Northern Hemisphere, including Europe and North America, and also should identify gaps in data and observations. The activities should contribute to the programme of the Year of Polar Prediction (YOPP)[[<http://www.polarprediction.net/yopp.html>]] and provide input to the improvement of short- to medium-term predictions of the Copernicus Climate Change Services (C3S)[[<http://www.copernicus-climate.eu/>]]. Proposals should include a work-package to cluster with other projects financed under this topic and if possible also under other parts of Horizon 2020, and should build on projects funded under earlier calls. Links with projects resulting from the Belmont Forum call on climate predictability [[<http://www.jpi-climate.eu/joint-actions/CPIL>]] are also welcome. Proposals should develop relevant forms of communication with the EU (and possibly national) services to adequately disseminate results that could be used for policy action. In line with the strategy for EU international cooperation in research and innovation [COM(2012)497], actions should contribute to implementing the Transatlantic Ocean Research Alliance. Due to the specific challenge of this topic, in addition to the minimum number of participants set out in the General Annexes, proposals should benefit from the inclusion of partners from the USA and from Canada. International cooperation with partners from other Arctic and non-Arctic third countries is also strongly encouraged.

The Commission considers that proposals requesting a contribution from the EU of between EUR 7 million and EUR 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction [Beneficiaries of projects participating in the pilot on open research data should follow the Global Earth Observation System of Systems (GEOSS) Data Sharing Principles and register in GEOSS the geospatial data, metadata and information generated as part of the project. Further information on GEOSS can be found at <http://www.earthobservations.org>].

Expected Impact:

The project results are expected to:

- Improve capacity to predict the weather and climate of the Northern Hemisphere, and make it possible to better forecast of extreme weather phenomena;
- Improve the capacity to respond to the impact of climatic change on the environment and human activities in the Arctic, both in the short and longer term;
- Improve the capacity of climate models to represent Arctic warming and its impact on regional and global atmospheric and oceanic circulation;
- Improve the uptake of measurements from satellites by making use of new Earth observation assets;
- Lead to optimised observation systems for various modelling applications;
- Contribute to a robust and reliable forecasting framework that can help meteorological and climate services to deliver better predictions, including at sub-seasonal and seasonal time scales;
- Improve stakeholders' capacity to adapt to climate change;
- Contribute to better servicing the economic sectors that rely on improved forecasting capacity (e.g. shipping, mining);
- Contribute to the Year of Polar Prediction (YOPP) and IPCC scientific assessments, and to the Copernicus Climate Change (C3S) services.
- Improve the professional skills and competences for those working and being trained to work within this subject area.

Topic	BG-11-2017 Climate impacts on Arctic permafrost, with a focus on coastal areas, and its socio-economic impact
Key words	Open Access, Engagement
Type of Action	Research and Innovation actions
Deadline	14-02-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5126-bg-11-2017.html

Specific Challenge:

Arctic permafrost contains twice as much carbon as the atmosphere, stored in the upper metres of the ground. Thawing of permafrost may trigger the release of this carbon and its transformation to greenhouse gases, reinforcing global warming (permafrost carbon feedback). Moreover, permafrost coasts make up 34% of the world's coasts. Increasing sea-level in combination with changing sea-ice cover and permafrost thawing expose these coastal areas to higher risks. Knowledge gaps exist in relation to the transfer of material - including organic matter - from land to sea and its fate, with the consequence that processes of accumulation and/or subsea permafrost degradation are not accounted for in global climate and Earth system models. The pressing challenge is to understand the impact of permafrost thawing on climate change and its implications for the environment, for the indigenous populations and the local communities. Finally, permafrost thawing affects the stability of built infrastructure.

Scope:

Actions should assess the impact of permafrost thawing on Arctic (natural and human) coastal systems and its effect on the availability/accessibility of resources, the stability of infrastructure, the growth of potential new economic activities, as well as on pollution and health. **The research should employ a holistic and trans-disciplinary approach and in cooperation with stakeholders. It should consider the needs of and the impacts on indigenous populations, local communities and economic actors operating in this vulnerable region in the sustainable development context.** Actions should address key processes of environmental change and develop appropriate adaptation and mitigation responses with an emphasis on permafrost at the interface between land and water.

Proposals should develop relevant forms of communication for EU (and possible national) services to adequately disseminate results that could be used for policy action. Trans-disciplinary and participatory approaches, including social sciences and humanities, in the process are considered necessary. In line with the strategy for EU international cooperation in research and innovation, actions will contribute to implementing the Transatlantic Ocean Research Alliance. Due to the specific challenge of this topic, in addition to the minimum number of participants set out in the General Annexes, proposals should benefit from the inclusion of partners from the USA and from Canada. International cooperation with partners from other Arctic and non-Arctic third countries is also strongly encouraged.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction [Beneficiaries of projects participating in the pilot on open research data should follow the Global Earth Observation System of Systems (GEOSS) Data Sharing Principles and register in GEOSS the geospatial data, metadata and information generated as part of the project. Further information on GEOSS can be found at <http://www.earthobservations.org>].

Expected Impact:

- Improve the capacity to predict the impacts of permafrost thawing, both sub-sea and on land, identify and reduce uncertainties, and quantify key processes not currently or poorly represented in predictive models;
- Develop capacity to manage risks and to take advantage of opportunities emerging from Arctic changes;
- **Promote the engagement of and interaction with residents of Arctic coastal communities and indigenous societies and develop a legacy of collaborative community involvement with scientific, economic, and societal actors and stakeholders on the development of Responsible Research and Innovation agendas that meet their concerns and expectations.**
- Contribute to the ongoing and possible future OSPAR actions in Arctic water
- Improve the professional skills and competences for those working and being trained to work within this subject area.

Topic	BG-12-2016 Towards an integrated Mediterranean Sea Observing System
Key words	Open Access, Engagement
Type of Action	Research and Innovation actions
Deadline	Two Stage 1 st stage: 17-02-2016 2 nd stage: 13-09-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5116-bg-12-2016.html

Specific Challenge:

The achievement of economic, environmental and societal sustainability of Blue Growth in the Mediterranean area requires that we understand and are able to forecast the evolution of the ecological, social and economic processes in the region. This must take into consideration the proper functioning of vulnerable marine ecosystems and sea-related economic sectors. In the Mediterranean region, several issues are specifically acute such as the vulnerability and poor resilience of ecosystems, the over-exploitation of seabed and biological resources, the severe pollution events and limited remediation actions, the drastic climate change effects, the frequent extreme events and geohazards, and the uneven protection of coastal infrastructures

and populations. The EU is committed to supporting the development of solutions to solve the above mentioned issues through several policies and international agreements such as the EU Integrated Maritime Policy (IMP), the Marine Strategy Framework Directive (MSFD), the Common Fisheries Policy (CFP), the EU neighbourhood policy, the Barcelona convention and more recently the EU BLUEMED Initiative. One of the main goals of the latter is to create an interoperable, fully integrated multiplatform observing and forecasting capacity to support the conservation of biodiversity, and to forecast and manage risks and emergencies at the coast and at sea. The implementation of these policies and conventions requires a strong knowledge base and predictive capacities that are derived from Earth observation data. These observation data are, however, still very fragmented, or are even lacking for certain areas of the Mediterranean Sea, in particular in the southern part. They are also still difficult to access, partly because of the many initiatives and systems that exist. The challenge here is to conduct the research and innovation activities that are necessary for the integration of the existing Earth observation facilities and networks in the Mediterranean Sea building on relevant initiatives such as Copernicus [www.copernicus.eu]. The Copernicus data and products, where available, should be used by the research and innovation community following the free, full and open access approach approved in the Commission Delegated Regulation (EU) No 1159/2013 of 12 July 2013. This includes the data from the Copernicus space infrastructure (Sentinel missions) and, where affordable, the Copernicus Contribution mission data, where the latter can be of use for Horizon 2020 projects developing new Copernicus Services. Applicants are advised to consult published information on the availability of Copernicus Sentinel Data, access to Copernicus Contributing Mission data at the Commission's web http://ec.europa.eu/growth/sectors/space/research/index_en.htm. Wherever possible, applicants are also encouraged to use the Earth Observation Data Warehouse (<http://copernicusdata.esa.int/web/cscda/home>), GEOSS [GEOSS – Global Earth Observation System of Systems], GOOS [GOOS – Global Ocean Observing System], EMODNet [EMODNet – European Marine Data Observation Network], ESFRI [ESFRI – European Strategy on Research Infrastructures] and in particular all those with strong links to marine and maritime issues, and national initiatives. This would fill out the existing observational gaps, and would help exploit the relevant data to build the necessary knowledge base and prediction capacities.

Scope:

The research and innovation activities to be included in the proposal should contribute to the development of an integrated observing system for the whole Mediterranean Sea building on existing facilities (remote sensing and *in-situ*) and initiatives, and addressing both the open sea and the coastal zone. **This should be based on open data and should facilitate easy access to those facilities and the data. Another focus should be on conducting the research and innovation necessary to underpin the full and open discovery and access to the ocean observations and to facilitate the interoperable exchange of ocean observation as promoted through the Group on Earth Observation (GEO) for the Mediterranean Sea.** The proposal should also address observational gaps in the Mediterranean Sea, in particular those related to the *in-situ* component of the observation system. Optimising existing systems and using new ocean observation technologies make *in-situ* ocean observation and the integration of the biological dimension into observing systems more cost-effective. The proposals should also focus on the use of *in-situ* measurements to calibrate and validate relevant remote sensing data and products, including possible new products derived from space infrastructures such as

the Sentinel and Earth Explorer missions that support the improvement and evolution of operational services in the Mediterranean Sea. The above activities should include the participation of international partners from the coastal states of the Mediterranean Sea.

In line with the objective of the EU Strategy for international cooperation in research and innovation (COM (2012) 497), proposals should contribute to implementing the Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 8 million would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction.

Expected Impact:

To contribute to the implementation of the BLUEMED Initiative's vision and its related Strategic Research and Innovation Agenda and Implementation Plan, in particular as regards the goal to develop an integrated Mediterranean observing system, proposals must:

- Provide an additional European contribution to established global observing systems e.g. Copernicus and GEOSS. Provide a Mediterranean Sea Integrated Observing system as a component for GEOSS.
- Contribute to increasing the temporal and geographic coverage of observational data in the Mediterranean Sea and identify observational gaps.
- Provide qualified data to improve the predictive capacity of model products and improve the cost effectiveness of data collection in support of ocean-related industrial and societal activities.
- Improve the knowledge base that is needed in order to cope with global challenges such as climate change, scarcity of natural resources and regional hazards; this would make it possible to make better-informed decisions within key sectors, and increase the safety of offshore activities and coastal communities.
- Improve the implementation of European maritime and environmental policies and international agreements (e.g. Marine Strategy Framework Directive, INSPIRE Directive[[INSPIRE-Infrastructure for Spatial Information in the European Community]] , Common Fisheries Policy, EU Integrated Maritime Policy, the Barcelona convention) by providing the knowledge base needed to support policy decisions towards the sustainable growth of the EU Mediterranean marine and maritime economy.
- Improve the professional skills and competences of those working and being trained to work within the blue economy.

Topic	BG-13-2016 Support to the BLUEMED Initiative: Coordination of marine and maritime research and innovation activities in the Mediterranean
Key words	Engagement, Open Access, Science Education
Type of Action	Coordination and support action
Deadline	17-02-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5120-bg-13-2016.html

Specific Challenge:

The Mediterranean Sea is going through rapid changes in response to closely interlinked natural and anthropogenic pressures. Climate change influences its physical dynamics and hydrological structure, while nutrient and pollutant loads are flowing from growing urban areas, land and coastal activities. Increasing maritime traffic also leads to safety concerns, potential pollution and the introduction of invasive alien species. Fishing remains unsustainable. The area's marine heritage and its ecosystem services are also at risk. In addition, the geo-political complexity of the area adds further difficulties related to the establishment of favourable framework conditions to support the growth of a blue economy (e.g. in trans-border cooperation on sea-related activities, including maritime spatial planning). Within this frame, coordinated and integrated action needs to be carried out by Member States individually and among Member States together in order to create synergies and complementarities between sectors and countries. This is to provide added value to regional, national and EU investments, remove barriers, avoid duplication and reduce fragmentation, and was put forward in the Vision Statement of the 'Research and Innovation Initiative for Blue Jobs and Growth in the Mediterranean Area – The BLUEMED Initiative'. This initiative and its related Strategic Research and Innovation Agenda will contribute to achieving a healthier, more productive, resilient, better known and valued Mediterranean Sea. In addition, a common marine and maritime R&I strategy needs to be further consolidated in order for it to be possible to achieve solid knowledge-based sustainable and long lasting 'Blue Growth' in the region.

Scope:

This action is expected to contribute to the implementation of 'The BLUEMED Initiative' vision with its related Strategic Research and Innovation Agenda and Implementation Plan. This calls for the further alignment and convergence of national research and innovation activities and other relevant initiatives and investments with the different actors and across different sectors *in primis* between the European countries bordering the Mediterranean Sea coasts and the whole EU. In this context, proposals should establish and consolidate an operational network of marine and maritime research funders and other key players. Proposals should support the design and implementation of new transnational joint activities, by using the most suitable and effective collaboration methods and tools. These new activities should focus on the key challenges and other relevant issues identified in the BLUEMED Strategic Research and Innovation Agenda (SRIA) and related Implementation Plan, namely support for technology development, promotion of multidisciplinary research and an innovation-enabling environment, improving human and research infrastructures and capacities, creating a fully

integrated observing and forecasting system, **promoting citizen awareness and literacy on marine issues, and improving training**. This action should build on past and ongoing regional, national and EU projects (e.g. SEASera ERA-NET, PERSEUS COCONET, ESFRI research infrastructures EMBRC, Euro-Argo, ICOS, EMSO etc.) and initiatives. **It should integrate research, policy, industry (including aquaculture) and society (including the preservation of local coastal cultures)**. It should also contribute to pooling different funding streams, at national and EU level, and combine them in an effective way. Lastly, it should create the conditions for extending the initiative to the Southern Mediterranean coastal countries. Support for related events organised under the auspices of the Presidency of the Council of the European Union should be envisaged.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 3 million and a foreseen duration of four years would allow this challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts or durations.

Projects funded under this topic will by default participate in the Pilot on Open Research Data in Horizon 2020, with the option to opt-out, as described in the introduction.

Expected Impact:

To contribute to the implementation of the BLUEMED Initiative's vision, its related Strategic Research and Innovation Agenda and Implementation Plan, proposals must:

- Make the Mediterranean Sea healthier, more productive, resilient, better known and valued.
- Boost the knowledge base and contribute to creating the right conditions for developing new technologies and services and for improving human and infrastructure capacity in the Mediterranean region.
- Boost the 'blue economy' and contribute to creating more jobs in the Mediterranean region.
- Increase the competitiveness of EU researchers, industry and SMEs within the marine and maritime sectors.
- Improve the coordination and alignment of national marine and maritime research programmes.
- Maximise the impact of national and EU-funded marine and maritime research.
- Contribute to the implementation of the EU Integrated Maritime Policy, its environmental pillar the Marine Strategy Framework Directive (MSFD), the Common Fisheries Policy (CFP) and the Communication 'Blue Growth - opportunities for marine and maritime sustainable growth'.
- Improve the professional skills and competences of those working and being trained to work within the blue economy.

3.2.3. Rural Renaissance – Fostering Innovation and Business Opportunities

Topic	RUR-01-2016 Consolidated policy framework and governance models for synergies in rural-urban linkages
Key words	Engagement, Science Education
Type of Action	Research and Innovation action
Deadline	Two Stage 1 st stage: 17-02-2016 2 nd stage: 13-09-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5105-rur-01-2016.html

Specific Challenge:

Increasing urbanisation and the transformation of rural economies and communities result in new types of rural-urban interaction and dependency, to which policies and governance approaches still have to fully adapt. Consolidated evidence is needed to assess the impact of such interaction on rural growth potential (in which there is an increasing interest worldwide) and understand, in concrete and operational terms, how linkages and dependencies between urban and rural activities affect the creation of added value and jobs. Recent studies have provided some evidence that well-functioning relationships between urban and rural areas can lead to higher growth rates in both. They may also deliver more sustainable, integrated and inclusive forms of development, building on local assets and natural resources to improve adaptation and resilience to global change. There is a need for thorough understanding and a consolidated conceptual framework is needed to tailor policy intervention at different scales so as to maximise rural job and growth creation on the basis of synergistic interaction.

Scope:

Building on the EU typology of urban and rural areas[[http://ec.europa.eu/eurostat/statistics-explained/index.php/Urban-rural_typology;http://ec.europa.eu/eurostat/statistics-explained/index.php/Urban-rural_typology_update]] and on the outcomes of previous studies on rural-urban linkages, proposals should consolidate a conceptual and policy framework adapted to the diversity of European needs, including a well-argued approach to defining functional areas. They should analyse how European rural areas interact with other (in particular, urban) areas in their region or beyond, exploring endogenous conditions that enable them to interact and quantifying the importance of these connections for the rural economy and society. Activities should involve case studies covering a diverse set of territorial contexts and scales of analysis describing practical linkages between rural and urban activities, mutual dependencies, competitive or synergistic relationships, the distribution of value-adding production steps between rural and urban areas and the institutional and policy context. **Proposals should involve participatory research identifying concrete opportunities for**

greater synergies and cooperation between urban and rural activities and communities, bottlenecks impeding synergistic development and concrete solutions to remove these bottlenecks. Activities should assess the effectiveness of a variety of existing or emerging governance approaches and instruments, including those provided by the European structural and investment funds, looking at official authorities but also at informal governance groups (e.g. local action groups). Concrete outputs could be a set of governance models and tools adapted to different types of situation. Such models should cater for better economic development as well as for modernisation of service delivery.

Activities should look at economic, environmental and social linkages and dependencies in an integrated way and examine various territorial settings, covering various forms of territorial interaction beyond city-hinterland relationships, including networks of small market towns and other types of more distant, cross-border or international interaction.

Projects should fall under the concept of the 'multi-actor approach' involving local development or economic development bodies in rural and urban areas or representatives of both rural and urban economic players. Activities should involve engagement with government bodies at the appropriate scale, and with businesses and society. **Targeted communication activities and easy-to-use policy-oriented outputs and training material will ensure maximum uptake of the results during the lifetime of the project and beyond.** Networking activities between case-study areas and other areas interested in rural-urban synergies and leading to longer-term cooperation may be envisaged. Some cooperation activities with projects financed under topic RUR-2-2017 could be included.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Results are expected to improve policies for the management of rural-urban linkages through:

- consolidation of a policy-oriented conceptual framework allowing the quantitative and qualitative description of a wide range of economic, environmental and social interactions and the definition of functional areas;
- improved understanding of functional rural-urban linkages and how these translate into varying development patterns, helping to explain growth and employment performance and sustainability;
- identification of opportunities for greater cross-sectoral cooperation and synergies; and
- provision of:
 - a set of successful and transferable governance models applicable to different types of situation and rural settings;
 - appropriate policy recommendations to enhance the development of these governance models at various scales; and
- **communication and training material to facilitate dissemination of projects outcomes and foster their uptake by a significant number of relevant authorities across Europe.**

- Better managed urban-rural relationships, improved governance and increased cross-sectoral cooperation will enable further growth and job creation in rural areas in the long term.

Topic	RUR-02-2017: Coastal-rural interactions: Enhancing synergies between land and sea-based activities
Key words	Engagement, Science Education
Type of Action	Research and Innovation action
Deadline	Two Stage 1 st stage: 14-02-2017 2 nd stage: 13-09-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5112-rur-02-2017.html

Specific Challenge:

At the interface of land and sea, coastal areas are environmentally fragile but also attractive areas with unexploited business opportunities. Land-based activities in coastal regions and even beyond, in upstream river-basins, influence the availability and quality of fresh water reaching the sea and, as a consequence, coastal and sea-based economic activities (including tourism) and the exploitation of marine resources. Equally, coastal development can have positive or negative effects on hinterland development, e.g. tourism-related pressure on land availability. Mainstream agro-environmental policies tend to fail when it comes to lowering nutrient load on the shorelines while rural economies do not always benefit from the economic development on the coast. There is a need to explore how territorial governance approaches and cross-sectoral economic development approaches could deliver mutually beneficial impacts for rural territories and coastal areas and seas which cannot be achieved in other ways, in particular as regards mitigating the impact of land-based activities on coastal water quality.

Scope:

Combining environmental, agricultural and socio-economic research, proposals will identify and analyse interactions between land (coast and hinterland) and sea, identify the various components of local economies at the interface of land and sea and analyse their respective importance and short, medium and long-term development trends taking into account market, environmental and climate forecasts. The analysis should provide an inventory of the positive and negative externalities of different activities, including the effect they have on each other, and consider whether solutions exist to mitigate negative externalities and enhance positive externalities, listing motivations and barriers to change for the types of player involved. The analysis should highlight potential cross-sectoral interactions and innovation that could emerge from greater cooperation between sea-based and land-based businesses or organisations.

The analysis should cover a representative set of coastal areas or regions across Europe varying according to size and geographical, environmental, socio-economic, institutional and administrative conditions (regional, inter-regional, macro-region, cross-border). **Interactive research approaches should be used to engage with local businesses and citizens and elaborate options for cooperation, networking and integrated governance seeking to enhance partnership.** Activities could usefully build on a review of positive (and perhaps negative) examples from different areas, including innovative business models integrating land-based and sea-based production with simultaneous benefit for the local economy, local jobs and the environment both on the coast and in the hinterland. Proposals could seek to create long-lasting relationships within and between the case study areas benchmarked by the project in order to generate knowledge exchange.

Concrete outputs would include a set of tools which could be used to foster synergistic relationships in different coastal areas of Europe, and concrete and operational governance models to be applied. The potential use of instruments provided by the European Structural and Investment funds for the period 2014-2020 should be explored. **Communication and dissemination activities should be carefully targeted and planned to reach out to all potentially interested areas beyond those participating in the consortium. Training material and coaching activities may be envisaged.** Some cooperation activities with projects financed under topic RUR-1-2016 could be included.

Proposals should fall under the concept of the 'multi-actor approach' and involve farmers groups and other land and sea-based businesses, and economic and local development bodies. Engaging with managing authorities of European structural and investment funds during the project would help increase implementation of the project outcomes.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

Results are expected to contribute to the long-term improvement of sea water quality combined with the creation of added value and jobs in coastal areas and hinterland through:

- development of a transferable set of tools and indicators allowing the quantitative and qualitative description of a wide variety of economic, environmental and social land-sea interactions, thus improving understanding of economic and social interactions in coastal areas, serving a more evidence-based policy-making at local and regional level;
- a thorough understanding of the factors (barriers and motivators) influencing behaviour and solutions to enable joint actions;
- increased potential for job and added-value creation in coastal areas thanks to the identification of new business opportunities stemming from closer cooperation between land- and sea-based economic operators; and
- reduced negative externalities from land-based activities in the regional hinterland on sea-based activities thanks to better economic cooperation and integrated governance.

The project may lead to the creation of longer-term relationships between coastal areas serving as European flagships for rural-coastal synergies and ensuring longer and wider dissemination.

Topic	RUR-03-2017: Towards 2030: Policies and decision tools for an integrated management of natural resources
Key words	Engagement
Type of Action	Research and Innovation action
Deadline	Two Stage 1 st stage: 14-02-2017 2 nd stage: 13-09-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5111-rur-03-2017.html

Specific Challenge:

Policies influencing the management and use of natural resources at national and EU levels have evolved considerably in the past decades as underpinning objectives have widened to meet societal needs (food security, environment, energy, climate change, etc.). However, this process has been fragmented and incomplete. In addition the technology and information available to decision-makers have advanced significantly in this time. To ensure sustainable management of natural resources in the long term there is a need for an integrated framework that addresses all society's objectives appropriately by incentivising actions / behaviours / investments contributing to desirable targets. Appropriate decision-support tools are needed to help implement such an integrated and systemic approach.

Scope:

Activities will take place on various geographic scales reflecting levels of policy / use relevance, from regional to EU levels. **Investigations relating to both policy and decision tools will be fully participatory so as to ensure the involvement of the society at large.** Policy development will take account of all current and expected major societal needs as regards natural resources and their use in terms of products and other types of goods, services and functions. Decision-support tools and models will help prioritise multiple resource uses (e.g. land, water) at various geographic scales (meso level and related regional strategies + national/EU level for general policies), taking advantage of existing databases and tools and what is possible on the basis of modern capabilities. Activities will cover agricultural and forestry land. While focusing on Europe, proposals are encouraged to draw on good examples from elsewhere.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

The project results are expected to:

- improve knowledge of land and water resource availability and use at various geographic scales;
- improve decision support tools for the management of land and water resources; and provide a coherent and integrated policy framework for the management of natural resources at regional / national / EU levels.

Topic	RUR-04-2016 Water farms – Improving farming and supply of drinking water
Key words	Engagement
Type of Action	Research and Innovation action
Deadline	Two Stage 1 st stage: 17-02-2016 2 nd stage: 13-09-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5107-rur-04-2016.html

Specific Challenge:

Agriculture is the biggest source of pesticides and nitrate pollution in European fresh waters [http://ec.europa.eu/eurostat/statistics-explained/index.php/Agri-environmental_indicator_-_pesticide_pollution_of_water&Agri-environmental_indicator_-_nitrate_pollution_of_water]. The quality of drinking water, which matters a lot to EU citizens, and the level and cost of treatment prior to consumption depend greatly on the quality of the ground-water and surface-water used to produce it. This is partly why the Water Framework Directive (WFD), linked to the Drinking Water Directive, puts such emphasis on the protection of ground-water and surface-water resources [http://ec.europa.eu/environment/water/water-framework/info/intro_en.htm]. The diffuse pollution of water sources from the pesticides and fertilisers used in farming systems has been addressed with varying degrees of success by current policy tools but clearly remains an obstacle to achieving the WFD objectives. Monitoring such pollution is also challenging because of the high number of registered pesticides, the cost of analyses and the need for samples to be taken during periods of application and use, and in various weather conditions. Additionally, the time dynamics of water resource systems entail a delay between action at the soil surface and reaction in the ground-water. Appropriate monitoring and decision-support tools are needed to help develop and implement governance models to preserve the quality of drinking water resources.

Scope:

Proposals will entail a variety of case studies identifying good practices in the field of drinking-water management involving improved farming systems and land-use management; these will cover a variety of pedo-climatic conditions, vulnerable zones with different types of farming systems, contrasting legal frameworks, larger and smaller water collection areas, including rural and urban areas and only rural areas with a focus on small water supplies, which face the biggest problems in the EU and globally. The effectiveness of various measures in mitigating diffuse agricultural pollution will be analysed. Work will include cost-efficiency analysis of mitigation measures and cost-benefit analysis for the society and the actors concerned of

identified preventive and curative options for the delivery of high-quality drinking water. Transition pathways from "paying for depolluting" to "rewarding farming systems delivering water quality" options shall be investigated, taking into account various temporal and spatial scaling issues. Governance models, including private spring-water companies and public water-supply bodies, will be investigated. The project will deliver improved public policy instruments and decision support for the various alternatives, including monitoring and control tools, taking into account the necessary cooperation and regional partnerships. **Proposals will develop harmonised, transparent and understandable indicators to ensure reliable and comparable data in order to involve farmers and citizens.** Proposals should fall under the concept of the 'multi-actor approach'.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

- **good cooperation between stakeholders** on pesticides, fertilisers and irrigation management practices capable of reducing point source and diffuse pollution in different contexts;
- harmonised datasets on pesticide and fertiliser contamination of the drinking-water resources;
- **greater involvement of farmers and other citizens in the monitoring of water quality;**
- water governance models that are more conducive to the adoption and long-term durability of efficient on-farm and land-use strategies; and
- integrated scientific support for relevant EU policies (e.g. Common Agricultural Policy, Water Framework Directive, sustainable use of pesticides).

Topic	RUR-05-2017 Novel public policies, business models and mechanisms for the sustainable supply of and payment for forest ecosystem services
Key words	Engagement
Type of Action	Innovation action
Deadline	14-02-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5100-rur-05-2017.html

Specific Challenge:

Regional differences with respect to the forest management systems implemented and long production cycles characterise the forestry sector in the EU. Forests generally provide for a range of goods and services, some valued by existing markets (i.e. wood and non-wood products), others not. Of the latter, some are "public goods" (i.e. they are non-excludable (everyone benefits from them) and are not subject to consumption rivalry), such as carbon sequestration and landscape, while others are "common-pool resources" (i.e. they are non-excludable goods but subject to competition in use), such as recreation or water supply. The

regulatory framework is divided into forest policies and forest-related policies (e.g. rural development, climate, biodiversity, and energy) which are not necessarily mutually reinforcing. The responsibility for forest policies ranges from EU level (monitoring, protection, land use, land use change and forestry (LULUCF) reporting, etc.) to Member State or federal state level (inventory, planning, management, etc.). If the policy or market fails – a recognised threat – the undesired outcome is suboptimal provision of ecosystem services. The sustainable provision of ecosystem services therefore requires policy coordination, and the use of novel policies, business models and mechanisms, while taking into account the production of wood and non-wood forest products. Several EU Member States, with the help of the European Commission, are currently mapping and assessing the state of forest (and other) ecosystems and their services in their respective national territories as part of the 'Mapping and Assessment of Ecosystems and their Services (MAES) exercise. There is now significant scope to capitalise on these efforts and for greater implementation of the knowledge they have generated in practice.

Scope:

Proposals should aim to develop novel public policies, business models and mechanisms to "internalise" the proven socio-economic value of forest ecosystem services ("externalities") and contribute to their sustainable supply, with proper consideration given to the multifunctional role of EU forests. Proposals should consider the holistic basket of economic, socio-cultural, recreational and environmental services, from both the supply and demand side, and the trade-offs between them. **They should aim to close the gap between academic work, associated policy recommendations, and practice on the ground, and help achieve public acceptability.** The role of active forest management, which incurs reduced income and/or higher investment, needs to be emphasised. Specifically, there is a need to develop mechanisms for the payment of ecosystem services at the appropriate level of forest management and administration. The pilot testing of the proposed mechanisms, which may combine public policy tools with business models, is encouraged. Proposals should include contributions from the social sciences and humanities, fall under the concept of the "multi-actor approach" **and seek public engagement with regard to the groups of stakeholders included in the consortia and the proposed business models/mechanisms.**

The Commission considers that proposals requesting a contribution from the EU of up to EUR 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission or selection of proposals requesting other amounts.

Expected Impact:

Proposals should show how some, or all, of the following impacts will be achieved:

Enhanced coordination in policy making together with the development of novel policies and business processes, translated into increased incentives for forest owners/administrators to sustainably supply essential ecosystem services, such as carbon sequestration, biodiversity conservation, water regulation, soil and nutrient regulation, landscape and recreation, while maintaining production of wood and non-wood forest products.

Topic	RUR-06-2016 Crop diversification systems for the delivery of food, feed, industrial products and ecosystems services: from farm benefits to value-chain organisation
Key words	Engagement
Type of Action	Innovation action
Deadline	Two Stage 1 st stage: 17-02-2016 2 nd stage: 13-09-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5106-rur-06-2016.html

Specific Challenge:

The temporal and spatial diversification of crops through rotation and associations allowing low-input agronomic practices are drivers for resource-efficient farming systems that can fulfil the need simultaneously to produce food, feed, industrial products (e.g. bioenergy, biomaterials, biochemicals) and other ecosystems services. These diversified and low-input farming systems will emerge if clear benefits to farmers and society are demonstrated and if the downstream value chains are properly organised.

Scope:

Proposals should involve field experiments of diversified cropping systems with different species, low-input agronomic practices in conventional and/or organic sectors, and locations in Europe over several years, in order to optimise the use of resources and increase overall farm yield and/or the land-equivalent ratio thanks to the synergistic effect of crop associations in time and space. Proposals should investigate crop diversification by growing different crop species on the same land in successive growing seasons (i.e. rotation) and within a growing season (i.e. multiple cropping), and growing different species in proximity in the same field (i.e. mixed, row and strip intercropping). Proposals should address all these options (rotations, multiple cropping and intercropping) using either only annual crops (scope A) or annual and perennial crops (scope B). Proposal should consider activities on improved machinery for low-input agronomic practices and harvesting. Breeding activities are excluded. Technical, economic, social and environmental evaluations of the tested diversified systems should be carried out at farm level.

The proposals should also investigate, on the basis of existing case studies, how downstream value chains and the various actors and stakeholders involved (e.g. farmers, cooperatives, logistics providers, industry, consumers) can be impacted by the diversification of cropping systems. Proposals should carry out technical, economic, social and environmental evaluations of the diversified systems at overall value chain level, on the basis of case studies, quantifying the potential for food, feed and industrial products from harvested crops and residues/co-products. Proposals should address technical, social, cultural and economic barriers (e.g. logistics, volume of markets, transparency along the chain, payment for ecosystem services) and drivers. Proposals should analyse path dependencies and lock-ins affecting the various

actors and produce roadmaps/recommendations for successful value chain organisation, with a focus on resource-efficiency along the chain.

Proposals should fall under the concept of the 'multi-actor approach' engaging relevant actors such as farmers, cooperatives, logistics providers, industry and should include public engagement targeting consumers and civil society. SME participation is encouraged. Selected projects should liaise closely together and with complementary activities funded in response to topic SFS-02-2016 on 'mixtures and associations in cropping systems' and SFS-31-2016 on 'farming for tomorrow'.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts. At least, one project in scope A and one project in scope B will be funded (above the evaluation threshold).

Expected Impact:

The expected impact of the project will be assessed on the basis of:

- higher arable land productivity, and land-equivalent ratio for intercropping systems;
- diversification and increase of farmers' revenues through access to new markets and reduced economic risk;
- lower environmental impact of diversified cropping systems with reduced use of pesticides, chemical fertilisers, energy and water;
- improved delivery of ecosystem services, including biodiversity, soil fertility, pest and disease control, groundwater and surface water quality and carbon sequestration;
- organisation of resource-efficient downstream value chains with the involvement of relevant actors and decreased use of energy along the chains;
- market provision of food, feed and industrial products from harvested crops and residues/co-products produced from diversified cropping systems; and
- increased awareness and knowledge/data exchanges among actors on the benefits of diversified cropping systems (covering different pedo-climatic conditions, using different crops) and on downstream value chain organisation across Europe.

In the long term, this action will help to increase crop diversification and biodiversity in Europe, which is an objective of the common agricultural policy. It will also contribute to the sustainable development of the bioeconomy.

Topic	RUR-07-2016 Resource-efficient and profitable industrial crops on marginal lands
Key words	Engagement
Type of Action	Research and Innovation action
Deadline	Two Stage 1 st stage: 17-02-2016 2 nd stage: 13-09-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5104-rur-07-2016.html

Specific Challenge:

Industrial crops can contribute to the diversification of farmers' income and to the supply of renewable raw materials for industrial applications fostering the bio-based economy and climate-change mitigation. To avoid land-use competition with food, it is important to promote the development of resource-efficient varieties that can grow on marginal land (i.e. areas facing natural constraints[[See JRC guidance document on "Scientific contribution on combining biophysical criteria underpinning the delineation of agricultural areas affected by specific constraints, <http://publications.jrc.ec.europa.eu/repository/bitstream/JRC92686/lbna26940enn.pdf>] such as low soil productivity or extreme climatic conditions) while generating technical and economic benefits and limiting environmental impact.

Scope:

Proposals should provide an up-to-date database of existing resource-efficient industrial crops (species and varieties) with their characteristics, needs, performance and end-use applications (e.g. fine or bulk chemicals, materials, energy). Proposals should test, validate and disseminate this tool with the involvement of end-users (e.g. farmers, industry). Proposals should map marginal land in Europe that is most suitable for industrial crops, taking account of socio-economic (e.g. accessibility) and environmental considerations (e.g. conservation of biodiversity and continuity in the provision of ecosystem services), such as EU and national mapping and assessment of ecosystems and their services. Proposals should analyse best-practice cases of industrial crop cultivation and address technical, social, cultural, environmental and economic barriers to and drivers of the use of marginal land for industrial cropping. Proposals should produce policy recommendations and best-practices guides to promote the appropriate sourcing of renewable materials from marginal land at local/regional level.

Proposals should identify the most promising industrial crop species suited to cultivation on large areas of appropriate marginal land in Europe, and plan breeding programmes and field tests to advance genetics and low-input agronomic practices, thus improving the technical, economic and environmental performance of these crops.

Proposals should fall under the concept of the 'multi-actor **approach**' **engaging relevant actors such as researchers, farmers, cooperatives, industrial players from various sectors (e.g. bioenergy, biochemical and biomaterial sectors) and civil society organisations.** SME

participation is encouraged. **Dissemination and networking activities should focus on the promotion and use of the tools and guides that are developed** (i.e. industrial crop database, mapping of most suitable marginal land, policy recommendations and guides at local/regional level).

The Commission considers that proposals requesting a contribution from the EU of up to EUR 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

This action contributes to an increased sourcing of renewable materials from marginal land with the production of low-indirect land use change (i.e. avoiding displacement of agricultural production for food and feed or of forest production), low-input and economically profitable industrial crops for farmers. Applicants will measure the expected impact of the project on the basis of:

- increased awareness and knowledge/practice exchanges among actors across Europe on growing industrial crops on marginal land with different pedo-climatic conditions, using suitable crops and appropriate agronomic practices;
- improved agronomic practices with limited input use (e.g. pesticides, chemical fertilisers, energy and water) and improved genetics of industrial crops potentially best suited to marginal land in Europe; and
- the diversification and increase of farmers' revenues through access to new markets.

In the long term, the results will foster the development of the bio-based economy and contribute to achieving energy and climate targets.

Topic	RUR-13-2017: Building a future science and education system fit to deliver to practice
Key words	Science education, Engagement
Type of Action	Research and Innovation action
Deadline	Two Stage 1 st stage: 14-02-2017 2 nd stage: 13-09-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5110-rur-13-2017.html

Specific Challenge:

Transition towards more sustainable agriculture, forestry, food and bio-based value chains, equipped to face the challenges ahead, requires a renewal and strengthening of the technical and soft skills of all concerned. Along with ensuring delivery of peer-reviewed output from practice-oriented research, this will contribute to an efficient and interactive agricultural knowledge and innovation system (AKIS).

In 2010, 71% of European farm managers were operating on the basis of practical experience only. Education levels vary greatly depending on country, farm manager's age and gender, or farm structures, and this can hamper innovation. As the proportion of farmers with secondary and tertiary education rises, education will play an increasing role in farmers' capacity to co-create and implement new techniques and practices, anticipate and adapt to legislative, policy, market and environmental changes, design innovative ways of marketing their products and take part in interactive innovation systems and networks. New production processes and new types of supply chain in the wood, food and bio-based industry sectors also create a business demand for new skills. On the science side, there may be a shortage of researchers and capacities in fields of science of crucial importance for sustainable agriculture which are under-developed or unattractive in Europe.

While basic research remains necessary, a crucial challenge is also to remove bottlenecks to the delivery of practice-oriented research to end-users. Current research evaluation systems are based mainly on scientific publications and give little incentive, appreciation or reward to scientists willing to invest in practice-oriented research. Some front-runners are engaging in new ways of rating such research activities that deserve to be assessed, applied to agriculture and may be upscaled to a wider range of research providers and funding bodies.

Scope:

Proposals will involve the production of a challenge- and foresight-based inventory of skills that will be needed in agriculture, forestry and related value chains, covering primary producers, advisors, industry, businesses and scientists. Proposals will review how current science, education and training systems in a wide and varied range of EU Member States (and possibly third countries) cater for these needs, seeking to draft roadmaps for the improvement of curricula, learning methods and long-term interaction between education, science and economic players. Particular attention should be paid to soft (e.g. entrepreneurial, intermediation and communication) skills in particular for farmers, advisors and researchers,

and technical skills related to new practices or processes and sustainability requirements in scientific fields of importance for the future. Needs should be differentiated in the light of the variety of farming systems, current trends in structural change, emerging business models in farming and subsequent value chains and geographical conditions. Proposals should analyse how education and training systems could improve, in particular by attracting more farmers and other players to engage in sufficient education and lifelong learning and by ensuring that these systems are fit for purpose and permanently updated. Piloting of new curricula and training methods in some of the participating institutions could be considered. The effectiveness of existing EU policy instruments on education and training in this area should also be assessed and improvements proposed. Proposals will take into account relevant EU initiatives to ensure potential synergies (e.g. Erasmus+, Marie Skłodowska-Curie actions, Knowledge and Innovation Community Food for Future, etc.).

Furthermore, proposals should develop an operational system for encouraging and measuring performance and reviewing outputs of interactive innovation and practice-oriented research, with a view to improving their effective delivery and the uptake of best practices from the field. They should build on front-running initiatives and assess different options currently being tested in the EU or elsewhere (e.g. the EIP-AGRI common format). Activities should deliver practical methodologies and criteria for i) measuring performance of research providers and projects with regard to their outputs for practice; and ii) translating academic knowledge into practical knowledge easily understandable by end-users. To this end, proposals should develop a peer-review system for research outputs ready-made for delivery to farmers and foresters, exploring all components required to operate such a system.

Proposals should build on the analysis to make further policy recommendations on how to develop education, training and science in the future. **Proposals should fall under the concept of the 'multi-actor approach' and be highly participatory, involving specialised education bodies, farming/forestry sector representatives and advisors from the outset of project development to maximise bottom-up elaboration and final uptake of project results.** It may be useful to involve authorities in charge of curriculum development and measuring research impact. Communication and dissemination activities should reach out far beyond the consortium to improve the uptake of research results.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 7 million allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

This action should improve the performance of science and education systems and their benefits for agricultural and forestry sectors and related industries. The following impacts are expected:

- a shared inventory of the skills needed for a transition to more competitive and sustainable agriculture and related value chains, serving as a basis for continuous and longer-term cooperation between education bodies across Europe, leading to intensified exchanges and regular updates of the inventory;

- improved technical and soft skills for farmers, foresters, advisors, industry employees and scientists, translating into better farm management, increased competitiveness, sustainability and resilience to environmental, climate and market changes;
- greater awareness of gaps in research capacities and specific fields of science of crucial importance for sustainable agriculture;
- **increased efficiency of agricultural knowledge and innovation systems in the EU thanks to i) improved linkages between education, science and economic players, ii) enhanced capacity of players to interact with one another, and iii) contribution to an institutional shift towards better recognition and rewarding of practice-oriented research;**
- **improved quality and usefulness of research outputs for the immediate use by farmers, foresters or value-chain businesses,** thanks to a peer-review system leading to an improved implementation of research results by end-users and an innovative agricultural sector; and recommendations for improved policies for education, agriculture, research and innovation at European, national and regional levels.

3.2.4. Bio-Based Innovation for Sustainable Goods and Services – Supporting the Development of a European Bioeconomy

Topic	BB-05-2017 Bio-based products: Mobilisation and mutual learning action plan
Key words	Engagement
Type of Action	Coordination and Support action
Deadline	14-02-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/6081-bb-05-2017.html

Specific Challenge:

Ensuring that research and innovation in bio-based products and processes is not only excellent, but also relevant and responsive to the needs of all actors is important, not least in ensuring the uptake of results. Surveys show that consumers and citizens in general have little awareness and knowledge of bio-based products (BBP). To improve market uptake of bio-based products, shape future research in BBP science, technology and innovation and meet the views and expectations of society, there is a need for a broad, inclusive assessment of the challenges and opportunities at hand.

Multi-actor approaches are needed to identify and address both the risks and different stakeholders' interests and aspirations, in order to maximise the benefits of new bio-based business models within society. Mobilisation of all actors along the value chain is crucial to mitigate the probability of "technology mismatches" (i.e. development of technologies without a corresponding reliable and cost-efficient feedstock supply, or which face insufficient market demand).

Scope:

The Mobilisation and Mutual Learning Action Plan (MML) should ensure the engagement of all relevant groups and tackle innovation related challenges by establishing a multi-stakeholder platform, gathering a plurality of actors with different perspectives, knowledge and experiences[[Involving a balanced representation of experts and professionals in the fields of public engagement and bio-based products in general, and more specifically researchers, civil society (CSOs) and non-governmental organisations (NGOs), scientists in the field of social sciences and humanities, industry and policy-makers.]], and maintaining open dialogue between the different stakeholders.

The objective of the platform should be the development and implementation of an Action Plan that would address the challenges of raising awareness of and engaging with the citizens on the bio-based products. Proposals have to be based on and develop the concept of Mobilisation & Mutual Learning Platforms (MML). The design of this platform and its activities should take into account and build on methods developed previously in European projects and initiatives (including consultation processes in the field of bio-based products).

The Commission considers that proposals requesting a contribution from the EU of up to EUR 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

The direct and sustainable impact of proposals will be:

- to create networks of specific target groups in order to raise citizens' awareness and understanding of bio-based products;
- to create a better framework for new bio-based market opportunities, through broad stakeholder engagement leading to responsible, reliable, and societally acceptable solutions;
- to contribute to responsible policy-making, helping to shape further research on bio-based products and improving acceptability of existing bio-based products.

3.3. Secure, clean and efficient energy

3.3.1. Energy Efficiency

Topic	EE-06-2016-2017: Engaging private consumers towards sustainable energy
Key words	Engagement, Gender
Type of Action	Coordination and Support action
Deadline	15-09-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/4095-ee-06-2016-2017.html

Specific Challenge:

Consumers should be considered at the heart of the energy system and become active market players. The future private consumer should be more aware, active, energy sufficient, as well as being a prosumer producing energy for their own consumption, where this is possible. Furthermore, in view of the rise in energy prices, consumers are spending an increasing share of their income on energy, with estimates stating that more than 50 million Europeans are affected by energy poverty [EESC (2013/C/341/05) referring to the European Fuel Poverty and Energy Efficiency project, 2009]]. Energy efficiency, energy savings and increased use of locally produced, including own produced, renewable energy are key tools in addressing fuel poverty.

In this context, **engagement actions are needed across Europe in order to achieve behavioural change towards more sustainable choices and decisions for energy. This includes increasing and understanding consumer 'apetite' for higher efficiency products.**

Although awareness on the benefits of collective consumer action in the field of EE and RES has increased in past years, such action is still hampered by a number of barriers, including financial and regulatory barriers and inconsistencies in grid integration practice. In addition, insufficient use of relevant ICT solutions and insufficient understanding of energy bills contribute to hampering the achievement of a more sustainable energy system.

Scope:

Develop and roll out tailored and effective and innovative engagement actions to motivate changes in consumers' sustainable energy behaviour that would result in reduced energy consumption in buildings, heating/cooling systems and/or appliances. The proposed actions should focus on clearly defined target groups of private consumers (individuals or collectives), using market segmentation [Market segmentation: this involves dividing a bigger target group into subgroups of consumers with common needs and priorities, and developing and implementing specific actions to target them. As an example, vulnerable consumers may be considered too wide a target group and further segmentation would be expected.]. The proposed actions should demonstrate an understanding of different types of behaviours and consider the different approaches needed to influence them. The actions should also address

the risk of "rebound effects", propose measures to counteract them, and apply current theory and practice on consumer decision making processes (e.g. effects of new technologies on energy behaviour). **All relevant stakeholders necessary for the successful implementation of the action should be involved and it is expected that relevant consumer organisations, in particular, are either directly involved or their support is clearly demonstrated in the proposal.** Where relevant for the proposed action, **gender issues should be taken into account, in particular the role gender characteristics may play in influencing consumer behaviour.** Actions should preferably cover a wide geographic area through complementary actions covering various parts of the EU.

The proposed action should cover one or more of the following:

- Empower and facilitate actions for consumers to become prosumers, or to form collective consumer groups/consumer cooperatives (addressing energy efficiency and/or renewable energy, and energy storage, where applicable, with a focus on action).
- Support clearly defined groups of vulnerable consumers in tackling fuel poverty by facilitating more sustainable energy behaviour and choices in their everyday life, without compromising comfort levels. This should also aim at achieving structural changes of national policies to specifically address fuel poverty and could include the transfer of best practices for the active engagement of vulnerable consumers.
- Facilitate wider deployment and consumer adoption of existing ICT-based solutions, for energy efficiency and information on energy consumption and costs, with a focus on action and resulting in improved understanding of ICT interfaces and information depiction (including smart metering and related systems).
- Facilitate consumer understanding of energy bills (on and off line), leading to actions allowing for a reduction in energy consumption. Such actions should ensure robust monitoring to demonstrate the effectiveness of the approach proposed,
- Create better instruments for improving consumer understanding and routing purchase decisions towards higher efficiency products, ensuring high performance in the areas important to health and wellbeing at the same level of effectiveness and with no additional relevant environmental impacts,
- Distilling policy lessons from the market insight gathered as a means to review existing, and produce better, legislation.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Proposed actions are expected to demonstrate the impacts listed below (wherever possible, use quantified indicators and targets), depending on the scope of the proposal:

- Primary energy savings triggered by the project within its duration (in GWh/year per million Euro of EU funding);

- Number of people changing their behaviour and taking informed decisions, documenting why and how changes are an effect of particular measures taken, as well in terms of the sustainability of the behavioural change;
- **Number of consumers engaged by actions aiming at improving consumer understanding and routing purchase decisions towards higher efficiency products;**
- Renewable Energy production and Investments in sustainable energy triggered by the project within its duration (*for actions on prosumers/consumers groups*, respectively in GWh/year and million Euro of investments per million Euro of EU funding);
- Policies and strategies created/adapted to include fuel poverty (*for actions on fuel poverty*, to be measured in number of citations / statements from governance bodies).

Topic	EE-07-2016-2017: Behavioural change toward energy efficiency through ICT
Key words	Engagement, Ethics, Gender
Type of Action	Coordination and Support action
Deadline	21-06-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5059-ee-07-2016-2017.html

Specific Challenge:

The objective is to demonstrate that ICT-based solutions can contribute to saving energy by motivating and supporting behavioural change of energy end-users.

The main challenges are (i) establishing cost-effectiveness, i.e. demonstrating that solutions allow a good return on investment through energy savings (ii) making energy usage data accessible to the consumer and to designated third parties (for application development or designing new business models around them) and (iii) demonstrating that energy savings can be achieved without compromising comfort levels.

Scope:

Activities are focused on the development of innovative user-friendly digital tools and applications or services making use of energy end-user generated information or captured from in-home equipment/sensors (like smart meters, communication-enabled heat metering tools, smart plugs, smart appliances and/or energy-aware products), in possible combination with intelligent controls and automation, with the purpose to significantly enhance energy efficiency by behavioural change of end-users taking informed decisions. **The solutions will focus on empowering consumers (buildings managers, buildings owners as well final users including residents, housing associations, visitors, public actors, etc.) to engage and collaborate in achieving energy savings and allowing them to explore different means and measures to manage their energy needs over the longer term.**

Proposers should integrate and validate different technological elements, each element with at least TRL 6 (please see part G of the General Annexes), combined with appropriate business models and social acceptance parameters.

Insights from social and behavioural sciences should be used to understand: (i) factors influencing consumer choices and (ii) the impact of consumer behaviour on the energy system. **Where relevant, gender, socio-economic, demographic and cultural differences should be identified and taken into account as a means of segmentation and tailoring actions to target groups.**

The proposals should respond to the following:

- The need for efficient and compact consortia, involving, as appropriate, ICT developers and providers, manufacturers of home appliances, energy experts, social sciences and humanities experts, citizens representatives, as well as utilities (DSOs or retailers), energy service companies (ESCOs) and building managers.
- The impact of indoor climatic conditions on personal health, productivity and comfort.
- The developed solutions should be deployed in a variety of building types located in at least two different climatic regions. Access to the buildings should be guaranteed, together with all relevant building information, including smart metering infrastructure.
- The proposed solutions shall be deployed and validated in real environments, clearly defined and monitored, for a period of at least 1 year, ensuring credibility and consistency of conclusions. Validation should cover business models and RoI, and should include detailed plans for sustainability and large-scale uptake beyond the project lifetime.

ICT solutions should primarily address energy efficiency, but may integrate other solutions including also indoor climate, building/home security or health monitoring. This "packaging" approach would need to demonstrate the added benefits for consumers, as well as the market potential.

Proposals should take into consideration the projects supported under the topic EE 11 of the Work Programme 2014-2015 of the H2020 Energy Challenge [CORDIS website: http://cordis.europa.eu/home_en.html].

The topic EUB-02-2017 ("Utilities: energy management at home and in buildings") in Part 5.i. Information and Communication Technologies of the Work Programme/ LEIT is also relevant and addresses similar challenges.

The proposers should explain in detail how they will address possible ethical issues like research on human participants and personal data protection.

The proposers should also explain what will happen after the end of the action of any project-related equipment deployed in buildings for the purpose of the project. Costs for the purchase of mobile devices like mobile phones, tablets as well as cost for services of internet connections are not eligible under this topic.

Proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Proposed actions are expected to demonstrate the impacts listed below (wherever possible, use quantified indicators and targets):

- Significant reduction of final energy consumption prompted by innovative ICT solutions clearly quantified and substantiated, and subsequent reduction of CO2 emissions.
- Accelerated wider deployment and adoption of user-friendly ICT solutions prompting behavioural change and energy efficiency, including plans for its sustainability after the project's life and potential/readiness for replication.
- Number of energy end-users changing their behaviour documenting why and how changes are an effect of particular measures taken, as well in terms of the sustainability of the behavioural change.

The proposals should quantify foreseen impacts, using preliminary but credible baselines and benchmarks to substantiate calculations and clearly demonstrate how the energy savings will be measured and reached.

Proposals are encouraged to take advantage of using the already developed common methodologies for calculating energy savings in public buildings and social housing[[For this purpose, an associated software tool called eeMeasure was created with the respective common methodologies for recording energy savings (<http://82.165.143.35:8080/eemeasure/> or <http://www.smartspaces.eu/news-events/news-details/article/eemeasure-calculation-of-energy-efficiency-in-buildings-web-portal-is-now-publicly-available-fo/>)

3.3.2. Competitive Low Carbon Energy

Topic	LCE-07-2016-2017: Developing the next generation technologies of renewable electricity and heating/cooling
Key words	Engagement
Type of Action	Research and Innovation action
Deadline	16-02-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2180-lce-07-2016-2017.html

Specific Challenge:

The technologies that will form the backbone of the energy system by 2030 and 2050 are still in the research and development cycle and need to be fully developed before they could fully demonstrate their potential value in our future energy system. It is crucial that these new technologies show evidence of promising developments and do not represent a risk to society.

Scope:

At least one of the following technology-specific challenges has to be addressed in 2016:

- a. **Photovoltaics:** *Developing next-generation increased efficiency high-performance crystalline silicon c-Si PV cells and modules:* c-Si technology holds a dominant share of the PV market and is expected to continue playing a central role for PV industry for some time in the future. The challenge is the development of advanced high-performance c-Si cells and modules based on novel architectures and/or processes which tackle efficiency limitations while improving cost-effectiveness[[A related activity is supported under topic NMBP 19-2016 "Advanced materials solutions and architectures for high efficiency solar energy harvesting", included in the work programme of 'Leadership in enabling and industrial technologies – Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing', in which the focus lies on the materials and materials combinations.]]. It is necessary to demonstrate device designs and fabrication processes of technologies with efficiencies higher than 25% at cell level and above 21 % at the module level and at the same time pilot manufacturing readiness at a competitive cost.
- b. **Concentrated Solar Power (CSP):** *Innovative components and configurations for CSP plants:* In spite of cost reductions in recent years, cost competitiveness remains a crucial barrier to the deployment of CSP plants. Several concepts with a potential for cost reduction are being explored. It is necessary to validate in relevant environment the feasibility of these concepts. Significant improvements with regard to one or more of the elements of a CSP plant (heat transfer fluids which can be used for direct thermal energy storage[[A related activity is supported under topic NMBP 19-2016 "Advanced materials solutions and architectures for high efficiency solar energy harvesting", included in the work programme of 'Leadership in enabling and industrial technologies – Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing', in which the focus lies on materials.]]; the solar field; high temperature receivers allowing for new cycles) are needed to reduce the cost of this technology.
- c. **Solar Heating and cooling (SHC)** [[Activities addressing this challenge contribute to the PPP on Energy-efficient Buildings.]]: *Innovative components for solar compact hybrid systems:* It is necessary to improve the cost competitiveness, performance and acceptability of solar compact hybrid systems (heating systems combining a solar system and a backup-heater), addressing developments needed in the areas of improved components, easier installation (plug and play), improved control and operation methods, compact and simplified design. Single family homes and/or multifamily homes and/or public buildings are particularly challenging targets, requiring assessing the implications for the user in terms of operation and maintenance of the system.
- d. **Wind energy:** *Advanced control of large scale wind turbines and farms:* The current progress in wind energy like larger wind turbines and farms, floating offshore wind, but also specific geographical challenges, require the development of advanced control strategies to improve efficiency and to further reduce the cost of wind energy as well as to increase the value of wind energy by improving the response to power system disturbances or electricity market conditions. While one of the primary challenges to be addressed is the development of new controls systems that treat the entire wind plant as a controls optimization problem it

is also needed to optimize energy capture for individual assets with the wind-turbine-centric controls and to develop a better understanding of the wind resources and better wind forecasting methods. The overall challenge is to design an integrated approach to advanced operation of a wind turbine and/or farm, to improve performance for new and operating wind power plants and improve control of the wind turbine and/or farm, reducing the failure rate and therefore resulting in less operation and maintenance.

e. **Ocean Energy:** *Increased performance and reliability of ocean energy subsystems:* The priority for the ocean energy sector is to increase significantly the performance, reliability and survivability (15-20 years target) of ocean-energy devices developing solutions based on alternative approaches, sub-systems and materials. An integrated research and development approach is needed to reach maximum impact for the whole sector, and to make ocean energy commercially attractive for investors. The challenge resides in an improved understanding of component failure and low reliability in current ocean-energy devices, and in the development of ocean energy devices of improved performance, contributing to reduce the cost of ocean-energy. A fundamental challenge to be addressed is the development of novel and advanced reliable prime mover (e.g. system blades, pitch and hub for TECs and device structure for WECs) and the development of novel and advanced power take-off and control systems, converting mechanical energy from prime mover into grid compliant electricity.

f. **Hydropower:** *Environmentally friendly hydropower solutions:* There is a need to improve the understanding of river ecology and the relation to river regulation. The challenge is to provide reliable knowledge based on high quality quantified data sets and suitable methods, models and devices allowing policy makers and hydropower plant designers and operators to take decisions on the ecologic compatibility of planning and operating hydropower stations. To meet the overall objective of self-sustaining fish populations, measures such as habitat improvement, nature based environmental flows, sediment management (spawning area), and fish passage facilities or their combination may be implemented. To identify the most cost-effective measures or their-combination, it is necessary to include systematic investigations on selected power stations in various Member States of different climatic and ecologic conditions, identify fish species most at risk from hydropower projects. At the scale of the power plant the establishment of the correlations between design parameters of the plants and turbines respectively the survival rates for selected, representative species are needed to create models for fish mortality which should be verified at selected stations and assessed by testing/validating suitable prototypes/devices. Obtaining these data is fundamental to enable decision makers on all levels to plan, commission and operate hydropower plants with full respect of ecological regulations band policies and to meet the Water Framework Directive requirements.

g. **Geothermal Energy:** *Shallow geothermal (low temperature) Improving borehole heat exchangers:* Cost-effectiveness and efficiency of geothermal systems for heating and cooling in individual or multiple (i.e. district heating) installations can be improved introducing new and more efficient materials. Increased efficiency of heat exchangers will bring costs down and increase the attractiveness of geothermal energy for heating and cooling applications. The challenge is to develop new materials and systems to improve the efficiency of borehole

heat exchangers by increasing the heat exchanged with the surrounding ground and water to make geothermal sources for heating and cooling more economically attractive.

h. **Combined Heat and Power:** *Development of highly-efficient, low-emission medium- and large-scale biomass-based CHP systems.* CHP has a high potential for heat and electricity production in particular for decentralised applications. However, the challenge is to increase both technology performance and resource efficiency, while reducing environmental impacts. Cost effective, robust and low emission (both CO₂ NO_x and particles) medium and large-scale industrial CHP (>1MW) with high thermal and electrical efficiency and increased high-temperature heat potential up to 600°C need to be developed allowing the use of a wider base of solid, liquid or gaseous sustainable biomass and recovered feedstock. Ash use or removal, as well as ash challenges during combustion, requires particular attention. A significant step forward in the technology efficiency together with a reduction in resource consumption and reduced emissions is needed, to deliver reduced costs, both operation and maintenance, and increased attractiveness of renewable heating.

i. **RES integration in the energy system:** *RES system support functions for the future energy system:* In a future European energy scenario with very high shares of renewables (up to 100%) in the energy mix, system support functions that are provided today by synchronous generation will need to be provided by renewable generation or procured from third parties. RES should significantly contribute to a more stable operation of the future energy system, allowing growing percentage of renewable sources to displace traditional dispatchable generation. The challenge is to define and develop system support functions or ancillary services for the contribution of different RES technologies to stable and safe energy system operations in the best technical and economic way. Development and validation of system support functions from renewables, provided at transmission and distribution grid level, is needed; there is also a need to define the most suitable pathways to include the identified functionalities needed into the different RES development roadmaps, staggering their development in parallel to the development of the network connection codes.

For 2017, at least one of the following technology-specific challenges has to be addressed:

a. **Photovoltaics:** *Developing next-generation increased-efficiency high-performance perovskite PV cells and products*[[A related activity is supported under topic NMBP 19-2016 "Advanced materials solutions and architectures for high efficiency solar energy harvesting", included in the work programme of 'Leadership in enabling and industrial technologies – Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing', in which the focus lies on the materials for a broader range of technologies.]]: Recently the power conversion efficiency of lead halide perovskite-based thin film photovoltaic devices achieved exceptional progress. Improvements in solution processing and stability, combined with the earth abundance of the constituent materials, have made the lead halide perovskites among the most promising solar cell materials. The challenge is to further develop perovskite solar cells toward their theoretical power conversion efficiency and their commercially and environmentally viable fabrication. It is necessary to demonstrate device designs and price competitive fabrication processes of technologies with sufficient stability and at least 21% efficiency at cell level.

- b. **Concentrated Solar Power (CSP):** *New cycles and innovative power blocks for CSP plants:* In spite of cost reductions in recent years, cost competitiveness remains a crucial barrier to the deployment of CSP plants. Several innovative concepts for new cycles and power blocks with a potential for lifecycle cost reduction are being explored. The challenge is to validate the feasibility of these concepts in relevant environment.
- c. **Solar Heating and cooling (SHC)**[[Can be considered contributing to the PPP Energy-efficient Buildings]]: *Development of components for residential single-family solar-active houses:* The potential of solar heating can be further exploited in residential buildings to cover a significant fraction of the heat demand. Developments are needed in the areas of improved components, innovative materials, improved control and operation methods, innovative configurations. The challenge is for solar heating to cover at least 60% of the heat demand of a single family home, while minimizing the implications for the user in terms of operation and maintenance of the system.
- d. **Wind Energy:** *Reduction of environmental impact of wind energy:* The challenge is to develop potential mitigating strategies or alternative solutions and to increase public acceptance of wind energy, thereby shortening consenting procedures, on the basis of an increased scientific understanding of the social and environmental impact of wind turbines and (clusters of) wind farms both on and off-shore (including floating) and to identify solutions for improved wind turbines/farms with less impact. Innovative mitigation actions could increase the deployment possibilities for wind energy, developing a better understanding of the impact of wind energy on the environment as there are still gaps in the knowledge which result in long consenting procedures and reduced deployment possibilities and secondly, developing innovative mitigation actions. **Cooperation with NGOs and civil society groups is essential for further investigation of the roots of resistive behaviour as engaging and involving concerned communities can facilitate addressing this specific challenge.**
- e. **Ocean Energy:** *Development of advanced ocean energy subsystems: innovative power take-off systems and control strategies:* The challenge is to improve performance of ocean energy devices and reduce the overall cost of ocean energy by means of the demonstration of innovative power take-off systems and control strategies in order to increase power capture and power conversion efficiency, to reduce cost of components in the systems and to increase power quality. For the advanced sub-system an improved understanding of their interaction with energy resource is needed. Further, new system designs and methodologies are needed to enhance reliability and performance levels, making a step change in the sector and introduce as well a certain level of standardisation.
- f. **Hydropower:** *Increasing flexibility of hydropower:* Hydropower is still amongst the largest sources of renewable energy. The challenge is however to make hydropower available in a time as short as possible independent of plant size. New technologies, generators and turbine designs need to be developed to increase ramping rates and to allow start-stop-cycles to reach up to 30 times per day depending on head and volume, while lifetime of components and respective life time prediction methods under heavy-duty operating conditions are considerably improved and at the same time avoiding adverse effects on downstream water courses. The refurbishment and simultaneous upgrading of

hydropower stations offers a huge potential to increase renewable electricity production; the challenge is to leverage the storage potential of hydropower for grid balancing on the base of new technologies, finally allowing plant operators to operate successfully in the modern power markets and to make a significant contribution to European renewable energy objectives and policies.

g. **Geothermal Energy:** Deep Geothermal (medium-high temperature): *Materials for geothermal installations:* Geothermal resources at medium-high temperature can produce at competitive costs electricity, heat or a combination of both. With the increase of the temperature the geothermal fluids become more aggressive, corrosion and scaling might occur and the efficiency and longevity of the plant components are at stake. Geothermal plant reliability must be improved. The challenge is to develop new materials and systems to increase efficiency and longevity of the installations, by securing the integrity of the well and of the equipment, with particular reference to the pumps. Reduced well losses and increased efficiency and longevity of the plant components will lower the risks associated with deep geothermal installations and increase cost-competitiveness by reducing the replacement frequency of components.

h. **Combined Heat and Power:** *Transforming renewable energy into intermediates:* Biomass and other renewable and waste carbon sources offer a far unexplored potential as storable renewable energy source in integrated systems. Improving storage characteristics of upgraded biomass and other renewable and waste carbon sources will provide a flexible element for heat and power production and for balancing the grid stability, as well as for transport applications, therefore majorly contributing to the EU 2020 energy objectives. The challenge is to develop viable processes and deliver possible economic benefits along the value chain via power-to-gas and/or power-to-liquid concepts for RHC, transport and storage applications, using hydrogen or syngas or liquid renewable carriers produced from excess electricity from PV or wind for biomass gasification or liquefaction or in biogas plants to enhance the yields of syngas or biogas as well as for waste carbon upgrading.

a. **RES integration in the energy system:** *RES system support functions for the future energy system:* In a future European energy scenario with very high shares of renewables (up to 100%) in the energy mix, system support functions that are provided today by synchronous generation will need to be provided by renewable generation or procured from third parties. RES should significantly contribute to a more stable operation of the future energy system, allowing growing percentage of renewable sources to displace traditional dispatchable generation. The challenge is to define and develop system support functions or ancillary services for the contribution of different RES technologies to stable and safe energy system operations in the best technical and economic way is needed. Proposals should propose, develop and validate system support functions from renewables, provided at transmission and distribution grid level, and include the definition of the most suitable pathways to include the identified functionalities needed into the different RES development roadmaps, staggering their development in parallel to the development of the network connection codes.

Proposals should address one or more of the technology-specific challenges described above. Combining renewables areas, when new innovative ideas could bring breakthrough, is welcome, but the proposal should have a clear focus on at least one of the technology specific challenges. The proposals should bring technology solutions to TRL 4-5 (please see part G of the General Annexes) at the end of the action.

Environment, health and safety issues shall be considered in all developments and appropriately addressed.

Proposals shall explicitly address performance and cost targets together with relevant key performance indicators, expected impacts, as well as provide for development of explicit exploitation plans.

Technical issues, synergies between technologies, regional approaches, socio-economic and environmental aspects from a life-cycle perspective (including public resistance and acceptance, business cases, pre-normative and legal issues, pollution and recycling) need to be appropriately addressed wherever relevant. As in many cases, renewable energy projects are part of complex ecosystems, **with links to broader environmental, socioeconomic and livelihood issues that are of particular relevance to local communities, multidisciplinary research designs that integrate contributions also from the social sciences and humanities are encouraged.**

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 to 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Further to what mentioned for the specific technologies, proposals focusing on the technology specific challenges a) to h) should address all the general impacts listed below:

- Reduce the technological risks for the next development stages;
- Significantly increased technology performance;
- Reducing life-cycle environmental impact;
- Nurturing the development of the industrial capacity to produce components and systems and opening of new opportunities;
- Contributing to the strengthening the European industrial technology base, thereby creating growth and jobs in Europe;
- Reducing renewable energy technologies installation time and cost and/or operational costs, hence easing the deployment of renewable energy sources within the energy mix;
- Increasing the reliability and lifetime while decreasing operation and maintenance costs, hence creating new business opportunities;
- Contributing to solving the global climate and energy challenges.

The proposals focusing on the technology-specific challenge i) in 2016 and on the technology-specific challenge j) in 2017 should address all the following impacts:

- Improving EU energy security;
- Making variable renewable electricity generation more predictable and grid friendly, thereby allowing larger amounts of variable output renewable sources in the grid;
- Bringing cohesion, coherence and strategy in the development of new renewable energy technologies;
- Contributing to solving the global climate and energy challenges.

Topic	LCE-14-2017: Demonstration of large >10MW wind turbine
Key words	Science Education, Engagement
Type of Action	Innovation action
Deadline	07-09-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2175-lce-14-2017.html

Specific Challenge:

Up-scaling projects often lead to the development of better or less expensive applications for smaller turbines.

EU-funded projects have been working on the design of 10-20 MW wind turbine concepts for some time. The challenge is to demonstrate and construct now a full scale >10MW turbine and provide proof of a significant cost reduction potential.

Scope:

The development of large scale (>10MW) turbines will have intrinsically logistical requirements regarding handling, installation, operation and maintenance, constituting a large part of the levelised cost of energy (LCOE). Improved handling (storage, loading, transport, etc.) on land, in the harbours and/or at sea, as well as improved logistics around operations and maintenance have to be taken into account in this innovation action.

TRL 7 shall be achieved at the end of project activities (please see part G of the General Annexes).

Opening the project's test sites, pilot and demonstration facilities, or research infrastructures for practice oriented education, training or knowledge exchange is encouraged. Activities to engage and involve local communities in the innovation action, to further improve social acceptance are encouraged.

The Commission considers that proposals requesting a contribution from the EU of between EUR 20 to 25 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts

Expected Impact:

This action will have a positive effect on the cost of energy and offshore wind energy will become more cost-effective. Developing cost-effective and reliable large turbines will contribute to make wind power fully competitive. In 2030 the cost of energy for offshore wind should be reduced at least by 50%. The action will also result in a more effective use of the seas and oceans, and will reduce the time needed for installation, operation and maintenance. The action should contribute to the strengthening the European industrial technology base, thereby creating growth and jobs in Europe.

Topic	LCE-21-2017: Market uptake of renewable energy technologies
Key words	Engagement
Type of Action	Coordination and Support Action
Deadline	05-01-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2168-lce-21-2017.html

Specific Challenge:

Since the adoption of RES Directive in 2009[[Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources]], most Member States have experienced significant growth in renewable energy consumption and the EU and large majority of Member States are on track towards 2020 RES targets. Considering Member States' current and planned policy initiatives, their current implementation rates and the various barriers to renewable energy development, the need for improvements for some RES technologies, like offshore wind, advanced biofuels, CSP and geothermal, however, becomes apparent.

To ensure the level of growth needed to deliver the technology deployment rates at least to the level planned in the National Renewable Energy Action plans and their necessary contribution to the 2020 RES targets. EU targets for renewable energy, and to create the appropriate business environment for EU industrial leadership in low-carbon energy technologies, a number of important market-uptake challenges need to be addressed.

Scope:

One of the following technology-specific challenges has to be addressed:

1. **Photovoltaics: Tackling the bottlenecks of high penetration levels of PV electricity into the electric power network:** PV electricity is not necessarily generated when mostly needed. Furthermore, small distributed PV systems feed into the grid possibly all at the same time challenging grid stability. To enable the effective and efficient integration of growing shares of PV power into the grid, the idea of PV producers becoming “prosumers” – both producers and consumers of energy – is gaining ground while “self-consumption” is becoming a major driver

for the installation of small distributed PV systems. To facilitate this to happen, the following sub-challenges need to be addressed:

- a. Development of solutions for innovative system-integration and power-management for households/larger buildings (in general small distributed PV systems) including storage, particularly addressing the impact of self-consumption on the operation of the grid and the value of PV electricity when aggregated and offered to the wholesale market;
 - b. Based on these solutions, elaboration of business and management models, including cost-benefit analysis and assessing economic feasibility for the European urban landscape.
2. Heat Pumps: Accelerate the penetration of heat pumps for heating and cooling purposes: Heating and cooling represents almost 50% of the final EU energy consumption and cooling demand is increasing. The cost associated with the purchase and installation of heat pumps remains an obstacle for a wider penetration on the market. In order to accelerate the penetration of heat pumps for heating and cooling purposes, proposals should address the following challenges:
- a. identification of the most promising cost reduction options for CAPEX, installation costs, and OPEX as well as development of EU wide scenarios of deployment; proposed prioritisation of R&I investments;
 - b. development of solutions for innovative system integration and integrated power management for household/industrial buildings.
3. CSP: Facilitating the supply of electricity from CSP plants in Southern Europe to Central and Northern European countries - By means of CSP Southern European countries could supply renewable electricity on demand to the entire European energy market, including Central and Northern European countries – in particular, the Renewable Energy Directive foresees cooperation mechanisms to this end to allow Member States to meet their national targets cost-efficiently. The exploitation of this possibility would greatly facilitate the market uptake of CSP, but this has not happened so far. The challenge is to identify all issues (technological, legal, economic, political, social, financial, etc.) that may constitute an obstacle to the supply of renewable electricity on demand from CSP plants to Central and Northern European countries (other than those bottlenecks related to building new physical interconnections), and to provide options for addressing them in the context of a concrete project case.
4. Wind energy: Increasing the market share of wind energy systems: One of the following specific sub-challenges need to be addressed: i) Develop spatial planning methodologies and tools for new onshore wind and repowering of old wind farms taking into account environmental and social impacts but also the adoption of the latest developments in wind energy technology; ii) Identify the bottlenecks for further deployment in Europe and the regulations which limit the adoption of technological innovation and their deployment possibilities; iii) Increase the social acceptance and support for wind energy in 'wind energy scarce regions' **using, with solid involvement of social sciences and humanities and local communities and civil society to understand best practices and to increase knowledge about social and environmental impact of wind energy.**
5. Geothermal energy: Tackling the bottlenecks of high penetration levels for geothermal energy systems: Geothermal energy suffers from a level of penetration that is limited compared to its potential and there are growing concerns regarding the environmental and the social impact of geothermal installations. The challenge is to remove environmental and

social concerns that pose barriers limiting the contribution of geothermal energy to the energy mix. The challenge is to assess the nature of public concerns and the elements that influence individual and group's perception of geothermal installations, to increase the understanding of the socio-economic dimension of geothermal energy, and to promote change in community responses to new and existing geothermal installations. Different technologies and possible technological solutions, with particular reference to reinjection of incondensable gases in deep geothermal plants, are key elements of the environmental and social impact assessment. Specific challenges related to deep and shallow geothermal energy require separate considerations. Risk management strategies and adequate technology selection, for example induced seismicity or emission reduction should be addressed, when relevant.

6. Sustainable Fuels: Facilitating the market roll-out of liquid advanced biofuels and liquid renewable alternative fuels: The challenge is to enable commercialisation of advanced biofuels to help meeting the 10% target for Renewable Energy Sources in the EU transport energy consumption by 2020 and then contribute to the EU targets of 27% share of Renewable Energy Sources in the EU energy consumption and of 40% GHG reduction by 2030. Fossil fuels and biofuels produced from starch, sugar and oil fractions of food/feed crops are excluded. Proposals shall address one or several of the following sub-challenges:

- a. Development of tools for predicting the fuel cost in relation to different supply and demand scenarios taking into account technology performance, economies of scale, feedstock costs, market demand, socio-economic aspects, etc. and including sensitivity analysis through conceptual engineering and cost estimation for the most common conversion routes;
- b. Development and implementation of innovative crop rotation schemes for the production of lignocellulosic biofuels with improved sustainability;
- c. Development of numerical tools for prediction of fuel and fuel blend properties and model validation to facilitate the certification process in the transport sector;
- d. Development of communication strategies to increase the public acceptance for advanced biofuels for the most common conversion routes;
- e. Setting up sustainable and cost-effective European biomass supply chains for the industrial production of advanced biofuels;
- f. Actions aiming at development and implementation of common standards and certification schemes for fuels at EU-level;
- g. Actions aiming at harmonization of national standards and certification schemes for fuels at a European level;
- h. Development of tools and actions for capacity building among relevant stakeholders of all steps in the advanced biofuel value chain aiming at substantially reducing biofuel costs at large scale.

Proposals should address one of the sectorial technology challenges mentioned above. The complexity of these challenges and that of the related market uptake barriers calls for multi-disciplinary research designs, which may include contributions also from the social sciences and humanities. Regional specificities, socio-economic, spatial and environmental aspects from a life-cycle perspective shall be considered. **For all actions, the consortia should involve and/or engage relevant stakeholders and market actors who are committed to adopting/implementing the results.** Where relevant, proposals should also critically evaluate the legal, institutional and political frameworks at local, national and European level and how, why and under what conditions these (could) act as a barrier or an enabling element.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 to 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

It is expected to increase the share of renewable energy in the future energy mix and to increase the share of sustainable advanced biofuels and renewable alternative fuels in the final EU transport energy consumption or facilitate those increases in the future. In addition, contribution to market understanding for possible policy and regulatory development is anticipated.

Topic	LCE-29-2017: CCS in industry, including Bio-CCS
Key words	Engagement
Type of Action	Research and Innovation action
Deadline	05-01-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2159-lce-29-2017.html

Specific Challenge:

The application of CCS to industrial sectors other than power (e.g. steel, cement, refining) is expected to deliver half of the global emissions reduction from CCS by 2050. In the near future, these industrial applications will open up new opportunities and avenues for CCS that can accelerate its deployment. Also, Bio-CCS technologies have the potential of leading to CO₂ negative emissions. Integrating CCS technology in the best possible way so as to optimise the use of energy in the capture process, minimise process efficiency losses, achieve a suitable CO₂ purity for transport and storage, and maintain the quality of the industrial end product, is a particular challenge.

Scope:

Piloting under realistic conditions is required to significantly lower the energy penalty and capture costs. Projects must include activities to explore (possibly shared) local or regional transport and storage needs and solutions.

Focus should be on progressing technologies that already reached TRL 4-5 to TRL 7 (please see part G of the General Annexes). Environmentally benign and cost-effective technologies should be pursued. Collaboration with industrial end users is essential.

In line with the strategy for EU international cooperation in research and innovation [COM(2012)497], international cooperation is encouraged, in particular with China.

Knowledge sharing with a wide range of stakeholders, as well as early and sustained engagement and involvement of concerned communities through targeted information and dissemination activities, is essential.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 4 to 9 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

The cost- and resource-effective application of CCS in industrial operations will expand the available options for CCS and provide a stepping stone to its wider deployment; the concomitant deployment of CCS both in fossil-fuel power production and in energy-intensive industries could facilitate clusters of CCS projects, thereby improving economies of scale for both CO₂ transport and storage. CCS in energy intensive industry can help ensure a competitive position for existing EU industries in a future carbon-restrained world, thus reconciling competitiveness with EU climate goals.

Topic	LCE-30-2017: Geological storage pilots
Key words	Engagement
Type of Action	Research and Innovation Action
Deadline	05-01-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2158-lce-30-2017.html

Specific Challenge:

The EU is committed to an overall reduction of greenhouse gas emissions of at least 80% by 2050. Nonetheless, fossil fuels will continue to be used in Europe's power generation as well as in other industrial processes for decades to come. Therefore, the 2050 target can only be achieved if the emissions from fossil fuel combustion in the power generation sector and energy intensive industries are eliminated from the system. This will require the application of Carbon Capture and Storage (CCS). A key challenge in the short-term for driving CCS to deployment is the development of geological storage.

Scope:

Projects should enable, under "real life" conditions, the development and demonstration of best practices for the entire storage cycle, from site characterisation to operation, including key components of CO₂ transport infrastructure, monitoring and mitigation/remediation of leakage, and including education and training. Focus should be on progressing technologies that already reached TRL 4-5 to TRL 6 (please see part G of the General Annexes).

Knowledge sharing with a wide range of stakeholders, as well as early and sustained engagement and involvement of concerned communities through targeted information and dissemination activities, is essential.

In this particular context, new types of interactions between societal actors are encouraged. Projects should identify the key drivers and influencers of public attitude, identify distorted perceptions and develop sound arguments to address them.

International cooperation is encouraged, in particular activities between EU project(s) under this topic and non-EU projects (e.g. from Australia and/or North-America).

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 9 to 16 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Demonstration of safe and environmentally sound CO₂ storage will play a key role in optimising the safe operation of storage sites and in fine-tuning regulatory issues, in promoting confidence in CO₂ storage and building public awareness of CCS. Pilot-scale demonstration projects should contribute to accelerating the development and deployment of CCS through an enhanced and effective cooperation in research and innovation between various stakeholders and Member States/Associated Countries, thereby allowing a more efficient use and stronger leverage of financial resources and promoting knowledge sharing.

Topic	LCE-31-2016-2017: Social Sciences and Humanities Support for the Energy Union
Key words	Engagement, Gender, Ethics
Type of Action	Coordination and Support action
Deadline	16-02-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2178-lce-31-2016-2017.html

Specific Challenge:

Completing the Energy Union remains one of the top priorities of the European Commission, and a critical component in Europe's transition towards the decarbonized energy system of the future. Over and above the many technological challenges that need to be overcome on the road to reaching these twin goals, **a number of cross-cutting issues need to be better understood, particularly those relating to socioeconomic, gender, sociocultural, and socio-political aspects of the energy transition.**

Addressing these cross-cutting issues is crucial to furthering social acceptability of the many changes that the energy transition implies, as well as to better understand why citizens may

resist these changes and to devise appropriate mitigating strategies or alternatives. Of particular importance in this context are the factors that drive individual and collective energy choices and energy-related behaviour, the governance frameworks in which these choices are made, and the changing roles particularly of consumers and "prosumers" in the energy system.

Scope:

Proposals should address one, or a combination, of the following issues (a comparative perspective, with case studies or data from at least three European Union Member States or Associated Countries, will be considered an advantage):

In 2016:

- Factors driving individual energy choices and energy-related behaviour (such as **values and ethics, structures of everyday practices, belief systems or social or cultural, notably gender, roles**), employing different data-gathering techniques;
- Factors driving collective energy choices and energy-related behaviour (such as social, economic, or other forms of organization or experiences with social mobilization).

In 2017:

- Socioeconomic incentive structures that encourage or discourage energy-responsible behaviour;
- **Political, institutional, and organizational frameworks that condition and structure citizen participation, including questions of inclusiveness, gender, democracy, organizational formats and business models.**

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

The proposed research will

- provide a better understanding of these factors and their interrelations with technological, regulatory, and investment-related aspects which is crucial for the further advancement of the energy transition and ultimately the success of the Energy Union.
- further the completion of the Energy Union and particularly its research and innovation pillar, as well as the continued implementation of the Strategic Energy Technology (SET) Plan and especially the Action Plan based on the Integrated Roadmap.

Topic	LCE-36-2016: Support to the energy stakeholders to contribute to the SET-Plan
Key words	Engagement
Type of Action	Coordination and Support action
Deadline	16-02-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2169-lce-36-2016.html

Specific Challenge:

Major investments in research and innovation are needed to develop and deploy the technologies needed for the transformation towards a decarbonised energy system. To address such a significant investment challenge, **it is fundamental that public and private stakeholders involved in the relevant sectors join their forces, agree on common objectives and align strategies for achieve them.**

Scope:

The European Technology Platforms bring together stakeholders from academia, industry, and civil society involved in the development of research and innovation strategies for energy technologies, and interacting with relevant public authorities of the Member States as well as the European Commission.

This topic calls for Coordination and Support Actions to assist the mission of certain of these European Technology Platforms in the field of energy in:

- contributing to the SET-Plan activities and strategy;
- helping define priorities, strategies, R&I investment decisions and programmes;
- **collaborating between stakeholders in addressing energy system integration challenges;**
- identifying technical and non-technical barriers to the delivery of innovation to the energy market;
- assisting the European Commission and Member States in defining the research programmes, financial instruments, and addressing the mentioned barriers;

In order to come to a coordinated, coherent, and efficient implementation of the objectives of the Energy Union including the 2030 Framework scenario and the 2050 Roadmap for a secure, affordable, competitive and efficient energy system.

Within the scope of this call, proposals are expected **to address the coordination of stakeholders' activities as indicated above, as well as dissemination and networking towards stakeholder**, and analysis and reporting for the purpose of monitoring and assessing progress towards research and innovation implementation plans of each sector.

Proposals shall address one of the following specific energy technology sectors:

- Photovoltaics
- Ocean energy

- Zero emission fossil fuel power plants and energy intensive industry
- Biofuels

The Commission considers that proposals requesting a contribution from the EU of around EUR 0.6 million would allow this specific challenge to be addressed appropriately for a period of 2 years (*to be confirmed*). Up to one proposal for each technology area indicated above could be funded.

Expected Impact:

It is expected that **an increased cohesion of the stakeholders involved in the sector will be reached through constructive and inclusive meetings, workshops, and conferences, and on the basis of the availability of scientifically sound, transparent and objective information for all interested parties.** Moreover, stronger cooperation between stakeholders should enable agreement on concrete priorities, on longer term strategies, barriers to innovation and on better identification of the energy integration challenges. **Increased communication between research, industry and civil society actors will facilitate exploitation of research results and hence the deployment of high-efficient and competitive low-carbon energy technologies.** This will contribute to the SET-Plan, providing it with adequate input from a wide spectrum of stakeholders, facilitating the development and implementation of its different activities on a sound basis.

3.4. Smart, green and integrated transport

3.4.1. Mobility for Growth

Topic	MG-3.5-2016: Behavioural aspects for safer transport
Key words	Engagement
Type of Action	Research and Innovation action
Deadline	Two stage 1 st stage: 20-01-2016 2 nd stage: 29-09-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2090-mg-3.5-2016.html

Specific Challenge:

To make all transport modes safer (roads, rail, waterborne and aviation), an increased understanding is needed of the behaviour of individual users (in this case drivers, riders, pilots, cyclists, pedestrians and other transport users), and of their interaction with their associated safety-related systems and services (such as on-board technologies, mobile devices and infrastructure).

The challenge is to study those key factors that influence safe transport user behaviour, both individually and collectively, **taking into account demographic factors (gender, age, socio-cultural aspects, etc.)** and societal framework conditions (changing living conditions etc.). Using the knowledge gained on the interacting parameters that define user behaviour and their combined effects, appropriate measures and systems should be developed and assessed to ensure safe user performance, to pro-actively anticipate user response and reduce the number of errors and potential accidents in the transport system.

Scope:

Proposals should address the following aspects:

—Distraction and health related factors such as: studying the parameters that influence user condition (fatigue, illness, use of drugs, medicines, alcohol, etc.); distraction caused by using on-board and mobile devices; behaviour causing unsafe conditions (e.g. switching off safety functions, extreme emotions) affecting response in pre-crash situations; assessment of the psychological condition of those in charge of vehicles/vessels; and identification and development of suitable mitigation measures.

—Social and demographic factors such as: variations in safety behaviour, socio-cultural issues, **gender**, age and disability and their impact on risk assessment and exposure of each individual or group; and identification and development of measures to address these factors and reduce their impact.

—Risk appraisal such as: development of analysis and assessment methods for factors affecting the level of risk users are willing to take, e.g. the ability to judge and manage conditions like weather, infrastructure condition and traffic levels; and development of means to reduce hazardous risk taking.

—Measures to modify transport user behaviour such as: novel enforcement and incentive schemes for high risk groups; **focused and coordinated training schemes and tools for transport users based on reliable interaction and behavioural models piloted widely across different types of traffic and geographical regions**; analysis of changes in users' behaviour from first use to familiarisation and confidence in new safety assistance systems.

Extensive knowledge on user behaviour has been developed within each transport mode, e.g. mental overload for pilots, the effect of shift rotation on train driver response time. Transfer of knowledge between transport modes and an effective deployment of multi-modal solutions are recommended, as well as the inclusion of non-traditional transport modes, such as personal mobility devices.

Active participation of SMEs is strongly encouraged.

In line with the strategy for EU international cooperation in research and innovation[[COM(2012)497]], international cooperation is encouraged, in particular with industrialised countries (i.e. US, Japan, Canada, Australia) and emerging economies (primarily China, India, Brazil). Proposals should foresee twinning with entities participating in projects funded by US DOT [United States Department of Transportation (<http://www.dot.gov/>)] to exchange knowledge and experience and exploit synergies.

The Commission considers that proposals requesting a contribution from the EU of between EUR 4 and 9 million each would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Solutions will contribute to achieving the objective of the Transport White Paper to ensure that the EU remains a world leader in the safety of all modes of transport.

Research and innovation on this topic will result in: reduction of fatal, serious and minor accidents through measures to mitigate unsafe transport user behaviour patterns; economic savings linked to the reduction of accidents; safer use of vehicles and increased awareness of other users; effective enforcement and training schemes based on reliable behavioural models; safe integration of new types of vehicle and increased usage of 'soft' modes.

Topic	MG-8.4-2017: Improving accessibility, inclusive mobility and equity: new tools and business models for public transport in prioritised areas
Key words	Gender
Type of Action	Research and Innovation action
Deadline	01-02-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2103-mg-8.4-2017.html

Specific Challenge:

Accessibility is a concept used in order to address both travel patterns, **attitudes and needs of particular social groups – e.g. gender specific needs**, unemployed persons, vulnerable to exclusion citizens such as elderly, children, disabled, etc., as well as the mobility needs and transport use characteristics of people living in different types of areas such as rural, remote or deprived urban areas. To obtain a more comprehensive view which will allow the elaboration of measures and transport systems that will improve inclusive mobility and equity, and support social innovation in this area, it is necessary to incorporate both approaches considering specific geographical factors as well as the mobility needs and capabilities of particular population groups.

Rural areas, for example, are faced with continuous challenges linked to demographic, socio-economic and mobility factors such as: declining populations characterised by more pronounced ageing; income factors; reduced number of services and economic viability of public transport schemes; longer distances and different mobility needs related to public transport. Urban peripheral, suburban and deprived urban areas on the other hand are often characterised by population groups which face acute social, demographic and economic problems which impact on their mobility and on their ability to use available transport systems on equal terms.

In this context, the main challenge of this topic is to examine whether organisational, technological (including extended use of ICT) and social innovations in public transport can lead to improved accessibility, inclusive mobility and equity in prioritised areas, by responding better to their specific needs and demographic/socio-economic characteristics.

Scope:

Proposals should address all the following aspects:

- Analysis of the characteristics of prioritised areas in terms of spatial, demographic and socio-economic characteristics and identification of the factors that influence mobility and accessibility.
- Exploring travel behaviour and social habits of the population in a disaggregated way and assessing travel demands in prioritised areas.
- Addressing mobility needs of vulnerable to exclusion population groups such as: elderly, children, youth, disabled, people in poverty etc., as well as possible limitations to the use of new transport business models (e.g. IT illiteracy of elderly or low educated persons,

pricing, etc.). **Identification of gender-related specificities in each group is strongly recommended.**

- Critical assessment of existing innovative organisational and operational frameworks aimed at delivering new mobility solutions and their impact on inclusive mobility and equity.
- Identification and/or development of new, efficient, inclusive, affordable and accessible mobility solutions and public transport models taking also advantage of IT applications (such as social media, app-oriented services, etc.).

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 3 million each would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

As described in the specific challenge, certain geographic areas (such as rural, remote and deprived urban areas) as well as population groups (such as the elderly, disabled, in poverty, etc.) are faced with particular challenges regarding their mobility needs and capabilities, to which current public transport systems do not always respond adequately.

Work under this topic is expected to contribute to:

- The identification and critical assessment of sustainable and inclusive mobility options for European citizens in prioritised areas and improve accessibility offered by public transport systems.
- The development of effective, efficient and affordable mobility solutions which respond to the specific needs of particular population groups such as the elderly, the young, the disabled, taking into consideration the gender aspect.

The elaboration of new business models for public transport, with the deployment of organisational, technological (such as IT and app-oriented services) and social innovations taking into account possible social and demographic barriers for their effective use.

3.4.2. Automated Road Transport

Topic	ART-04-2016: Safety and end-user acceptance aspects of road automation in the transition period
Key words	Gender
Type of Action	Research and Innovation action
Deadline	Two Stage 1 st stage: 20-01-2016 2 nd stage: 29-09-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2057-art-04-2016.html

Specific Challenge:

Automated vehicles will be accepted by customers and society only when they will be deemed easy-to-use and fully reliable and safe regarding the planned manoeuvres and their execution. A key challenge is to ensure safe vehicles handling with reduced driver attention. Especially for level 3 automated driving systems an effective interaction between the driver and the automated vehicle plays an important role. To act in harmony with driver expectations, these systems should be engineered following a user-centric approach. User acceptance is particularly important for the design of, driver interfaces that will facilitate the transitions between human and automated driving. Moreover, the automated driving systems should be resilient to both system and driver failures and guarantee sufficient reliability and robustness in each and every situation in real world traffic. The introduction of automated vehicles into the existing traffic poses specific issues regarding safety, in particular during the transition period where there will be interactions with other vehicles (of any degree of automation or none) and other traffic participants such as pedestrians or cyclists.

Scope:

Proposals for research and innovation activities should address one or several of the following domains:

- Analyse user requirements, expectations and concerns (e.g. interaction with the system, trust, liability, privacy concerns, security, minimum safety and performance standards, etc.) related to the use of automated driving systems.
- Design safe human-machine interface and driver monitoring strategies to maximise the intuitiveness and situation awareness; enable safe and appropriate driver take over strategies; monitor drivers' behaviour, predict drivers' actions, and increase drivers' acceptance.
- Safety of automated driving in mixed traffic situations. Develop fail-safe/fault tolerant systems and solutions for highly reliable and safe operations of automated vehicles in any kind of complex and mixed traffic situations in the transition period, also including safe interactions with all different road users and difficult weather conditions.

Gender issues are particularly relevant and disaggregated data collection and analysis is strongly recommended.

In line with the Union's strategy for international cooperation in research and innovation[[COM(2012)497]], international cooperation is encouraged. In particular, proposals should foresee twinning with entities participating in projects funded by US DOT[[United States Department of Transportation.]] to exchange knowledge and experience and exploit synergies.

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 to 6 million each would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Actions are expected to develop safe automated driving systems which are fully in line with user expectations, easy-to-use and allow an effective interaction between the driver and the automated vehicle. These automated driving systems will be resilient to both system and driver failures and guarantee sufficient reliability and robustness in mixed traffic situations. Actions will provide significant contributions in the following areas:

- Reducing the number of accidents caused by human errors, such as inattention and distraction. Research will therefore help to achieve the European policy objective of halving road deaths by 2020, and, in the longer term, the Transport White Paper "Vision Zero" objective by preventing road accidents caused by human errors.
- Maintaining the leadership position in developing user-centric, safe and reliable vehicle automation systems by the European vehicle manufacturers and their suppliers.
- Proper validation procedures for automated driving systems to assess and test functional safety and performance.
- Integrating user requirements, expectations and concerns related to the use of automated driving systems.

3.5. Climate action, environment, resource efficiency and raw materials

Topic	SC5-01-2016-2017: Exploiting the added value of climate services - demonstration of climate services
Key words	Gender
Type of Action	Innovation action Research and Innovation Action
Deadline	Innovation Action: Two Stage 1 st stage: 08-03-2016 2 nd stage: 06-09-2016
Link	Research and Innovation Action: 07-03-2017 http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2190-sc5-01-2016-2017.html

Specific Challenge:

Responding to the climate change challenge requires climate-informed decision-making at all levels. The challenge is to minimise risks and costs and to seize opportunities.

Climate services (see introduction to this section of the call for a definition) have the potential to build the intelligence behind this transition, through the transformation of the wealth of data, information, model output and related methodologies into customised services and products that mainstream climate change into decisions and actions at all levels.

Bringing climate services to the market requires serving the demand of end-users and developing the business interface between suppliers and users of climate services.

The specific challenge of this action lies in the development of climate services concepts that are ready to be used, or show potential for future deployment, demonstrating the added value of using climate information and services by end-users in their operational decision-making.

Scope:

Proposals should address only one of the following:

a) Demonstration of climate services (2016 – Innovation Action – IA): In order to measure the added value of climate services for end-users, they must be 'user-centric'. As such, climate services need to be co-designed and co-developed through close collaboration of suppliers/purveyors and users. This action will support the user-driven demonstration of climate services in sectors or business networks in which their deployment can already take place at the current state of knowledge, or with limited incremental efforts. Proposals therefore need to prove the maturity and sustainability of the concept, while also addressing the replicability and marketability of the proposed services.

The action funded must respond to a formulated need for climate services by end-users that are served by climate service suppliers or business intermediaries; the demonstration project must be co-designed and co-developed with these end-users. The core of the action should be the demonstration of climate services in relation to issues where climate-related intelligence can support tangible decision-making processes in the public or private domain.

Actions with the main objective of developing supply-driven methodologies, assessing knowledge gaps or pure networking activities will not be funded.

The added value of the climate service provided has to be measurable and should be validated by the end-users collaborating in the demonstration projects. **The projects should communicate the added value of the services to other relevant end-user communities that must be specified in the proposal. If relevant, gender aspects in relation to the services may be addressed.** The action should also adequately address the barriers which currently hamper the full deployment of climate services in the given area and solutions to tackle these.

Given the focus on demonstrating the added value of a proven concept, the projects should be capable of delivering final results in a relatively short time period (typically within a project duration of two to three years). The funded action for climate services may be part of a larger development (e.g. infrastructure, wind farm) that is funded by additional or follow-up resources, be it private or public. One example is the relevant regional/national schemes under the European Structural and Investment Funds (ESIF), in particular under the European Regional Development Fund (ERDF), or other relevant funds such as the Instrument for Pre-accession Assistance (IPA II). Please note, however, that reference to such additional or follow-up funding will not lead automatically to a higher score in the evaluation of the proposal.

The response to the Call for Ideas launched by the Commission in December 2014 showed a wide range of demonstration possibilities with estimated budgets between EUR 0.8 million to EUR 5 million. Based on this outcome, the Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

b) From climate service concepts to piloting and proof-of-concept (2017 – Research and Innovation Action – RIA):

This action addresses areas where climate services show potential for being developed. Increasing the added value of climate services relies on matching the demand for services and the competences in the field. However, the availability of data, information and services does not always correspond to users' needs. **Within a co-designed process, there is a need to develop future applications in the most promising fields and to mobilise end-user communities where demonstration projects are not yet feasible.** This action should co-design (involving both suppliers/purveyors and users) pilot applications that support the proof-of-concept phase of climate services with high added-value in potential markets. The action should create case studies to address methodological issues, develop the user/provider interface, and test the relevance of climate services with a view to co-designing demonstration projects with the end-users at a later stage.

This action focuses on broad areas of application with a European or global scope. Proposals should take into account and where possible build upon activities addressed by other initiatives such as the ERA-NET Cofund action on climate services opened in the Horizon 2020 Societal Challenge 5 call of 2015.

Actions should foresee activities to cluster with other projects financed under this topic and – if possible – also under other parts of Horizon 2020.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

a) The project results are expected to contribute to:

- facilitating rapid deployment and market uptake of climate services by demonstrating their added value;
- providing added-value for the decision-making process addressed by the project, in terms of effectiveness, value creation, optimised opportunities and minimised risks;
- increasing the provision of climate services with added value to the end-users;
- fostering market uptake of climate services;
- offering concrete solutions to overcome barriers hampering deployment of climate services in the specific area of application.

b) The project results are expected to contribute to:

- providing added-value for the decision-making process addressed by the project, in terms of effectiveness, value creation, optimised opportunities and minimised risk;
- enhancing the potential for market uptake of climate services demonstrated by addressing the added value;
- ensuring the replicability of the methodological frameworks for value added climate services in potential end-user markets;
- promoting a better informed and connected end-user community.

Topic	SC5-03-2016: Climate services market research
Key words	Engagement
Type of Action	Research and Innovation action
Deadline	08-03-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2200-sc5-03-2016.html

Specific Challenge:

Climate services are a specialised field, but have the potential to evolve into a promising market, able to scale up the cost-effectiveness of climate change adaptation and mitigation in Europe and beyond. To enable the growth of the climate services market, there is a need to better understand the nature and scope of both the demand and supply sides, and to assess constraints and opportunities, so as to identify the untapped potentials and enabling conditions for market development in Europe.

Scope:

Actions should address one of the following:

a) Defining the European and international climate service market characteristics and foresight into market growth: Proposals should develop a comprehensive analysis of users, their needs, constraints and capabilities, and a systematic assessment of European climate services providers/purveyors – operating at national, European and international levels – together with their business models and services provided. Based on this, the potential for market development should be assessed. **This covers assessing the potential of including climate services in the decision-making process of perspective users (public administrations, business, individuals); translating users' needs into the required services, access and capabilities; assessing the divide between users' needs/perceived market potentials and services supplied, and identifying service and innovation gaps and responses.**

b) Climate services market barriers and enabling conditions: Proposals should assess the constraints and enablers – of scientific, technical, legal and socioeconomic nature – for the uptake of climate services and the growth of the market, leading to identification of gaps and responses. Proposals should develop a comprehensive analysis including: the assessment of policy environments and supportive frameworks (e.g. incentives, voluntary schemes, and standards); the assessment of the implications of competition and synergies among different provision modes (public/private, EU/national/local level); the analysis of ethical, legal and intellectual property implications of provision and use of climate services, including the assessment of criteria and protocols for quality assurance and quality control.

For both, based on appropriate surveys and analysis of case studies, proposals should develop best practices and recommendations for both climate services providers/purveyors and policy makers, with a view to growing the market and enhancing users' access to quality services.

Adequate involvement of, and outreach to, relevant stakeholders and multiplier organisations, as well as feedback and linkages to the relevant platforms and research and innovation actions in the field should be ensured. The topic calls for a strong trans-disciplinary approach. The participation of partners with a sound track record in market research is expected.

Projects with duration of maximum 2 years will be financed.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 1.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

The project results are expected to contribute to:

- enhanced access to climate services;
- greater reliability of climate services;
- better relevance and use of climate services for and by user organisations, through a supportive environment for business and the development of existing and creation of new markets, building market share;
- the development of a new generation of highly-customised climate services, tailored for users' needs;
- strengthening and broadening the use of climate services to new sectors/users.

Topic	SC5-06-2016-2017: Pathways towards the decarbonisation and resilience of the European economy in the timeframe 2030-2050 and beyond
Key words	Engagement
Type of Action	Research and Innovation action
Deadline	08-03-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2201-sc5-06-2016-2017.html

Specific Challenge:

In the broad spectrum of the feasible decarbonisation pathways, the challenge for political and economic decision-makers is to weigh uncertain impact chains against potentially devastating damage, immediate and medium-term engagement against long-term benefits, and the need for global mitigation efforts against differences in economic and political outlook on the international scene. It is therefore imperative to build a comprehensive evidence-based framework for research, business, investment and policy decision making which is able to assess the socio-economic implications of and incentives for medium- to long-term decarbonisation pathways (including their associated costs, benefit and risks), the challenges

of planning medium- to long-term technological transitions, the adequacy of future global commitments for achieving long-term climate goals as well as the risks and costs of climate change. **This action should be built around the co-design of pathways and scenarios with economic and societal actors and address relevant cross-sectorial perspectives of the decarbonisation of the European economy.**

Scope:

Trans-disciplinary approaches, including social sciences, are considered necessary to address this specific challenge.

Projects should also foresee activities to cluster with other projects financed under this topic and – if possible – also under other parts of Horizon 2020.

Proposals should address one of the following:

a) Managing technology transition (2016): The decarbonisation of European society will require a series of gradual or rapid technology changes in different sectors such as power generation, transport, industry, agriculture, and residential energy use. The massive deployment of new or existing low-carbon and smart technologies within a relatively short time represents an enormous challenge for innovators, regulators and investors, as well as for users and citizens. Proposals should explore and address the challenges of planning technological transition ahead of time and prioritising within and between different sectors in Europe so as to support stringent mitigation policies, taking into account among other aspects the inertia in innovation systems and lock-in effects. Special emphasis should be given to non-technological factors and drivers and innovative solutions influencing the development and deployment of low-carbon and smart technologies within the transformational requirements of the deep decarbonisation pathways for the timeframe 2030-2050 and beyond.

Proposals should also explore the inter-linkages between large-scale deployment of low-carbon technologies and intra-EU and international trade, energy security, job creation and the competitiveness of the European economy, as well as the necessary policy interactions across different governance levels (EU, national and sub-national). In addition, proposals should address the socio-economic and environmental implications of deep decarbonisation, including the consequences for supply chains and production of goods (e.g. agriculture, industry, feedstock, raw material availability) and the impacts on various social groups (including gender aspects). Proposals should also identify necessary changes in investment patterns, financial mechanisms and regulatory incentives in order to achieve sustainable growth, job creation and ambitious low-carbon goals.

Proposals should provide a research and innovation framework which allows the co-design of pathways and scenarios with key economic and societal actors and addresses relevant cross-sectorial perspectives of the decarbonisation of the European economy.

The Commission considers that proposals requesting a contribution from the EU of between EUR 4 million and EUR 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

b) Assessment of the global mitigation efforts in the perspective of the long-term climate goal (2016): The Parties of the United Nations Framework Convention on Climate Change (UNFCCC) agreed to limit the rise of global mean temperature to 2°C compared to pre-industrial levels, in order to prevent dangerous anthropogenic (i.e. human-caused) interference with the climate system. The 21st Conference of Parties of the UNFCCC, known as COP21, which will be held in December 2015 in Paris, will mark a milestone in the course of international efforts to engage on global climate action consistent with the 2°C target.

Proposals should analyse the adequacy of the outcomes of COP21 and the pledges of major emitting countries in view of the long-term climate goal. Proposals should also address the available pathways and necessary level of actions that will be needed to be on track with the objective of limiting temperature increase to below 2°C. Furthermore, proposals should analyse the implications and opportunities emerging from the UNFCCC negotiations on European decarbonisation and broader objectives, particularly in view of industrial competitiveness, green growth, international trade, energy security, public finance and cross-border capital flows.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged, in particular with countries that substantially contribute to global greenhouse gas emissions. Proposals should include partners from (non-European) high-, middle- and/or low-income countries.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 million and EUR 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

c) The risks and costs of climate change for Europe (2017): Climate change can induce large – or eventually extremely large – environmental and socio-economic damage. Defining and assessing complex impact chains under different climate change scenarios – from unmitigated to effectively mitigated – including macro-economic consequences (such as impact on growth and welfare) as well as non-market damage constitute a prerequisite of policy-making. In this constantly evolving research area, efforts must continue to further develop modelling tools and formulate more detailed and downscaled projections associated with the possible consequences of climate change, also taking into account climate tipping points and low-probability, high-impact events. Proposals should build on the latest results of climate science, with special regard to the IPCC's 5th Assessment Report and also relevant European projects [For example the PESETA II project (<http://peseta.jrc.ec.europa.eu/>)], and contribute to the evolution of methodologies in physical science, risk assessment and economics. Improved methodologies should then be applied to the analysis of possible impact chains, as well as to the economic valuation of climate action (mitigation and adaptation) in the EU at various levels (regions, countries, economic sectors) over medium to longer-term timeframes. Proposals should focus their analysis on Europe, but take into consideration the global context of climate change.

The Commission considers that proposals requesting a contribution from the EU of between EUR 4 million and EUR 5 million would allow this specific challenge to be addressed

appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Project results are expected to contribute to:

a)

- fostering the design and implementation of cost-effective medium to long-term technological transitions, consistent with decarbonisation pathways and economic development in Europe and beyond;
- providing a medium to long-term vision on low carbon technological development and deployment in Europe, within the context of a global economy;
- fostering greater transparency of models, methods and tools;
- contributions to major international scientific assessments (e.g. IPCC);
- enhancing the science-decision making interface, through co-creation/co-design with economic and societal stakeholders;

b)

- providing a thorough analysis of the adequateness, potential and barriers of international mitigation efforts in the perspective of the long-term climate target, and their repercussions for EU goals and policies;
- identifying most pressing areas for policy action at European or national/regional level;
- contributions to major international scientific assessments (e.g. IPCC);
- enhanced scientific cooperation with third countries;

c)

- providing more accurate and downscaled economic valuation of climate-induced impacts and risks in Europe;
- decreased uncertainties concerning the economic valuation of climate action in the EU, over the longer term (2050 and beyond);
- fostering greater transparency of models, methods and tools;
- contributions to major international scientific assessments (e.g. IPCC).

Topic	SC5-08-2017: Large-scale demonstrators on nature-based solutions for hydro-meteorological risk reduction
Key words	Engagement, Open Access
Type of Action	Innovation action
Deadline	Two Stage 1 st stage: 07-03-2017 2 nd stage: 05-09-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2188-sc5-08-2017.html

Specific Challenge:

Economic damage costs from extreme hydro-meteorological events (such as floods, droughts, storm surges, landslides) are increasing throughout Europe. Further investment in traditional, engineering solutions for risk prevention is no longer possible in several cases, due to the very high costs, and to the limited flexibility offered by such solutions to cope with extreme events for which changes in frequency, intensity and distribution may be expected due to climate change. Nature-based solutions can be flexible, multi-beneficial alternatives to traditional engineering, but adequate proof-of-concept for their upscaling and replication is lacking.

Scope:

Via large-scale demonstration, projects should aim to:

- develop, demonstrate and deploy innovative systemic and yet locally attuned nature-based solutions, including green and blue infrastructure and ecosystem-based management approaches, in rural and natural areas, including particularly sensitive ones such as mountainous and coastal areas, for hydro-meteorological risk reduction at watershed/landscape scale. **Solutions should be incorporated in an integrated design concept for land management and planning and be co-designed and co-deployed in a trans-disciplinary multi-stakeholder and participatory context with due consideration to and integration of social and cultural aspects and climate change effects;**
- develop a comprehensive framework for the comparison of green and blue/grey/hybrid hydro-meteorological risk prevention and reduction solutions, taking into account wider land use and adaptation to the effects of climate change, **considering impacts on landscape, local communities and cultural acceptance** as well as co-benefits such as biodiversity conservation/enhancement, more sustainable local livelihoods, human health and well-being, climate change mitigation, etc.;
- identify and assess barriers related to their social and cultural acceptance and policy regulatory frameworks and propose ways to overcome them;
- develop methodologies, tools and best practices enabling the replication and up-scaling of nature-based solutions in different contexts, including replication of innovative investment strategies, governance and business models, as well as performance assessment tools, protocols and standards for the design, operation and maintenance of these solutions;

- provide a consolidated evidence-base on co-development processes, performance standards, cost-effectiveness, operational requirements, life cycle costs and the multiple benefits of nature-based solutions as economically, socially, culturally and environmentally viable alternatives for hydro-meteorological risk reduction and climate change adaptation at watershed/landscape level, also considering the potential and limits of the solutions under different circumstances and conditions;
- **establish long-term sustainable data platforms considering existing initiatives and alternative options, such as pan-European web-based repositories, securing open, consistent data and performance measurements and interoperability of data infrastructures to ensure effective communication, public consultation, exchange of practices and sharing of experiences and a continuous building up of the 'knowledge portfolio' in the longer term (i.e. following project completion).**

Proposals shall address all of the above points.

The contribution of social sciences and humanities to these processes is considered necessary. Projects should envisage resources for clustering with other projects funded under this topic, under topic SC5-10-2016, and relevant topics on sustainable cities through nature-based solutions funded under the 'Smart and Sustainable Cities' call in part 17 of this Work Programme.

Because of the substantial investments that might be necessary for implementing the nature-based solutions, additional or follow-up funding (private or public) should be sought, including from relevant regional/national schemes under the European Structural and Investment Funds (ESIF), in particular under the European Regional Development Fund (ERDF), or other relevant funds such as the Instrument for Pre-accession Assistance (IPA II). To this end, projects could seek contact with ERDF/IPA managing authorities and with the authorities who developed the Research and Innovation Smart Specialisation Strategies (RIS3). Please note, however, that reference to such additional or follow-up funding will not lead automatically to a higher score in the evaluation of the proposal.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), cooperation and synergies with similar international demonstration activities on nature-based solutions for hydro-meteorological risk reduction and climate change adaptation, funded under different financial arrangements or programmes, is encouraged to facilitate mutual learning, sharing of experience, networking and follow-up. The project proposals could already indicate which interested regions/countries or other partners have been pre-identified for contact during the project.

The Commission considers that proposals requesting a contribution from the EU of at least EUR 12 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Projects are expected to contribute to:

- the EU being recognised as a leader in nature-based solutions for hydro-meteorological risk reduction and climate change adaptation and thus enhancement of territorial, socio-economic and ecological resilience and coherence;
- **the mainstreaming of nature-based solutions in land use planning, landscaping and territorial policies due to the provision of appropriate tools and best practices to assist decision makers, designers, competent authorities, planners, practitioners, enterprises, citizens and other stakeholders in reducing hydro-meteorological risks and in climate change adaptation;**
- development of an integrated EU-wide evidence base and a European reference framework on nature-based solutions and the stimulation of a new culture for 'land use planning' that links the reduction of risks with local and regional sustainable development objectives;
- enhanced market demand for nature-based solutions for hydro-meteorological risk reduction and climate change adaptation, due to the availability of protocols and standards for their design, operation, maintenance, performance monitoring and measuring of their broader economic, societal and environmental benefits;
- improved disaster risk management, due to enhanced capacity for providing quantitative assessments of nature-based solutions for disaster risk reduction and climate change adaptation;
- reduced human and financial costs due to better and more flexible disaster risk management with nature-based solutions;
- enhanced implementation of EU policies for disaster risk prevention and reduction, for climate change adaptation[[An EU Strategy on adaptation to climate change, COM (2013) 216.]], for Green Infrastructure[[An EU-wide strategy on Green Infrastructure: Enhancing Europe's Natural Capital, COM(2013)249]], and for water management (Water Framework Directive, Floods Directive, Blueprint to safeguard Europe's water resources), as well as of international frameworks, such as the Sendai Framework for Disaster Risk Reduction 2015-2030. Contribution to the priorities of the EIP Water.

Topic	SC5-09-2016: Operationalising insurance value of ecosystems
Key words	Engagement
Type of Action	Research and Innovation action
Deadline	08-03-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2208-sc5-09-2016.html

Specific Challenge:

There is an increasing trend worldwide in the occurrence and severity of disasters. This trend will be further aggravated by global changes, including environmental and climate change ones. As a result, individual households, industry, private investors and public authorities are finding themselves increasingly exposed to changing and multiple risks. Ecosystems, through the provision of their services, can provide more holistic solutions to disaster risk reduction and to the mitigation of the effects of climate change, while serving multiple purposes. For instance, they can simultaneously mitigate the impacts of hazards, enhance social, economic and environmental resilience, and reduce the exposure and vulnerability of communities, businesses, properties and other economic assets.

To promote the uptake of ecosystem-based approaches for disaster risk reduction and climate change adaptation,, the theoretical and empirical exploration of the concept of insurance value of the ecosystems – the value of the sustained capacity of ecosystems to reduce or eliminate risks to human society and economic activities caused by global change or natural hazards – and methodologies for operationalizing the concept are needed.

The insurance value of ecosystems comprises both an estimate of reduced risk, due to the physical presence of an ecosystem, and of the capacity to sustain risk reduction (resilience of the system) under global change. The insurance value of ecosystems has so far been overlooked in research and practice: e.g. socio-economic approaches to estimating insurance value are poorly developed, methodologies for quantifying and qualifying the insurance value of ecosystems are still in their infancy, and relevant institutional and economic incentives to protect, enhance or restore this insurance potential are lacking.

Nature-based solutions, by means of their proper insurance capacity, can provide cost-effective solutions for disaster risk management and reduction, and for climate change adaptation, but can also be used for the protection, restoration and conservation of ecosystems and thus enhance the insurance value of the latter.

Scope:

There is need for trans-disciplinary research on the insurance value of ecosystems, also involving legal, economic and financial expertise, to derive relevant quantitative assessments and propose ways through which such concepts can be practically used, for instance to provide incentives for promoting nature-based solutions in risk management and climate change adaptation agendas. **Trans-disciplinary and participatory approaches including natural and social sciences and humanities are therefore considered necessary.**

Actions should assess the potential of the insurance value of ecosystems and operationalize it in the design, development and implementation of risk reduction strategies. Proposals should aim to:

- develop methodologies and conceptual frameworks for assessing and monetising the insurance value of ecosystems and to integrate this into disaster risk management and climate change adaptation agendas. Analyse the qualitative and quantitative components and features of ecosystems needed to sustain the insurance capacity of ecosystems, including in urban areas. Provide evidence of the effectiveness of preventing further (ecosystem) degradation and of implementing nature-based solutions to protect, enhance and restore the insurance value of ecosystems, and for the potential of scaling-up from local to regional or other larger geographic scales;
- **establish truly comprehensive participatory processes that engage all relevant stakeholders, e.g. individuals, industry, private investors, financial institutions and insurance companies and/or public authorities, in the evaluation, development and implementation of the insurance value of ecosystems taking account of the cultural dimension of the insurance value of ecosystems and people's perceptions of risks and insurance;**
- develop and validate reliable and evidence-based methodologies to quantify short-term and long-term costs, benefits and co-benefits, at different scenarios, of increasing insurance capacity of ecosystems;
- provide EU standardised data, methodologies and models for quantifying insurance value by translating risk reduction and adaptive capacity into (monetary and non-monetary) value for different actors;
- develop and validate innovative financial frameworks and incentives and recommend changes to legal and/or regulatory frameworks for maintaining and/or enhancing the insurance capacity of ecosystems.

Proposals shall address all of the above points. Projects should foresee activities to cluster with other projects financed under this part of the call, and relevant topics on sustainable cities through nature-based solutions funded under the 'Smart and Sustainable Cities' call in part 17 of this Work Programme.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Projects are expected to contribute to:

- providing a robust scientific underpinning on the quantification, qualification and valuation of the insurance value of ecosystems to enable its full operationalization;
- integrating ecosystems insurance value into conventional insurance policies, leading to lower premiums for land and property insurance policies and decreased public costs for risk management and reduction;

- developing new public and private sector insurance models for resilience;
- increased participation and commitment of insurance companies to maintain or enhance the insurance capacity of ecosystems through innovative business models;
- increased deployment of multi-purpose and flexible, nature-based solutions by contributing to the development of policies that maintain or enhance the insurance capacity of ecosystems
- creating new business models that involve insurance companies in restoration activities;
- enhanced natural capital;
- creating business opportunities and a market for the preservation, restoration and protection of ecosystems and natural capital;
- supporting the objectives of the EU Adaptation Strategy[[An EU Strategy on adaptation to climate change, COM (2013) 216.]], particularly concerning the promotion of climate resilient investments and decision-making in the public and private sectors and the priorities of other EU and international policies, such as the EU Green Infrastructure Strategy and the Sendai Framework for Disaster Risk Reduction, where this is relevant.

Topic	SC5-11-2016: Supporting international cooperation activities on water
Key words	Engagement
Type of Action	Coordination and Support Action
Deadline	08-03-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2213-sc5-11-2016.html

Specific Challenge:

The outreach and opening of the Water JPI to third country partners is increasingly raising interest among the latter. Building on this momentum, the challenge is to further enhance the opening of the Water JPI to international cooperation and thus contribute to creating a coherent European Research Area that is open to international cooperation in the area of water – a global research and innovation challenge *par excellence*. In addition, it is foreseen that this topic would consolidate the alignment of national, EU and international water research and innovation programmes, which is one of the key objectives of Joint Programming Initiatives. Finally, there is a need to support the post-2015 global goal for water, building on related international activities taking place at United Nations level.

Scope:

Proposals should aim to create a framework and permanent dialogue to encourage the opening in a structured and strategic manner of the Water JPI to international cooperation with key international water research and innovation programmes and funding and investment institutions. Proposals should also investigate activities to align with and support the post-2015 sustainable development agenda, in particular the Sustainable Development Goal on water and its impact on other goals, such as nutrition, education, health, etc. Flagship

actions for possible joint funding between the members of the JPI Water, international cooperation partners and international programmes of strategic importance for the EU should be identified and prepared for.

This action should also organise and develop the knowledge base required to address water challenges and EU policy priorities within a global perspective. This can be accomplished through access to an integrated analysis of research results and recommendations arising from national and EU funded research and innovation projects in the area of water research and innovation. **The ultimate result would be more efficient knowledge transfer, wider dissemination and take-up of research findings both in terms of policy and innovation. In addition, it would strengthen links with relevant water sectors and the Water Supply and Sanitation Technology Platform.**

The Commission considers that proposals with a duration of five years requesting a contribution from the EU in the range of EUR 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Projects are expected to contribute to:

- increasing the scale and ambition of water research and innovation activities beyond the level that would otherwise be sustainable, increasing the overall coherence and efficiency of the use of European resources and valorising European know-how on water solutions at global level in the context of the post-2015 sustainable development agenda;
- making the Water JPI, in collaboration with the European Commission, a privileged and attractive partner for global cooperation in research and innovation, notably in the context of the Belmont Forum;

a strengthened role of the Water JPI for underpinning knowledge and evidence for supporting the implementation of related EU policies and for fostering the EU's position in global water-related negotiations and fora.

Topic	SC5-16-2016-2017: Raw materials international co-operation - International network of raw materials training centres
Key words	Engagement
Type of Action	Coordination and Support Action
Deadline	08-03-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2203-sc5-16-2016-2017.html

Specific Challenge:

Many countries are facing similar challenges in the field of mineral raw materials as the EU, including dependence on supply of raw material from international markets, shortage of knowledge on raw materials and their flows for decision making by authorities, industry, financial sector etc. Understanding of the global nature of raw materials value chains and ensuring sustainable supply of primary and secondary raw materials for the EU requires knowledge of materials flows at a global level and relevant skills. At present, there is a shortage of specialists in the EU in some areas related to primary and secondary raw materials production and raw materials markets. This is a challenge that needs to be addressed at the EU level together with the relevant countries around the world having expertise in the field. In addition, the global nature of raw materials value chains requires common approach and solutions at a global level in order to ensure fair and unrestricted access to raw materials worldwide. There is therefore a need for a more active involvement of the EU in relevant initiatives and closer collaboration with competent international organisations in the field of raw materials.

Scope:

Proposals should address one of the following:

a) Demand-supply forecast and raw materials flows at global level (2016): Proposals should develop a common methodology to mineral raw materials flows at global level which could be agreed and used at international level. As a pilot case, focus should be on critical raw materials and in particular the ones used in low-carbon technologies. The methodology should incorporate models on demand-supply forecast in order to allow for dynamic analysis of global materials flows. Proposals should provide recommendations and feed into future policy developments.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), international co-operation is required with the US and Japan in the field of Materials Flow Analysis. Where appropriate, synergies with the relevant EU Member States initiatives are to be explored and fostered.

Proposals should build on the outcomes of the Study on Data Inventory for a Raw Material System Analysis and on related studies performed by the International Resource Panel.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

b) Advancing the idea of a World Forum on Raw Materials (2016): With a view to contributing to the fair and unrestricted access to raw materials worldwide, this action should cover all the following points:

- develop an EU-based platform of international key experts and stakeholders that would advance the idea of a World Forum on Raw Materials and enhance the international cooperation among G20 Member countries as well as the other third countries active in the mining and other raw materials sectors.
- foster sharing of experience with a view to increasing understanding of all aspects of trade in raw materials and strategies to leverage natural resources for wider growth and development in close co-operation with the OECD to contribute to the OECD policy dialogue.
- where appropriate explore and foster synergies with the relevant EU Member States initiatives;
- identify common needs and threats, and develop and promote on international fora recommendations on possible actions to consolidate the efforts of the countries involved towards a more joint and coherent approach towards raw materials policy and investment;
- involve relevant organisations, in particular OECD, International Study Groups, CONNEX, the Intergovernmental Forum on Mining, UNEP Resource Panel, in the planned activities.

In line with the strategy for EU international co-operation in research and innovation (COM(2012)497), international co-operation is required, in particular with G20 Member countries as well as the other third countries active in the mining and other raw materials sectors, and international organisations.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

c) International network of raw materials training centres (2017): Proposals should create a self-sustainable long-term lasting international network of training centres for professionals. The proposals should involve educational and research institutions in the EU and the leading counterparts in third countries, based on specific country expertise in the primary and secondary raw materials sectors. The network should map skills and knowledge in the EU and the third countries, identify key knowledge gaps and emerging needs, develop roadmap for improving skills and knowledge, as well as establish common training programmes in the raw materials sectors.

In line with the EU's strategy for international co-operation in research and innovation (COM(2012)497), international collaboration is required. Where appropriate, synergies with the relevant EU Member States initiatives are to be explored and fostered.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

The project is expected to contribute to:

a)

- implementation of the Raw Materials Initiative[[http://ec.europa.eu/growth/sectors/raw-materials/policy-strategy/index_en.htm]] and achieving the objectives of the EIP on Raw Materials, in particular in terms of establishing and maintaining strong and sustainable relationships with the countries concerned, in particular with Japan and US;
- better informed decision-making by authorities and companies at the EU and global levels;
- better understanding of global raw materials flows and market trends.

b)

- implementation of the Raw Materials Initiative and achieving the objectives of the EIP on Raw Materials, in particular in terms of establishing and maintaining strong and sustainable relationships with the relevant international organisations and countries.
- fair and unrestricted access to raw materials worldwide;
- economic stability in the raw materials supply at a global level;
- better informed decision-making at EU and global levels.

c)

- implementation of the Raw Materials Initiative and achieving the objectives of the EIP on Raw Materials, in particular in terms of establishing and maintaining strong and sustainable relationships with the leading training institutions in the relevant countries;
- increasing the EU competence and expertise in the field of the primary and secondary raw materials;
- **improved availability of qualified and skilled workforce leading to higher competitiveness of the EU raw materials industry;**
- enhancing the possibility for new cross-sectorial innovations.

Topic	SC5-19-2017: Coordination of citizens' observatories initiatives
Key words	Engagement, Responsible Research and Innovation
Type of Action	Coordination and Support Actions
Deadline	07-03-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2196-sc5-19-2017.html

Specific Challenge:

Citizens' observatories [See http://ec.europa.eu/research/environment/index_en.cfm?pg=earth for more information about previously EU funded Citizens' Observatories activities]] are community-based environmental monitoring and information systems which build on innovative and novel Earth observation applications embedded in portable or mobile personal devices. **Thanks to the vast array of ubiquitous information and data they can provide, citizens' observatories can enable authorities to obtain evidence and inform environmental policy making, complementing more authoritative in-situ observation and monitoring networks and systems with a very positive cost-benefit ratio.**

Citizens are also provided with new opportunities to address environmental issues affecting them and to influence local decision making. Social innovation can be achieved through these novel partnerships which involve the private and public sector, NGOs and citizens, offering new business opportunities for SMEs in the fields of Earth observation and mobile technologies.

These activities are, however, at an early stage and still largely rely on research funding. Risks and opportunities still have to be explored, which requires a comprehensive analysis of their full potential and applicability. There is a need to create a citizens' observatories knowledge base in Europe across disciplines to avoid duplication, ensure interoperability, create synergies and facilitate its gradual uptake by environmental authorities. With an increasing number of citizen-based initiatives, a coordinated approach for the integration of citizens' observations is becoming necessary in Earth observation systems at local, regional and also global level.

Scope:

This action should bring environmental citizens' observatories and related communities together with existing relevant activities to benchmark and pinpoint best practices, identify barriers and synergies, promote standards, facilitate integration and stronger cooperation solutions, and stimulate a gradual uptake by public authorities of these new technological and methodological approaches. **Relevant issues such as technologies and methodologies for engaging citizens, social innovation opportunities, sustainability approaches including the role of the European private sector, especially SMEs, as well as data management and interoperability of platforms should be addressed.** A coherent approach should also be taken to ensuring the delivery and uptake of in-situ data and information coming from citizens observatories through GEOSS and Copernicus. **Hence, proposals should include a broad range of stakeholders, including public bodies, private sector representatives, research institutions – including from social sciences and humanities – NGOs and citizens' associations.**

To address these points effectively, social science research tools and methods will be required.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Up to one action shall be funded.

Expected Impact:

The project results are expected to contribute to:

- improved coordination between existing environmental citizens' observatories and related activities at regional, European and international level;
- expanded geographical coverage and use of environmental citizens' observation through an effective promotion and uptake of best practices and standards;
- wider dissemination and uptake of efficient information and data management and preservation strategies for existing and future citizens' observatory platforms;
- increased opportunities for SMEs and businesses in the field of in-situ Earth observation systems;
- better awareness and use of the citizens' observatories by environmental and disaster risk and emergency management decision makers;
- increased value added of GEOSS and Copernicus through the use of citizens' observations;
- a leading role for Europe in the integration and uptake of citizens' information in GEOSS.

Topic	SC5-20-2016: European data hub of the GEOSS information system
Key words	Open Access
Type of Action	Research and Innovation action
Deadline	08-03-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2207-sc5-20-2016.html

Specific Challenge:

As part of its 2015 strategic targets GEO has agreed to achieve sustained operation, continuity and interoperability of the GEOSS information system that facilitates access to, and use of Earth observation resources made available by the global GEO community. However the evolution of the current GEOSS information system[[<http://www.geoportal.org/>]] indicates that in parallel to this overarching goal there is a need also to strengthen the access to Earth Observation at regional level so that it becomes easier to harvest, consolidate and exploit those data at global level. The specific challenge under this topic is therefore to overcome the fragmentation of the European landscape of existing public and private Earth observation data infrastructures and to maximise their combined exploitation in the light of the evolving demand and supply of Earth observations in Europe. **In order to meet this challenge a European data hub of the GEOSS information system should be developed taking into account the global trend towards more open data policies, the availability of new big data**

technologies and the requirements for the development of the European digital economy.

The main function for such a hub would consist in harvesting available resources from relevant GEOSS data infrastructures in Europe and in particular from the distributed Copernicus data infrastructures. Developing such a hub would allow maximising and leveraging on past Community investments to support the GEOSS Common Infrastructure, in particular the broker technology, developed in the framework of several FP7 research projects[[<http://www.eurogeoss.eu/> <http://www.geowow.eu/>]]. This would also help retain ownership in the evolution of this IT technology, which is at the cornerstone of the GEOSS.

Scope:

This action will develop a GEOSS European hub consisting of an innovative web-based IT platform to provide users with a unique access point (gateway) to the diverse European range of Earth observation data (space-based and in situ data, from research and operational data infrastructures, across disciplines and communities) and services, as well as other relevant data sources such as socio-economic related ones. This platform should cope in particular with requests from European users willing to discover, access, combine and process multiple Earth observation data and information streams. Full interoperability with the GEOSS Discovery and Access Broker, with GEOSS data hubs developed in other regions of the world, and with environmental infrastructures associated with major EU programmes, legislations and initiatives shall be ensured. This applies especially to the Copernicus programme[[<http://ec.europa.eu/enterprise/policies/space/copernicus/>]], the EU Directives related to INSPIRE[[<http://inspire.ec.europa.eu/>]] and the reuse of public sector information [[<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:345:0090:0096:EN:PDF>]], as well as to research infrastructures such as GEANT and the EU High Performance Computing facilities. The GEOSS European data hub should be built in close cooperation with other national and European initiatives, in particular with Copernicus. Special attention shall be given to user-friendliness for multiple user profiles while ensuring system adaptability, scalability and robustness. At international level, this action should also contribute to the Community Strategy and Implementation plan of the Belmont Forum e-Infrastructures and Data Management Collaborative Research Action[[<http://www.bfe-inf.org/>]].

The European hub shall be open to academia, the public sector and to the European private sector. Its core concepts of data federation and user customisation shall support an open ecosystem of services and business opportunities and build on past EU research investments in support of the GEOSS information system. Proposals should address the sustainability issue of this platform beyond the project lifetime and a governance model driven by the public sector with possible contributions from private entities.

The Commission considers that proposals requesting a contribution from the EU of between EUR 9 million and EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

The project results are expected to contribute to:

- improved user-friendly discovery, access and exploitation of Earth observation data and information in Europe;
- strengthened European regional approach to GEOSS;
- broader uptake of GEOSS and Copernicus data, information and services;
- increased Earth observation-driven innovation and business opportunities for European SMEs and companies;
- wider commercial exploitation of Earth observation data and products beyond sectors that are not traditionally engaged in Earth observation;
- increased European capacity to address GEOSS societal challenges of prime importance to the EU such as achieving the post-2015 sustainable development goals or implementing adaptation and mitigation strategies to climate change.

Topic	SC5-21-2016-2017: Cultural heritage as a driver for sustainable growth
Key words	Engagement, Open Access
Type of Action	Innovation action
Deadline	Two Stage 1 st stage: 08-03-2016 2 nd stage: 06-09-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2199-sc5-21-2016-2017.html

Specific Challenge:

European cities and rural areas are unique cultural landscapes full of character at the core of Europe's identity. They are examples of our living heritage which is continually evolving and being added to. However some of them are facing economic, social and environmental problems, resulting in unemployment, disengagement, depopulation, marginalisation or loss of cultural and biological diversity. These challenges create demand for testing and experimenting with innovative pathways for regeneration. Cultural heritage (both tangible and intangible) can be used as a driver for the sustainable growth of urban and rural areas, as a factor of production and competitiveness and a means for introducing socially and environmentally innovative solutions. The overall challenge is to go far beyond simple conservation, restoration, physical rehabilitation or repurposing of a site and to demonstrate heritage potential as a powerful economic, social and environmental catalyst for regeneration, sustainable development, economic growth and improvement of people's well-being and living environments.

Scope:

Proposals should address one of the following:

- a) Heritage-led urban regeneration (2016)

b) Heritage-led rural regeneration (2017)

For both, actions should develop and deploy via large-scale demonstration projects novel heritage-led systemic approaches and solutions for sustainable growth. In order to pave the way for their rapid replication and up-scaling, a 'Role models' and 'Replicators' approach should be implemented.

The 'Role models' are urban or rural landscapes which have demonstrably and successfully pursued a heritage-led regeneration.

The 'Replicators' are urban or rural landscapes that will be assisted/mentored by 'Role models' and committed to their heritage-led regeneration within the duration of the project, replicating the heritage-led regeneration 'blueprints' of the 'Role models', properly contextualised to fit their particular contexts. The 'Replicators' will therefore proactively seek advice, assistance and mentoring from the 'Role models', have privileged contact with them and access to their know-how, and will participate in the definition of user requirements and the methodology for transferability of solutions, data collection etc.

The higher the number of 'Role models' and 'Replicators' involved, the larger the evidence base and hence the replicability and up-scalability potential of the project outputs under different contexts. The Commission considers that involving six 'Role models' and three 'Replicators' from different Member States would greatly enhance the potential of a proposal for replicating and up-taking of the results across Europe. Beyond this and in line with the strategy for EU international cooperation in research and innovation (COM(2012)497), participation of 'Role models' from non-EU countries is encouraged, since this would further enrich the evidence base of successfully implemented heritage-led regenerations and would thus enhance the replication and impact potential of such activities in non-EU regions (e.g. Latin America) and countries.

Replication critically depends on the timely and active involvement of the 'Replicators' in the project development, the effective and continuous knowledge transfer, mentoring, networking and support by the 'Role models' (e.g. through staff exchanges to enhance their capacity in, among other things, securing the financial resources necessary for the regeneration through innovative financing and business models, partnerships (e.g. public/ private) and mobilisation of investments). **The success potential of the proposal will be assessed according to the innovative nature and the replicability potential of the approach; the financing, business and governance models; the mobilisation of new investments; the participatory, multi-stakeholder and trans-disciplinary processes (also securing citizens' engagement and ownership of regeneration plans);** the long-term political and financial commitment of the competent authorities in the 'Replicators' to guarantee the project implementation, independently of possible changes in their political context during the course of the project; the capacity for mobilising and leveraging additional investments to secure economic and financial sustainability for the execution of the project; and the soundness of the approach in 'mentoring' and transferring knowledge from the 'Role models' to the 'Replicators' and beyond. **Partnerships should involve local and regional authorities, planners, enterprises, academics and local communities in a clearly defined structure with roles and responsibilities properly spelled out for all involved parties.** The participation of social

sciences and humanities disciplines such as architecture, archaeological sciences, cultural anthropology, law, economics, governance, planning, cultural and historical studies, is critical to properly address the complex challenges of this topic.

Projects should aim to:

- map, analyse and systematically document successful heritage-led regeneration models in 'Role models', linking where appropriate cultural and natural heritage; make this evidence base readily accessible to an EU-wide community of competent and interested authorities, planners, practitioners, enterprises and stakeholders (including civil society) through innovative communication and training strategies. Particular emphasis should be paid to successful business and management models, financing mechanisms, leveraging of investments, governance structures, urban and territorial plans and legal frameworks. 'Role models' would, if they so wish, also have the possibility of further upscaling their regeneration activities during the life of the project;
- assist 'Replicators' through provision of expertise, advice and capacity building in developing and implementing during the life of the project their heritage-led regeneration plans, including appropriate business and management models, financing mechanisms, governance structures, planning tools and legal frameworks;
- set up a robust monitoring scheme to monitor the performance of the deployed regeneration scheme, so as to assess the impact for the targeted rural and urban areas in an as quantifiable way as possible against a well-defined baseline at the time of the proposal. Performance monitoring should last for a period of at least 2 years within the life of the project. Longer term monitoring commitment beyond the end of the project, while continuing the systematic documentation of the data, will give an added value to the proposal;
- develop methodologies enabling the replication and up-scaling of heritage-led urban regeneration projects in different contexts, including replication of innovative investment strategies, governance and business models;
- identify potential regulatory, economic and technical barriers and propose concrete ways to optimise policy and regulatory and administrative frameworks;
- **establish long-term sustainable data platforms securing open, consistent data and performance measurements and interoperability of data infrastructures to ensure effective communication, public consultation, exchange of practices and sharing of experiences and a continuous building up of the 'knowledge portfolio' through future activities under Horizon 2020 and beyond, and long-term (i.e. beyond the life of the project) exploitability of the results.**

Proposals shall address all of the above points. Projects should envisage resources for clustering with other projects financed under this topic as well as other projects under the 'Cultural Heritage for sustainable growth' part of this call and – if possible – also under other relevant parts of Horizon 2020.

Because of the substantial investments that might be necessary for the heritage-led regeneration in the urban and rural context, additional or follow-up funding should be sought, be it private or public, from relevant regional/national schemes under the European Structural and Investment Funds (ESIF), including the European Regional Development Fund (ERDF), or

other relevant funds such as the Instrument for Pre-accession Assistance (IPA II). In the case of ESIF/IPA, contacts could be established with the funds' managing body during the duration of the projects. In case of relevance for the Research and Innovation Smart Specialisation Strategies, the project proposals could already indicate which interested regions/countries have been pre-identified. Please note, however, that reference to such additional or follow-up funding will not lead automatically to a higher score in the evaluation of the proposal.

The Commission considers that proposals requesting a contribution from the EU of up to a maximum of EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Projects are expected to contribute to:

- providing new heritage-led urban and rural regeneration paradigms, up-scalable and replicable, replacing the object-oriented approach with a spatial approach in heritage planning and offering new economic and investment opportunities, new products and services, reduced regulative and administrative barriers, **innovative governance adopting trans-disciplinary and participatory approaches and promoting citizens' engagement and new local skills and jobs;**
- strengthening Europe's capacity as a world-leader in promoting, financing, developing, managing and replicating innovative use of heritage for urban and rural regeneration in Europe and beyond;
- securing heritage conservation and sustainability through fostering collective management, responsibility and ownership of cultural heritage, and establishing a "community of practice" to promote heritage potential as a production (rather than a cost) factor to the society through unlocking its potential as a driver for regeneration and a catalyser for economic growth and jobs;
- providing as quantifiable evidence as possible of the cultural, social, environmental and economic benefits (e.g. set-up of companies, start-ups in new productive activities in different fields new cultural products and services, tourism, construction industry, developing talent, attracting new investment in the regeneration sector etc.) of heritage reuse at different levels, including in deprived or less developed areas;
- mobilising investment and opening up of new market opportunities for businesses through networking at European level competent authorities and stakeholders interested in using heritage to regenerate their cities or rural areas;
- positioning Europe as a leading force in the use of heritage as a means for social, cultural and economic development;
- assisting regions in developing their Research and Innovation Smart Specialisation Strategies by including sound heritage-led urban and rural regeneration projects.

3.6. Europe in a changing world - inclusive, innovative and reflective societies

3.6.1. Co-Creation for Growth and Inclusion

Topic	CO-CREATION-01-2017: Education and skills: empowering Europe's young innovators
Key words	Engagement, Science Education
Type of Action	Innovation action
Deadline	02-02-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/3071-co-creation-01-2017.html

Specific Challenge:

Creativity, entrepreneurial skills, risk taking adaptability and innovation capacity, problem solving skills, skills related to effective teamwork and sharing information and knowledge, may all be key competitive advantages for Europeans, starting from young children. **To make the best of this potential, it is essential that schools and educational institutions, as well as non-formal ways of learning, empower Europe's young innovators with the skills they need from early on in life.** Empowering the young through skills for innovation and entrepreneurship, including social entrepreneurship, is particularly important to building more inclusive societies giving opportunities to all, including young innovators from less privileged backgrounds or those with disabilities in order to address inequalities.

The challenge to be addressed by this topic is to improve learning and teaching in innovation-related skills for young boys and girls at the age of primary and secondary education through the design and piloting of new innovative ways of skills education, including technologies, processes and relations.

Scope:

New approaches for educating skills need to be developed, piloted and scaled up. **There is a lack of sufficient collaboration with entrepreneurial stakeholders in teaching and students practice, and a lack of inter-generational learning. Young people need to be supported with tools, resources and an open environment encouraging experimentation and the development of joint projects including based on interdisciplinary approaches. Effective supporting schemes should guide young people into their entrepreneurial journey.**

Building upon existing initiatives in Europe, the consortia (which shall include entrepreneurial partners, and may include partners from civil society and the social economy) shall develop new approaches and innovative models for skills education targeted at young people.

The involvement of young people in the activities of the consortium (not just as recipients of the outputs) is essential. This may include new inter-active methods and new pedagogical modules that will be easily accessible and part of an open platform, which will aim to reach out to thousands of schools and learning sites across Europe. The innovative schemes and new modules will enable the young, future innovators, to develop new capabilities and experimentation attitudes and turn their ideas into successful entrepreneurial and social projects [Links with SCIENTIX – The Community for Science Education in Europe –may be established].

Promising new models combining technologies with organisational change and building new participatory relations in learning processes - can be tested and adapted in different regions. The innovative models shall be piloted through the schools and/or other businesses and communities, providing young people with a practical set of creative and entrepreneurial skills that will open them up to a world of new possibilities and future jobs.

Within the scope of the action is to develop new models, to investigate and to test new mechanisms that the young generation is engaging in, for addressing societal challenges coupled with an entrepreneurial spirit as well as effective ways and mechanisms for collecting and promoting innovative ideas from the young people. Particular attention should be paid to gender issues.

The action should take into account and coordinate with, where appropriate, with other EU and national initiatives in the field, such as those supported in the context of Erasmus+ strategic partnerships and policy experimentation.

The Commission considers that proposals requesting a contribution from the EU in the order of EUR 2.5 million would allow this specific challenge to be addressed appropriately. This does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

The action will pave the way for innovating learning and teaching practices, so that innovation skills are part of a person's education, formal and informal, at schools and interacting communities as well as on-line. This will boost innovation and entrepreneurship capacity, bringing together many stakeholders including from education, traditional business, the social and service economy and volunteering schemes. It will thereby empower young innovators across Europe, provide for innovative business models and give them tools to engage in society and channel their energies to create opportunities for the future. In the long run the topic contributes to higher youth employment and to creating new markets and new jobs.

The knowledge generated as a result of the actions should be disseminated across Europe to benefit the largest numbers of young innovators.

Topic	CO-CREATION-03-2016: Piloting demand-driven collaborative innovation models in Europe
Key words	Engagement
Type of Action	Innovation action
Deadline	04-02-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/3076-co-creation-03-2016.html

Specific Challenge:

Facilitating open innovation would ensure that ideas and knowledge are transformed into socio-economic value for European citizens. An important market failure in Europe is that it has an abundance of unexploited ideas and research results with considerable innovation potential, which are not being brought to the markets.

Some of the main issues are linked to the difficulty in matching demand and supply of ideas due to the great amount of information available and to the difficulties in communicating it. The latter can be aggravated by the lack of absorptive capacity and the difficulty of certain actors to formulate a demand for innovative ideas or to adopt/adapt existing ones.

In open innovation and collaborative innovation projects it is more difficult to find appropriate sources of funding, since investors might fail to identify the potential of such projects, the actors involved and they might perceive an increased level of risk stemming from such configurations.

Scope:

Experimenting mechanisms to facilitate the match between supply and demand for innovative ideas, as well as the development of absorptive capacities within businesses and other knowledge users. Addressing such issues would facilitate knowledge co-creation among actors that better understand each other's needs and language.

The pilots need to address at least two of the following elements of the innovation eco-system:

- Designing and piloting systematic ways of connecting innovation systems across Europe, so that knowledge flows from one to the other easily and meaningfully. One way of achieving this could be by facilitating human capital mobility and therefore the absorptive capacities of the parties involved. This could include ideas such as "Innovation Human Capital Vouchers" aimed at stimulating SMEs to contact higher education institutes in order to find a solution to their problems;
- Focus on the skills and capabilities of businesses to tap into the European knowledge-base, by developing and piloting specific skills-sets that allows for an effective monitoring of new relevant knowledge, as well as skills that allow a better formulation of a demand for innovative solutions fit for the companies' needs (facilitating interaction between business and academia and/or between businesses);

- Design and pilot public/private funding mechanisms aiming at increasing private funding participation in collaborative innovation projects, contributing to bring innovative ideas to the market. Such mechanisms could build on or combine existing mechanisms;
- Piloting other concrete measures favouring collaborative forms of innovation from a demand-side point of view (i.e. with a focus on businesses needs).

All activities must be concrete experiments or pilots with quantifiable results. All piloted actions will be ready for replication and scale-up.

Activities that fall out of the scope of this call include: research activities, mapping of existing initiatives, collections of best practices, etc.

Applicants could include partners from different sectors, such as knowledge transfer offices, regional development agencies, business associations, business accelerators, networks bringing together businesses and academia, innovation hubs, innovation centres, investment funds, venture capital, crowdfunding platforms, research and technology organisations etc.

The action should take into account and coordinate with, where appropriate, with other EU and national initiatives in the field, such as those supported in the context of Erasmus+ Knowledge Alliances.

The Commission considers that proposals requesting a contribution from the EU in the order of EUR 2.5 million would allow this specific challenge to be addressed appropriately. This does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

It is expected that by better linking demand and supply of ideas and knowledge through new collaborative models, the projects will contribute in the medium term to an increase of innovation and competitiveness in Europe. In addition, starting from in the short to medium term, they will promote socio-economic benefits for European citizens, through the co-creation of solutions adapted to their needs, enabled by increasing the capacity of companies to absorb information. In the long term, due to the replication and scale up potential that the pilots will demonstrate, this will contribute to creating a European innovation ecosystem able to transform ideas and knowledge into socio-economic value for the European citizens.

The mechanisms and pilots supported by this topic will improve the flow of information through collaborative models with increased business participation. By strengthening business innovation through empowering the innovators to screen, identify and formulate a demand for relevant information, as well as increasing their capacity to absorb it and turn it into value, the projects will contribute to boosting innovation across Europe.

Topic	CO-CREATION-05-2016: Co-creation between public administrations: once-only principle
Key words	Ethics
Type of Action	CSA Coordination and support action , IA Innovation action
Deadline	24-05-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/3074-co-creation-05-2016.html

Specific Challenge:

Some of the main benefits of co-creation in public services are personalised approaches that appropriately suit the needs of citizens and businesses. A challenge for co-creation in the public sector is organising the collaboration between the different actors, including between public administrations themselves, in order to share information, knowledge and resources. Co-creation across borders contributes to achieving an effective Single Market.

Co-creation and collaboration between administrations can improve their efficiency and effectiveness by opening up and sharing knowledge and resources with the aim to unlock productivity improvements and foster the creation of more public value. Public administrations and government agencies can re-use the data already in their possession on citizens and businesses, under the control and consent of citizens and businesses, by sharing it between themselves. This can allow them to provide administrative services in a pro-active manner. Administrative burden of citizens and businesses will be reduced, legal obligations will be fulfilled faster and citizen services will be simpler and less cumbersome. Applied on a wide scale it can lead to a smart, inclusive and effective "Once Only principle" at European level.

In order to preserve privacy of citizens and business confidentiality, administrations would open up their information to another administration under the control and the consent of the citizen or business, in line with the EU's Data Protection legislation.

Scope:

In order to facilitate this personalisation and improve user experience, increasing digitisation of public services and the providing of key data only once with public administrations are important aspects. Its implication is that relevant public authorities need to cooperate not just at national level but also cross-border at EU level and share such data in a secure and user-friendly manner, respecting data protection and privacy and the sensitive nature of some of this data.

a) Innovation Actions

The countries participating in a proposal – covering the diversity of approaches across the EU - will need to enable the exchange of information or documents of businesses between their public administrations. The users, public administrations in the EU, will engage in the co-creation process, in order to collaboratively elaborate a common architecture. The project will enable the interaction and co-creation based on the existing national systems, and will re-use when relevant existing cross-border services, in particular services operated by the Connecting

Europe Facility (CEF) telecom programme. To demonstrate the robustness and the benefit to businesses the project must pilot the system for at least 12 months in real conditions. The free access to the foreground must be guaranteed to enable access by any Member State to the results specifications. **The project will also identify the drivers, barriers, potential vulnerabilities and legal issues (such as legal barriers or gaps) for the implementation of the once-only principle for businesses across borders in Europe.** The ultimate aim is that businesses should supply information only once to any public administration in Europe. Public administration offices take action to share this data also cross-border, thereby contributing to making the Digital Single Market a reality. The specific administration processes for businesses for piloting purposes will be identified in the proposal, building from a number of use cases.

The large scale pilot (IA) shall include a minimum of six relevant national administrations (or legal entities designated to act on their behalf) in at least six different EU Member States or Associated Countries.

The Commission expects to finance only one project under this action.

b) Coordination and Support Action

Proposals for a Coordination and Support Action will support networking, discussion, exchange of experience and planning for the implementation of the cross-border application of the once-only principle for citizens, taking into account data protection aspects and the control and consent of citizens. The proposals will need to develop a strategic stakeholder engagement plan and roadmap for future areas of action. The Commission expects to finance only one Coordination and Support Action for a maximum value of EUR 1 million.

Expected Impact:

Proposals need to demonstrate that they can achieve impact, which could be expressed, inter alia, in terms of time savings, administrative burden and cost reduction for businesses, improved service quality and administrative efficiency. Additional impact may be a step towards the 'whole-of-government' approach where the public sector acts as one entity, especially in its interactions with other actors including citizens and businesses.

Topic	CO-CREATION-06-2017: Policy-development in the age of big data: data-driven policymaking, policy-modelling and policy-implementation
Key words	Ethics
Type of Action	CSA Coordination and support action RIA Research and Innovation action
Deadline	02-02-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/3073-co-creation-06-2017.html

Specific Challenge:

As societal challenges are growing more complex and interlinked, public policy innovation and experimentation, using ICT can improve the effectiveness, efficiency and the quality decisions

in the public sector. Effective and reliable policies need to consider the available data (including its structure and topology) and evidence to ensure accurate and meaningful information. Big data offers many opportunities; using data analytics to generate new insights, increasing predictive power and identifying unexpected patterns and relationships that can help inform policy making. For instance data analytics tools can also help public authorities to better detect and evidence patterns of non-compliance in many policy areas affecting the health, the safety and the welfare of citizens in the internal market of goods, services and persons. Effective processing power and expertise are widely used in the retail and commercial sector, the challenge is to create effective resources to make this available to governments, allowing policy choices to become more evidence-based and analytical.

In addition, open policy-making and the integration of the citizens' perspective through the effective engagement of relevant social actors - for example over online platforms or by crowd-sourcing - can potentially generate vast amounts of data, which can allow policy options to become more informed. Furthermore, open policy-making can support a participatory, open and collaborative government vision. Besides simulations, perceptions data pose a further promising source of information. Conducted on a regular basis, e.g. by the Eurobarometer, identifying perceived bottlenecks in relation to policy reforms as well as assessing the perceived performance of past reforms becomes feasible; in some cases these official statistics may be complemented by new sources of data. Taken together, this may lead to developing second generation data tools and assessment for more targeted policy design. It also offers opportunities for different communities to take ownership of the use and analysis of data in an age where they are at risk of being alienated by too much information. In addition, policy implementation can significantly benefit from efficient enforcement and monitoring tools that are informed by data from various sources.

Scope:

In order to enable governments - at all levels - to benefit from the availability of relevant data and thereby introduce and implement effective policies, new or improved methods and tools are needed to support and establish new types of evidence-informed policy design and implementation and to facilitate the interpretation of big data for public communication, including new outcome-based. For public administrations to experiment with the possibilities offered by big data – for example through policy modelling, monitoring, enforcing, simulation, testing, analysis and policy compliance – there is a need to thoroughly understand the legal frameworks and to take into account sociological, cultural, political, legal and economic as well as behavioural aspects. Proposals should also elaborate on the relationship between evidence-based policy-making and citizens' participation, integrating the analysis of participatory elements.

a) Research and Innovation Actions

Proposals need to address several of the following aspects:

- Methodological development for using big data in policy development, examining the extent to which policy-making structures and systems are ready to absorb and analyse big data;

- **Critical interdisciplinary assessment of the economic, political, epistemological, ethical and legal premises and implications of big data practices (including algorithmic governance, smart cities, etc.), allowing for the reflection on the potential benefits and risks;**
- Develop scalable and transferable methods and re-usable tools for compilation, analysis and visualisation of data, including relevant open, official or certified data;
- Develop scalable and transferable methods and re-usable tools for mining, compilation, analysis and visualisation of data from any source, including data related to social dynamics and behaviour;
- Develop scalable and transferable methods and re-usable tools for data curation, meta-data schemes, data linking or for reconciliation of multiple data sets to render coherent narratives;
- Understanding the implications of the increasing materiality of data with the development of the Internet of Things and its implications for the sustainability of government's effective use of big data for improved policy making in the longer term;
- Develop scalable and transferable methods and re-usable tools for opinion-mining of large data sets in order to avoid the situation that the bigger the data, the less clear how they have been produced;
- Develop scalable and transferable methods and re-usable tools for policy modelling and simulation to improve the predicative analysis capacity of governments;
- Develop scalable and transferable methods and re-usable tools for iterative policy design and implementation (e.g. through the greater use of randomised controlled trials based on behavioural science);
- Develop scalable and transferable methods and re-usable tools for policy enforcement and compliance monitoring tools.

Proposals should apply their methodology to policy areas addressing societal challenges (e.g. environment, migration, radicalisation, inequalities, unemployment, internal market obstacles to the free movement of persons, goods and services). **When using open and big data in order to enlarge the evidence base for effective policy-making, principles such as independence, quality, coherence and consistency, confidentiality, impartiality and objectivity as well as representativeness and extrapolation to meaningful populations need to be considered. Data protection, ethical and privacy issues will also have to be addressed as well as ethical issues around storage, use and re-use of data.** Application and improvement of existing quantitative tools is preferable. Sociological as well as behavioural science approaches are encouraged, especially where they aim to develop a deeper understanding of how public policy and services interact with citizens. If relevant, proposals also need to analyse the suitability of the proposed software.

The Commission considers that proposals requesting a contribution from the EU of between EUR 4 and 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

b) Coordination and Support Action

The activities should aim at encouraging networking of relevant stakeholders and teams working in the area of data-driven policy-making and policy-modelling and to support constituency building. Following an assessment of the needs of public administrations, the multidisciplinary network will identify methods, tools, technologies and applications for their implementation in the public sector, taking into consideration activities also undertaken outside the European Union and considering specificities relevant to different policy domains of public activity. The activities will conclude with the outlining of a roadmap for future research directions.

The Commission considers that proposals requesting a contribution from the EU in the order of EUR 0.5 million would allow this specific challenge to be addressed appropriately. This does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Proposals need to demonstrate the impact to be achieved after the project phase, inter alia, in terms of improved public policy effectiveness, efficiency gains, precision gains, improved consistency, and reliance on evidence leading to increased policy compliance as well as in terms of the democratic dimension, such as greater transparency, good governance, increased trust in and the perceived legitimacy of government. Additional impact may be increased accessibility to the non-governmental players.

Topic	CO-CREATION-08-2016/2017: Better integration of evidence on the impact of research and innovation in policy making
Key words	Engagement, Responsible Research and Innovation
Type of Action	Research and Innovation action
Deadline	04-02-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/3075-co-creation-08-2016_2017.html

Specific Challenge:

The growing attention given to research and innovation over the past decades has resulted in increased amounts of public funding being channelled to research and innovation, but also to a variety of policies and funding programmes being put in place in Europe, in order to maximise the quality and impact of this funding.

These policies have been wide in scope, ranging from basic research all the way up to supporting the market introduction of innovation and used a variety of instruments, oriented not only towards the production of knowledge and innovation, but also towards optimising the processes by which innovations are generated (including Co-Creation).

Investments in R&I must be smart and efficient and obtain the most value for every euro invested. **This requires clear strategies for investing in R&I coupled with quality R&I**

programmes and strong institutions capable of implementing these programmes in close connection with the business sector and other stakeholders such as civil society. In addition, there is a clear need to improve the overall framework conditions for transforming R&I investments into tangible results, whether as new products or services or in terms of less tangible impacts such as improvements in the quality of life or inclusion.

The challenge for policy makers is to design policies and programmes with targeted funding to address well identified bottlenecks and which are adapted to the specific context of the research and innovation system in question. This is key to improving the efficiency of the European research and innovation system as a whole, as was stressed by the Commission in its Communication on 'Research and innovation as sources of renewed growth'. [[COM(2014) 339 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Research and innovation as sources of renewed growth.]]

Designing such policies and programmes requires a sound evidence base around the performance of research and innovation systems, the impact of research and innovation policies, the impact of research and innovation on economic growth, job creation and societal progress, and on the way in which public funding and policies can influence performance and impact. The Commission regularly publishes authoritative reports (e.g. the Innovation Union Scoreboard and the Innovation Union Competitiveness Report) which contribute to this evidence base, but given the increasing importance of research and innovation and recent evolutions in this field, the analysis regarding these issues needs to become more sophisticated.

Scope:

Research will focus on establishing new methodologies for assessing the performance and impact of research and innovation and the ways in which public policies and funding can influence these. This should focus in particular on the following aspects:

(2016) Integration of research and innovation in macro-economic models: fiscal policies are often supported by macro-economic models to make an ex-ante assessment of the impact of budgetary measures and structural reforms. This includes dynamic stochastic general equilibrium (DSGE) models, macro-sectoral models and econometric modelling. A common shortcoming of these macro-economic models is that they typically do not account for the long-term benefits of public research and innovation investments and policies, fail to take full account of the quality of these investments, or do so only in a limited manner. Projects should focus on developing modelling approaches which go beyond the current state-of-the-art by incorporating for instance: the distinction between public and private research sectors and the different ways in which public funding and policies can incentivise increased activity and quality in these sectors; the fact that quality of research and innovation is not homogenous (including at sectoral level) or the influence public policies can have on the quantity and quality of the stock of highly skilled people, on the link between human capital and the production and use of knowledge, on the productivity of knowledge production or on spill-over and technology diffusion mechanisms;

(2016) Improving the parameterisation of the aforementioned models: in addition to developing novel modelling approaches, further work is also needed on empirically determining the underlying parameters (elasticity factors) used in the aforementioned models and which link for instance the human capital stock to knowledge production, the production, diffusion and use of knowledge to innovation or which quantify the effect public policies have on these parameters;

(2017) New indicators for assessing research and innovation performance: projects should focus on developing and applying new indicators for assessing the performance of distinct elements of the research and innovation system, including the impact of research and innovation policies. These should go beyond the typical bibliometric and patenting indicators, as these only offer a limited view, in particular in an evolving landscape in which for instance open access mechanisms, social media, social innovation people mobility assume an increasing role. Such new indicators should allow policy makers to assess in a broader and more comprehensive way evolutions in performance and how these are linked to policy reforms;

(2017) Determining the societal impact of research and innovation funding: policy makers need to justify research and innovation spending by demonstrating the impact it has in terms of broader societal benefits. Projects should develop and test new ways to assess the societal impact of public funding allocated to research and innovation, for instance by building on examples of quantitative approaches (such as the USA's Star Metrics initiative or the European SIMPATIC project) or could develop qualitative approaches. **Projects should take a broad approach and go beyond evaluating impacts in terms of productivity growth, economic growth and job creation, by also assessing the impact of public funding on tackling major societal challenges such as those defined in Horizon 2020.**

Projects to be funded on the 2016 budget should address either the first or second issue described above or can combine them in one project. Projects to be funded on the 2017 budget should address either the third or fourth issue described above or can combine them in one project.

The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 1.5 million would allow this specific challenge to be addressed appropriately. This does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Depending on the aspect addressed, and in line with the scope above, projects are expected to respectively deliver the following impact:

- The development of models which provide a realistic assessment of the variety of ways in which research and innovation activities transmit into outputs and impact and of the ways in which public funding and policies can influence this transmission;
- An empirical determination of realistic values for the underlying parameters used in the models;
- **A monitoring of research and innovation performance which captures the broader spectrum of ways in which research and innovation activities translate into outputs and**

impact, in which knowledge circulates between public and private sectors and internationally or through which quality of research and innovation can be assessed;

- A reliable assessment of the societal benefits generated by public funding for research and innovation, not only in terms of productivity growth, economic growth and job creation, but also the impact it has on tackling major societal challenges.

3.6.2. Reversing Inequalities and Promoting Fairness

Topic	REV-INEQUAL-06-2016: Tackling inequalities at their roots: new policies for fairness in education from early age
Key words	Gender
Type of Action	Research and Innovation action
Deadline	04-02-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2298-rev-inequal-06-2016.html

Specific Challenge:

Despite ample analysis and many recommendations, educational inequalities remain pervasive in all European education systems regarding access, treatment and outcomes. European education systems need to cater for considerable diversity and enable all citizens to succeed and develop their full potential, irrespective of their background and according to their specific learning needs. Yet, whole social groups or sub-sets of the population persistently perform less well in education. There are also wide geographic disparities in education, between and within Member States, also regarding early-childhood (pre-primary) education. Finally, many learners with disabilities and/or special educational needs are still placed in segregated institutions or in mainstream settings with inadequate support, frequently leaving school with insufficient qualifications. The role of pre-primary and primary education has been recognised as being of fundamental importance in the educational cycle, as they lay the foundations for future educational and professional attainment. However, huge disparities exist within Europe also at this level.

The goal of reducing inequality and discrimination in European education systems is particularly challenging and relevant. However, it is both more efficient and equitable to invest in education in the very stages. Correcting failure later on is inefficient in comparison. Early childhood education facilitates later learning, and can produce large socio-economic returns, especially for disadvantaged children. Moreover, innovative practices for increasing the efficiency of education systems could also play an important role for equity.

Scope:

The research to address this challenge should focus on one or two dimensions that have to be comprehensively addressed. They may include additional aspects which are relevant to

addressing the specific challenge and they should take stock of most recent research in the field.

1) Reducing educational disparity and disadvantage from an early age

How can better or more enhanced educational and early childcare experiences for children improve the quality of their life? What policies are needed to reduce educational poverty in early childcare and early-childhood education? The research will focus on early childcare and early childhood education (pre-primary) and primary education. Proposals should build on the evidence of the successful contexts in which educational and care practices are demonstrating to be effective, considering the diversity of structures and agents influencing children's learning and psychosocial capacities. Research will assess the successes or failures of educational and care policies against inequalities in a comparative way and analyse institutional, cultural and ideological resistance to changes towards equality. It will seek to generate concrete policy guidance for system-wide, integrated and - where necessary - cross-policy strategies for effective intervention at an early age. Particular attention should be devoted to strategies for strengthening inclusive care and education, and providing for the successful inclusion of learners in early childhood education and care. **This could include combating** social, economic, **gender** and spatial **segregation and discrimination**; promoting the success of migrant-background learners; better equipping institutions and educators to deal with diversity and social inequality; providing active and inclusive pedagogies and psychosocial care policies; promoting citizenship and enhancing democratic values; better measuring and monitoring inequalities in education, including at the regional and local level, whereby microsimulation could be envisaged as a tool. Research will help define the roles of care and education at an early age as an essential tool against inequalities, taking into account the wider context of societies and education in Europe, and also adequately addressing the specific problems encountered by marginalised people (for example Roma).

2) The contribution of innovative forms of organisation management or professional practices in educational systems to equity and efficiency

Research should investigate how innovative forms of organisation and management or innovative professional practices (e.g. teachers' training and professional development) in educational systems and institutions may contribute to equity and efficiency. The research should address barriers, including cultural ones, to innovation in education systems and propose strategies for overcoming them. It should concentrate on European countries with higher levels of educational poverty and include comparisons with countries outside of Europe when relevant. The focus should lie on (long term) outcomes in terms of level of competence of pupils and students, taking into account all relevant dimensions of outcomes and the pupils' background in European educational systems (ISCED 0 to 4). **Possible dimensions to be analysed include:** governance issues (decentralisation of responsibility for expenditure, decision-making, assessing results, allocating public funding); teachers training; organisation of the curriculum; degree of autonomy of schools; level of segregation; accountability issues; availability and quality of facilities, including ICT, innovative teaching/learning methods; **gender balance**, and learning environments, including the role of teachers and community members.

The Commission considers that proposals requesting a contribution from the EU in the order of EUR 5 million would allow this specific challenge to be addressed appropriately. This does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Education is one of the five key objectives targeted by the Europe 2020 strategy for growth essential to combat (social) inequality and social exclusion by equipping the next generation with the skills and qualifications needed to build a socially and economically strong Europe and to provide for social cohesion and democratic values. Further specific research, taking into account the recent economic, demographic and social developments in Europe, and recent advances in approaches to teaching and learning practices will contribute to the identification, transferability and up-take of effective and efficient measures to combat inequalities in education right from the early age, increase educational outcomes, promote social and inclusive innovation and foster broad cross-policies cooperation among researchers, stakeholders, practitioners and policy-makers. Research should provide knowledge, evidence and propose practical options of e-learning and pedagogical methods that will improve the educational systems across Europe. The research will advance knowledge and options for the educational system and its potential for reform in order to become more creative and cost effective.

Topic	REV-INEQUAL-09-2016: Boosting inclusiveness of ICT-enabled research and innovation
Key words	Engagement, Responsible Research and Innovation
Type of Action	Coordination and Support action
Deadline	02-02-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2291-rev-inequal-09-2017.html

Specific Challenge:

The deployment of information and communication technologies induces changes that impact individuals, societies and the environment in profound and pervasive ways. Harnessing the expertise of social sciences and humanities (SSH) in ICT-related research and innovation is key to contribute, notably, to cohesion, fairness, and inclusiveness. Although the need for a constructive, reflective and critical interactions between social sciences and humanities, on the one hand, and technological disciplines, on the other hand, is widely acknowledged, it is a challenge to make it happen and ensure that insights and innovation stemming from both perspectives join up in order to deliver inclusive ICT-enabled innovation. It calls for a smart approach to multiple disciplinarity that combines different tools and relies on the dynamic uptake of social sciences and humanities' perspectives. With this in mind, a structured distributed approach to the mainstreaming of social sciences and humanities across all topics aiming at ICT-related research and innovation has been set up. This approach strives to nurture a horizontal and mutually enriching relationship between SSH and ICT communities. For

responsible and inclusive innovation to come true, one has to move beyond a reactive and risk-based approach, and encourage ongoing critical accompaniment of this innovation, rather than seeking mere acceptance of technological artefacts. This expands the remit of what is expected from SSH expertise. Instead of being confined in a "watchdog" or an "airbag" role for S&T developments, SSH is itself a source of innovation.

Scope:

This topic calls for the coordination and support action that will bring life to the distributed and structured approach designed to ensure a responsible approach to research and innovation through the uptake of SSH expertise across all H2020 areas leading to ICT-related innovation. It should act as a "hub" and activate the constructive interactions of SSH research with the ICT-related projects across H2020.

The purpose of the hub is to stimulate **responsible and inclusive ICT research and innovation by encouraging the uptake of the SSH expertise in ICT-related projects and by coordinating and supporting the embedded expertise within the H2020-funded ICT-related projects, as well as linking these H-2020 projects with the relevant SSH expertise and initiatives both in Europe and in the world, to ensure that this important knowledge basis is fed into the H2020-funded ICT related research and innovation.** The coordination and support action is expected to generate in a collaborative way a shared understanding what it takes for ICT research and innovation to be responsible and inclusive, and to make it happen.

In terms of coordination efforts, **the hub is expected to ensure an active dialogue and the sharing of experience among ICT developers, SSH researchers and other stakeholders (NGOs, citizens and users e.g.) across H2020 ICT-related projects** [A particular attention will be paid to ensuring synergies with the projects flowing from the ICT-LEIT topic "ICT35-2016: Enabling responsible ICT-related innovation"]. **It is also expected to channel the fruits of this dialogue into discussions with policymakers, into the shaping of future research agendas, and into a reflexive assessment of the SSH research practice in the remit of the digital transition.**

In terms of its supporting function, the hub will catalyse information sharing about activities in Europe that are enhancing responsible and inclusive approaches to ICT-related research and innovation. Drawing on ongoing developments, it will provide tools and advice for fostering responsibility and inclusiveness of ICT research and innovation. It will support the visibility of the relevant activities through sustained communication efforts (annual conferences, awareness raising, interactive web-based platform e.g.). It will encourage debates on the challenges raised by hyper connectivity and support experimental activities in interactive labs to stimulate reflection on cutting-edge issues.

The Commission will select one proposal only and considers that proposals requesting a contribution from the EU of EUR 3 million would allow this specific challenge to be addressed appropriately. This does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Improved level and efficacy of the interaction between SSH and ICT disciplines with a view to harnessing ICT-related innovation for reversing inequalities and contributing to responsible and inclusive innovation processes through SSH expertise;
- Improved take-up of societal concerns in ICT-related research and innovation;
- Increased worldwide visibility and influence of a European community with a shared vision for inclusive ICT research and innovation;

The proposals themselves are expected to identify key measurable success indicators –to be further framed in the course of the project- that measure impact in community building and engagement, and uptake of inclusive responsible ICT research and innovation approaches within and beyond the consortium.

Topic	REV-INEQUAL-10-2016: Multi-stakeholder platform for enhancing youth digital opportunities
Key words	Engagement, Responsible Research and Innovation, Gender, Ethics
Type of Action	Coordination and Support action
Deadline	04-02-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2293-rev-inequal-10-2016.html

Specific Challenge:

Today's children and young people lack opportunities to participate actively in policy and decision making, as well as in designing their digital agenda. Children and young people are major users of the internet and online services, it needs to be ensured that they are equipped with the right and trusted environments to take advantage of this as active participants in the digital society. The online environment is rapidly changing and we need to develop the tools to identify and understand the needs of the young generation.

Young people in Europe need not only the space to discuss and to engage with multiple stakeholders and decision makers across borders and boundaries, but also to be given the instruments to actively shape the research agenda as well as to participate in research related to their use of digital technologies. Innovative research methods are needed to empower children and young people by giving them an active role in research. Efforts need to be undertaken to give a voice and to empower children and young people who are marginalised or at risk of exclusion. Only an active participation of all citizens, and especially of all young people in shaping policy and broader societal developments, can create the basis for a well-functioning European society.

Scope:

This coordination and support action should aim at the creation of an online platform to engage children and young people, framed by research according to their needs and behaviours. Children themselves will be able to take initiatives on the research topics and

methods, while the researchers will act as facilitators. Children and young people will be given more active and participative roles that allow empowerment. The vulnerability of children and young people in the online environment and how to build online resilience will also play a role in this action. **Gender issues will be paid particular attention. Furthermore, gender and diversity balance among the participating children and young people will be ensured.**

The platform should bring together stakeholders from research and policy makers, together with children and young people around Europe. Synergies with the existing platforms such as the participation platform on the European Youth Portal should be envisaged. Specifically it should:

- allow for child and youth-directed research, where researchers and policy makers act as facilitators;
- **conduct research and develop a knowledge base as well as critical perspective on the use and interactions with the digital world of children and young people. This will be done in collaboration with interdisciplinary researchers and social scientists;**
- **discuss within peers but also with decision makers, industry and civil society on their needs and expectations from the digital society;**
- co-create with multiple stakeholders research and policy priorities.

The Commission considers that proposals requesting a contribution from the EU in the order of EUR 1 million would allow this specific challenge to be addressed appropriately. This does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Stimulate children and young people's civic engagement through online participation;
- Allow for innovative research methods on children's and young people's use of internet and digital technologies through their active participation in the research;
- Empower children and young people by allowing them to take an active role in policy making and societal developments;
- Leverage youth participation and dialogue with stakeholders and decision makers;
- **Ensure full and safe participation of children and young people in accessing and creating online content and services.**

3.6.3. Engage Together Globally

Topic	ENG-GLOBALLY-09-2016: Centres/Networks of European research and innovation
Key words	Responsible Research and Innovation,
Type of Action	Coordination and Support action
Deadline	14-06-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2310-eng-globally-09-2016.html

Specific Challenge:

To create a network of centres in the world's most dynamic and innovative countries and regions that will connect and support European researchers and entrepreneurs globally, in order to strengthen the position of Europe as a world leader in science, technology and innovation.

Scope:

To establish new centres, or networks of centres, building where possible on existing European science, technology and innovation structures located in international partner countries and regions in order to ensure economies of scale while avoiding unnecessary duplication. These centres/networks will engage in activities such as:

- Networking services including partnering events, workshops, boot camps, venture capital pitching events, best practice exchange, visits and tours etc.;
- Advice and support to European academic as well as industrial/private sector actors on how to internationalise by engaging in research and innovation in the international partner country/region; this may be based on studies, analysis and monitoring work, including on local conditions in the country/region, e.g. on local innovation and market framework conditions, on links between business needs, the labour market and training/education etc.;
- **Advocacy towards international partner countries/regions in favour of open and responsible research and innovation;**
- Providing work space, infrastructure and secondment opportunities to private and public European organisations that want to be represented in the partner country in an economic way while enjoying the synergies of co-location with other representatives of European organisations;
- Design and piloting of public/private funding mechanisms aiming at increasing alternative methods of finance of the Centres/Networks based on a demand driven set of services;
- Promotion, awareness raising and training activities, e.g. on European science, technology and innovation strengths and actors, on cooperation opportunities, on the international dimension of Horizon 2020, on opportunities offered by national programmes etc.

Proposed work shall seek to establish the centres/networks and ensure their initial operational phase. Establishment shall take place in accordance with a business model that shall aim to finance, in the medium term (at the latest by the end of the grant), part of the activities of the centre/network through service contracts with private and public clients. The services offered should be open on equal terms to all EU Member States and Associated Countries and their organisations.

Each proposal shall target one country and region that is an established or emerging science, technology or innovation leader; proposals addressing all or part of Brazil, China and the USA are strongly encouraged without excluding other countries with similar characteristics.

Consortia shall ensure adequate involvement of European stakeholders from existing structures or representations in the addressed partner countries/regions. Proposals should build on previous work of bilateral and regional international cooperation projects where appropriate.

A maximum of one proposal will be supported per international partner country or region. The Commission considers that proposals requesting an EU contribution of around EUR 3 million for a duration of 3-4 years would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Under this topic, legal entities established in the target country/region are eligible for funding from the Union.

Expected Impact:

- Reinforced cooperation between European research and innovation organisations and researchers and those of the Union's international partners;
- Higher visibility and prestige for European research and innovation and its actors in international partner countries/regions;
- Stronger presence of European organisations in the science and innovation environment of the partner country/region;
- Improvements in the framework conditions for international cooperation in research and innovation;
- Enhanced impact of results from research and innovation projects, including those under Horizon 2020, through increased access to excellence and to markets across the world.

3.6.4. Understanding Europe - Promoting the European Public and Cultural Space

Topic	CULT-COOP-08-2016: Virtual museums and social platform on European digital heritage, memory, identity and cultural interaction
Key words	Engagement, Open Access
Type of Action	CSA Coordination and support action RIA Research and Innovation action
Deadline	04-02-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/3089-cult-coop-08-2016.html

Specific Challenge:

ICT changes the way cultural digital resources are created, disseminated, preserved and (re)used. It empowers different types of users to engage with cultural digital resources, for example through web discovery interfaces representing a wealth of information from collections (archives, scientific collection, museums, art galleries, visual arts etc.) enabling their re-use and re-purposing according to users' needs and inputs. The Virtual Museum (VM) is not a real museum transposed to the web, nor an archive or a database of virtual digital assets but a provider of information on top of being an exhibition room. VM provide opportunities for people to access digital content before, during and after a visit in a range of digital 'encounters'. Virtual museum is technologically demanding especially in terms of virtual and augmented reality and storytelling authoring tools which must covers various types of digital creations including virtual reality and 3D experiences, located online, in museums or on heritage sites. **The challenge will be to give further emphasis on improving access, establishing meaningful narratives for collections and displays and story-led interpretation by the development of VM. It will also address the fundamental issues that are required to make this happen e.g. image rights, licencing and the ability of museums to support new ICT technology.**

The emergence of new social paradigms in the area of European Heritage induce the creation of specific social platforms that will encourage an active participation of a large number of stakeholders aiming at a better understanding of the European cultural heritage. Moreover it should facilitate and support a better understanding of the past to better build our future. The challenge is to support the multidisciplinary awareness needed for providing a comprehensive framework for the accessibility, preservation, participatory and sustainable management of cultural resources and assets, based on a holistic, social understanding of European culture and cultural heritage. This challenge will contribute to the debate over these issues and opportunities by facilitating an open dialogue on how technological changes, new business models and scientific progress impact and accelerate developments, including social change, determine policy changes, and support new investments (both private and public) involving diverse actors with different stakes and agendas.

Researching digital cultural heritage is of key, long-term importance to Europe in order to form a robust knowledge base on how cultural heritage may develop in the 21st century. This will enable creative and innovative partnerships between museums, creative industries and public-domain areas such as education with transfer value to other socio-cultural areas and will advance strategies for heritage institutions, including museums, to harness transversal citizen resources and thus enhance their benefit to wider society.

Scope:

a) Research and Innovation Actions

European cultural heritage is being radically transformed with the wide adoption of digital media used for engagement, participation and inclusion. **Researching these transformations encompass the engagements of citizens in their own formation of heritage and the options for heritage institutions to capitalize on the new forms of communication and interaction.**

The real potentiality of a virtual museum is in the creation of a personalized, immersive, interactive ways to enhance our understanding of the world around us. The audio-visual narrative is one of the best means to effectively communicate about objects in a museum to the ordinary visitor. Therefore, actions will focus on the development of highly innovative technologies, methods and ICT tools to significantly improve the 'digital encounter' including quality of images, sonic narratives, the display and interactivity with digital objects. Besides, actions should research and create new ways of personalised storytelling, interactivity and adaptive guidance, bridging the physical and the digital world. The technology resulting from the research should be validated in real life environments. During test and validation phases, due attention has to be paid to scalability, portability, transmedia and interoperability of the technologies proposed and the support needed when implemented. Furthermore, social media tools should be integrated into the VM platform in order to facilitate exchange of information among users.

The Commission considers that proposals requesting a contribution from the EU in the order of EUR 2.5 million would allow this specific challenge to be addressed appropriately. This does not preclude submission and selection of proposals requesting other amounts.

b) Coordination and Support Action

The scope of this action is to develop and maintain a sustainable platform engaging a large number of key actors, stakeholders and communities of practices on how to improve the collaboration and comprehension among the entire community, in order to build up a common roadmap for future activities and explore how these new encounters can be evaluated to understand the models. The platform should engage - and be open to all - practitioners and stakeholders wishing to contribute to decision making processes, agree on objectives and priorities, share experiences, policies and practices. Partnership and collaboration between public and private stakeholders should be encouraged. The platform will concretise its action through the organisation of workshops, conferences or any other awareness-raising actions.

The Commission considers that proposals requesting a contribution of EUR 1 million would allow this specific challenge to be addressed appropriately. This does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Virtual Museums and Social Platform are accessible for everyone, breaking the restrictions of geography and time. VM & SP will help to increase European citizens' curiosity for art and their understanding of cultural heritage. VM & SP will support access to culture and citizens' engagement with culture in less developed regions.

Researchers and scholars will benefit from the new possibilities to shape, access and study European Culture.

Synergies between virtual and traditional museums and cultural institutions will support the economic growth of the sector as measurable impacts will be achieved beyond the beneficiaries of the funded projects.

Topic	CULT-COOP-09-2017: European cultural heritage, access and analysis for a richer interpretation of the past
Key words	Open Access
Type of Action	Research and Innovation action
Deadline	02-02-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/3087-cult-coop-09-2017.html

Specific Challenge:

Collections in archives, museums, and at cultural heritage sites contain a wealth of digital texts, images, audio-visual content and 3D representations of objects or scenes as well as other information such as multispectral or thermal imaging revealing the actual state of conservation, which are largely inaccessible to both computers and humans. In addition, human beings as members of their societies can be regarded as natural archives entail information about the complex semantic and conceptual knowledge organizing a society in its cultural settings and stored in non-verbal practices and rites as well as in language.

Humans can easily extract meaning from individual digital assets but are quickly overwhelmed by the sheer number of items which are usually spatially and/or temporally disconnected and of different digital quality. New technologies can be a valuable instrument to process large amounts of data in order to identify new correlations and interpretations and extract new meaning from our cultural and intellectual heritage. To close, or at least narrow, the "semantic gap" would present a major step forward in digital humanities and other sciences related to European heritage, memory, identity and cultural interaction. Likewise, it is of immediate relevance to find new ways of accessing the complex information embodied in culture-related human 'natural archives'. In addition, the increase and growing complexity of digital cultural

material raises new challenges as regards its preservation over time, an essential condition for re-use and study.

Scope:

In order to better understand and inform the present by richer interpretations of the past, actions **should create affordable and efficient digital access, documentary methods analysis and preservation services for cultural resources**. This should be achieved by tackling issues such as automatic contextualisation and identification of content and by developing analytical tools, including methods for automatically finding content which is semantically similar to a given item, or content which is related to a given high-level concept. This aspect also calls for fundamental work related to the philosophy of meta-data designs especially of language-based data that should be in close coherence with the architecture and typology of human conceptual systems. Actions should also develop innovative tools and methods to extract meaning from digital artefacts (including video recordings, audio recordings, digital images, text, multispectral and thermal information and 3D representations of objects or scenes) considering also the spatio-temporal dimension and the quality of the digital content in order to allow the study and preservation of European heritage. The work must fundamentally address the issue of data quality and interoperability.

Work will be performed in close collaboration with Humanities and Social Sciences researchers.

The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 3 million would allow this specific challenge to be addressed appropriately. This does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

New ways of taking into account the state of the art in computer science and big data management, of searching European digital content which used to be inaccessible, buried among huge amounts of data and not sufficiently tagged with adequate metadata.

Improve the understanding of the rich diversity of European cultural heritage and create added value for the society by providing humanities researchers, journalists, policy makers and the interested public with new ways of finding answers to their questions about European cultural heritage and history.

Topic	CULT-COOP-11-2016-2017: Understanding the transformation of European public administrations
Key words	Engagement
Type of Action	Coordination and Support action Research and Innovation Action
Deadline	04-02-2016
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/3088-cult-coop-11-2016_2017.html

Specific Challenge:

Public administrations are important actors in the European society to deliver public goods and values, from protecting vulnerable people to finding out information on waste collection. They have a complex and varied function, providing essential support, defining rules in a complex society. Due to different historical backgrounds, they are also organised very differently and play different roles across Europe. Today, the continuous improvement of public administrations, public services and policies is at the heart of the agenda of policy-makers. While new organisational structures, concepts and digital tools have contributed to increasing the efficiency, effectiveness, inclusiveness and quality of public administrations, today's societal challenges are ever more complex and inter-linked. Simultaneously, economic and budgetary pressures constrain the public sector, while governments need to renew their legitimacy, addressing the increasing and ever more complex expectations from citizens and businesses. Citizens call for more efficient and accountable use of public funds, meaningful participation in public affairs and for services that are as easy to use and personalised as for example electronic banking. There is a need to find ways that more effectively create public value - related to quality of public service delivery, public sector efficiency, social inclusion and participation, public trust and good governance - in an environment of constant change. Addressing these complex issues requires holistic responses, which in turn call for the transformation of public administrations and its role in society.

Effective collaboration across government departments and with non-governmental actors is essential to good governance. It requires working across portfolio boundaries to jointly achieve integrated responses to the issues of policy development. In addition, effective collaboration with societal actors in public service delivery and policy-making can help governments improve their ability to address user needs and innovate their problem solving capacity. ICT is a key enabler to facilitate this. Effective engagement with societal actors can help unlock societal assets, thereby easing the resource needs on governments, allow new services and new businesses to be born and help citizens to actively participate in the decisions that affect their lives. It allows them to be involved in the co-creation of services, including their design and delivery, as well as in finding solutions to societal challenges [[United Nations eGovernment Survey 2014]]. Collaboration, sharing and re-use between public administrations can help reduce administrative burden, waste and duplication and drive efficiency.

This calls for innovative and collaborative mechanisms with new institutional arrangements, leadership and human resources' capacities and structures for greater collaboration among

government agencies and departments and with other actors. It requires reflecting upon the likely changes in people's expectations about their relationships with governments, their role and their ability to deliver public value - and this calls governments to re-examine their governance approaches and strategies [OECD Recommendation of the Council on Digital Government Strategies, 2014]. **It requires understanding the legal, political and cultural aspects of this transformation and prepare for the necessary organisational, administrative, technical human resource and legal changes to link departments internally together, but also to effectively engage with users, citizens, businesses, social partners, civil society organisations, non-profit organisations, social enterprises, communities and all those who want to interact.** It raises questions about how governments can organise themselves around user expectations, needs and associated requirements, rather than their own internal logic and needs. How can they create an open environment and ecosystem, where public administrations make tools supported by ICT, assets, data, information and resources available for re-use, invite all actors to collaborate within clear frameworks? How can governments still they remain accountable for public value generation? How can co-creation and collaboration transform the way public and collective issues are explored and how services and policies are designed, produced and delivered? Which role can professional communicators, e.g. journalists, play in this process? What is the impact of different country contexts? What sectors of public policy are potentially the most concerned by this transformation? What new rules and standards, organisations, resource allocation, institutional capacities are needed? **Measured impacts, recommendations and lessons can inform policy-makers' judgement on whether and how they would be able to embark on the transformation towards the open and collaborative government 'environment'. What are the underlying conditions, enablers, risks and barriers?**

Through understanding the future role of government and the public sector in Europe, we can enhance European cohesion, well-being, welfare and unity, while challenging the narratives of voices which question the relevance of European values. In order to contribute to individual and societal development, we need to consider how to embrace the positive potential of digital technologies to strengthen the cohesion of European society, through shared values and to facilitate active participation in the democratic system.

Scope:

a) Research and Innovation Actions

(2016/2017) Research is needed to explore and analyse how the public administrations can become open and collaborative, **encouraging the engagement and participation of public, private and civil society stakeholders - such as for example other public authorities, users, citizens, businesses, researchers, civil society organisations, social innovators, social entrepreneurs, media actors, artists and designers - for effective, appropriate and user-friendly public service design, delivery and policy-making.**

The research proposals should present evidence of previous experience in creating environments fostering co-creation through engaging different societal actors in addressing research and impact goals (scientific, political and social) and their planned research should go beyond the existing theories and empirical evidence. The actions need to engage multi-disciplinary and multi-sectoral teams to explore the complexity of public services, enablers for

public administrations, identify the necessary changes, risks and barriers to implementation, assess the potential of different policy domains and explore feasibility in different public administration contexts (across a representative set of Member States and different levels of governments). The actions need to provide a set of concrete recommendations for policy-makers at local, regional and national level. The actions need to address the transferability and sustainability of their results.

Proposals need to address several of the below aspects:

- Exploring what the role of governments in an open and collaborative government setting may be and how this could be embedded in an EU setting (taking into account shared European values, diversity as well as principles of subsidiarity);
- Developing methods and approaches to understanding community assets, needs and requirements in order to provide meaningful public services;
- **Understanding the demographics, appropriateness of participatory practices and their feasibility for scaling up, so as to generate civic participation on all levels, ensure level playing field in public engagement and legitimacy of the process;**
- Analysing the necessary cultural attitudes, roles, skills, expertise, knowledge as well as incentives and drivers (such as for example possibilities for wellbeing, healthy life, employment, democracy issue, etc.) of those involved in this process (including civil servants, service providers and users);
- Exploring how innovative processes and mechanisms (e.g. through scalable open platforms or open architectures, etc.) can be embedded in public administrations to create an open digital government environment and ecosystem for improving service delivery and citizen engagement;
- Analysing the conditions under which user-knowledge input is fully integrated in the services/policy development/design process;
- Analysing what co-creation in the public sector can learn from the private sector in terms of critical drivers and enabling factors;
- Exploring the suitability of different institutional frameworks for collaboration both within the public sector and with external actors that allow sharing data, information and services internally between departments and with external parties for re-use;
- Exploring the suitability of innovative technologies that facilitate for example co-creation, sharing relevant information between stakeholders, address issues of privacy, data protection and security or improve communication;
- Analysing the drivers and enabling factors for societal actors to engage in public service or policy co-creation and identifying different sustainability models (such as for example Public Private Partnerships, government spin-offs, hybrid government teams, etc.);
- Exploring, monitoring and measurement approaches, methods and tools to understand the impact of open, innovative and collaborative government for public administrations, for growth and societal well-being and for substantiating the link between innovative public sector service and public sector efficiency.

Actions may want to strengthen their recommendations for prioritisation of reform steps to be taken by relying on insights through perception data with respect to the public sector in general or the public administration in particular (e.g. bottlenecks perceived by both the citizens and businesses in dealing with the public sector, etc.) It is essential that users are a

fundamental part of any proposed project and proposals may want to validate the prototype developed in any of the above.

The Commission considers that proposals requesting a contribution from the EU of between EUR 4 and 5 million would allow this specific challenge to be addressed appropriately. This does not preclude submission and selection of proposals requesting other amounts.

b) Coordination and Support Action

(2016) The aim is to bring together actors inside and outside public administrations, including policy makers, politicians, civil society organisations, users, businesses, researchers, social innovators, social entrepreneurs, initiatives, good practices both in the EU and internationally to identify good practice cases, discuss and exchange on the transformation of public administrations in Europe and discuss the future role of government in this context. Proposals will need to develop a strategic stakeholder engagement plan and a roadmap for future research directions.

The Commission considers that proposals requesting a contribution from the EU in the order of EUR 0.5 million would allow this specific challenge to be addressed appropriately. This does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

The actions will form the basis for new institutional strategies and mechanisms to enhance collaboration among government departments and with other actors to collaboratively design, produce and deliver public services and policies. The findings will help public administrations at all levels to rethink their roles in the European society. Results will give guidance to governments and policy makers on how to transform public administrations to become open, innovative and collaborative. The policy recommendations will provide guidance on the cultural, legal or procedural changes needed to facilitate the direct uptake of research and other insights by stakeholders. The actions will also improve the understanding of the effectiveness of related public policies in different democratic models. Taking up the policy recommendations will ultimately lead to improved public service delivery and policy effectiveness, higher quality services, improved societal evidence, improved user experiences and inclusiveness as well as increasing level of civic participation, transparency, trust, social inclusion, accountability of institutions and good governance.

3.7. Secure societies - protecting freedom and security of Europe and its citizens

3.7.1. Security

Topic	SEC-01-DRS-2016: Integrated tools for response planning and scenario building
Key words	Ethics
Type of Action	Innovation action
Deadline	25-08-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2312-sec-01-drs-2016.html

Specific Challenge:

At present, the wide range of sectors, disciplines and actors involved in disaster risk management are not sufficiently interlinked, which prevents efficient response planning and the building of realistic multidisciplinary scenarios. Integrated tools need to be developed to support such actions. Stronger partnerships among research, policy, (research or monitoring) institutes, industry/SMEs communities and practitioners, in particular first responders, are required for better preparedness of societies to cope with complex crisis situations.

Scope:

Disaster risks (natural, accidental, or intentional) should be addressed in the context of:

- the EU Civil Protection Mechanism (Decision 1313/2013), which paves the way for reinforced cooperation in civil protection assistance interventions for the protection primarily of people, and also of the environment and property in the event of natural and man-made disasters, emergency situations in case of mass events, acts of terrorism and technological, chemical, biological, radiological or environmental accidents;
- the IPCC[[Intergovernmental Panel on Climate Change COM(2012)497]] recommendations in relation to extreme climatic events;
- the Sendai Framework for Disaster Risk Reduction at international level. [[http://www.wcdrr.org/uploads/Sendai_Framework_for_Disaster_Risk_Reduction_2015-2030.pdf]]

Response to emergency situations resulting from the materialisation of such risks requires inter-organisational coordination among many actors, and efficient coordination requires improved response planning and scenario building. This can only be achieved through the integration of support tools that can be used operationally by a large variety of decision-makers, back-office experts, and first responders. Such tools can build upon previous and ongoing FP7 projects and preliminary results from H2020 actions to avoid duplication, and should be demonstrated in representative and realistic environments and situations involving firefighting units, medical emergency services, police departments, and civil protection units.

The participation of SMEs is strongly encouraged.

In line with the EU's strategy for international cooperation in research and innovation [Intergovernmental Panel on Climate Change COM(2012)497] international cooperation is encouraged, and in particular with international research partners involved in ongoing discussions and workshops, with the European Commission. Legal entities established in countries not listed in General Annex A and international organisations will be eligible for funding only when the Commission deems participation of the entity essential for carrying out the action.

The outcome of the proposal is expected to lead to development up to Technology Readiness Level (TRL) 7 or 8; please see part G of the General Annexes.

Indicative budget: The Commission considers that proposals requesting a contribution from the EU of € 8million would allow for this topic to be addressed appropriately. Nonetheless this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Short term

- More efficient response capacity of the EU and between neighbouring countries in particular in the frame of the "request for assistance" mechanism
- Improved strategy for response planning and scenario building in the EU and beyond (in particular in the context of the Sendai Framework for Disaster Risk Reduction)

Medium term

- Enhanced autonomy, mobility (i.e. long range, quick deployment) and resilience of rescue and first aid organisations in case of natural or man-made disasters, including in remote regions or in case of emergency situations during mass events
- Updated knowledge of existing relevant capabilities, and of best practices and lessons learned from similar, past incidents
- Enhanced understanding of human factors in relation with events affecting critical infrastructure
- Development of new tools, and adaptive networking of existing technologies (e.g. self-deploying infrastructure and autonomous sensors including passive sensors early warning systems, satellite-based integrated monitoring, system networks for recovery) that are useful for response planning and scenario building, including e.g. modular concepts and systems based on renewable energies, robust and flexible autonomous systems for transport and rescue missions, electric vehicles, emergency aircraft load planning optimisation, mobile power systems, new resilient electrical energy storage systems, mobile laboratories, autonomous system entities (land- and air-based) etc. using data exchange standards, demonstrating a high level degree of interoperability, the ability to be used in all-hazards approaches (man-made and natural disasters, and their combination), and compliant with EU guidelines and recommendations
- Development of scenarios developed in specific geographical areas with the direct involvement of local authorities and end-users
- Development of novel visual interfaces and user-friendly tools enhancing stakeholders and population awareness and involvement

- Consolidation of the methodology for cross-border (regional and Pan European) single and multi-risk scenario-building.
- Enhanced cooperation between autonomous systems entities: satellite-, sea-, land- and air-based systems, including but not limited to the Copernicus, Galileo and EGNOS systems, from different agencies and of a large variety of capabilities, and costs
- **Assessment of the societal acceptance of such tools, also from an ethical point of view.**
- Greater cooperation among actors involved in crisis management
- **Stronger involvement of practitioners (e.g. first responders and monitoring institutes) in validating and testing of tools, concepts and methodologies**

Topic	SEC-07-FCT-2016-2017: Human Factor for the Prevention, Investigation, and Mitigation of criminal and terrorist acts
Key words	Ethics
Type of Action	Research and Innovation action
Deadline	25-08-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2318-sec-07-fct-2016-2017.html

Specific Challenge:

The European Union (EU) consists of more than 500 million people across the twenty-eight countries which make up the Union. Economic growth, together with the opportunities provided by a free and democratic society based on the rule of law, generate prosperity amongst Europe's citizens who benefit from increased mobility across national borders, and from globalized communication and finance infrastructure – but with such opportunities also come risks, as terrorists and criminals seek to pursue destructive and malicious ends. There are a number of significant common threats which have a cross-border impact on security and safety within the EU[[European Agenda for Security COM(2015) 185 final]], and security has become a key factor in ensuring a high quality of life in the European society and in protecting our critical infrastructures through preventing and tackling common threats. The European Union must prevent, and if necessary investigate and mitigate the impact of criminal acts, whilst protecting fundamental rights of its citizens. The consistent efforts made by the EU Member States and the Union to that effect are not enough, especially when criminal groups and their activities expand far beyond national borders.

Scope:

The Lisbon Treaty enables the EU to act to develop Europe as an area of justice, freedom and security. The new European Agenda on Security underlines that, an EU-wide approach to security, integrating prevention, investigation and mitigation capabilities in the area of fight against crime is increasingly required.

The definition of a European Security Model which builds upon the analysis of the human factors [Includes societal factors.], at the roots of the design of security strategies and methodologies, is needed. Such a Model would encompass: the development of a common

understanding of security issues among EU security practitioners, as well as of the causes and effects of insecurity among EU citizens; common EU methodologies to be implemented by security practitioners (about enhancing prevention and anticipation and/or the timely involvement of all the actors that have a role in protection from the political, economic and social scene).

The globalization of communications and finance infrastructure allows for cybercrime to develop, and corruption and financial crime to take new forms. Cyber criminality is a phenomenon by which criminal acts with new tools and within a new environment, which is not satisfactorily understood, nor properly addressed. The same applies to the innovative technologies and methodologies for financial crime. Law Enforcement Agencies need new equipment to counter such developments.

Proposals should address only one of the following aspects:

Sub-topic 1. New methods for the protection of crowds during mass gatherings;

Sub-topic 2. New methods to prevent, investigate and mitigate cybercriminal behaviours;

Sub-topic 3. New methods to prevent, investigate and mitigate corruption and financial crime to fight the infiltration of organised crime in the European Union (licit) economy;

Sub-topic 4. New methods to prevent, investigate and mitigate high impact petty crimes;

Sub-topic 5. New methods to prevent, investigate and mitigate high impact domestic violence.

Only the sub-topics not covered in 2016 will remain eligible in 2017. A list of topics that remain eligible in 2017 will be published in due time in the section "Topic Conditions & Documents" for this topic on the Participant Portal

In line with the EU's strategy for international cooperation in research and innovation [COM(2012)497] international cooperation is encouraged, and in particular with international research partners involved in ongoing discussions and workshops, with the European Commission. Legal entities established in countries not listed in General Annex A and international organisations will be eligible for funding only when the Commission deems participation of the entity essential for carrying out the action.

Indicative budget: The Commission considers that proposals requesting a contribution from the EU of € 3million would allow for this topic to be addressed appropriately. Nonetheless this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

The EU law enforcement agencies will benefit from improving and consolidating knowledge about security problems and their remedies.

In detail, and for each sub-topic:

- A policy-making toolkit, for security policy-makers, to advance towards a future European Security Model applicable by European law enforcement agencies and/or

- **Common approaches, for the long-term, for assessing risks/threats and identifying relevant risk-based security measures, including through acceptance tests (that take due account of legal and ethical rules of operation) and cost-benefit considerations and/or**
- Complementing the relevant work of Eurobarometer, better understanding of how the citizens perceive security and how it affects their feeling of insecurity, and in connection with potential limitations to, or risks of violations of privacy, and the consequent challenges for LEAs;
- Toolkits for law enforcement agencies, based and validated against the needs and requirements expressed by practitioners, and improving the perception by the citizens that Europe is an area of freedom, justice and security.

The societal dimension of fight against crime and terrorism must be at the core of the activities proposed within this topic.

Topic	SEC-10-FCT-2017: Integration of detection capabilities and data fusion with utility providers' networks
Key words	Ethics
Type of Action	Innovation action
Deadline	24-08-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2325-sec-10-fct-2017.html

Specific Challenge:

Research undertaken in recent years has proposed innovative approaches for the detection of precursors of explosives, drugs, and more generally speaking substances threatening the security of the citizens. Such approaches often require the installation of networks of sensors throughout urban areas. Utility networks, which are well developed in such areas, could be both sources of information through the analysis of the substance that they transport/provide (e.g. energy consumption, characteristics of used waters) or of their environment (e.g. quality of air, etc.). They can constitute networked (mobile) platforms for sensors, but this potential remains largely untapped.

Scope:

Proposals should address the deployment of detection systems in large and medium cities, in existing networks, or a combination of such networks, for instance for the detection of explosive precursors and illegal chemicals (drugs). Proposals shall address sewage networks and quality of air monitoring networks, and may address other networks. The experiment should last a significant period of time (at least two years).

Proposals should also provide for a mobile platform equipped to ascertain the composition and location of suspicious measurements, once data have been provided by the networked detection systems.

Proposals should provide for the prototype of a system controlling the detection systems and capable of fusing data provided by a variety of such networks, and of interfacing with other networks, pay particular attention to ethical issues raised when using such systems, and address the sustainability of such systems.

Whereas activities will have an exclusive focus on civil applications, coordination with the activities of the European Defence Agency (EDA) may be considered with possible synergies being established with projects funded by the EDA programmes. The complementarity of such synergies should be described comprehensively. On-going cooperation should be taken into account.

Proposers for this topic should look for an enhanced SME participation.

The outcome of the proposal is expected to lead to development up to Technology Readiness Level (TRL) 7 to 8 for the sensors deployed; 6 for the control and information system, and the mobile platform; please see part G of the General Annexes.

Indicative budget: The Commission considers that proposals requesting a contribution from the EU of € 8million would allow for this topic to be addressed appropriately. Nonetheless this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Short term:

- Real-life demonstrations of the combination of systems detecting precursors of explosives, and drugs, installed on at least two utility networks, and making use of a prototype of information systems fusing the data provided by these networks;
- Better understanding of the effectiveness of the combination of technologies used to detect and locate a bomb factory or a drug lab/drug consumption/traffic;

Medium/Long term:

- Provision of a higher level of information/intelligence to those involved in counter-terrorist and countering drugs activities (e.g. Law Enforcement Agencies, Security & Intelligence Agencies, and Government Laboratories)

Topic	SEC-15-BES–2017: Risk-based screening at border crossing
Key words	Ethics
Type of Action	IA Innovation action
Deadline	24-08-2017
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2328-sec-15-bes-2017.html

Specific Challenge:

The concept of 'borders' has changed in recent times. The purpose and function of borders have been, and remain, to delineate and demarcate one sovereignty from another. However, borders must also allow for the smooth movement of people and goods.

Maintaining the current level of checks is becoming increasingly expensive given the ever growing volumes of people and goods on the move, and increasingly more disruptive of flows. It would remain sustainable if thorough checks could be limited to fewer individual goods and people pre-selected further to a preliminary (and non-disruptive) risk-based screening of the flows.

Scope:

Proposals should take account of the four-tier access control model developed in the EU: measures undertaken in, or jointly with third countries or service providers (e.g. those managing Advance Passenger Information or Passenger Name Record systems); cooperation with neighbouring countries; border control and counter-smuggling measures; control measures within the area of free movement in order to prevent illegal immigration and cross-border crime inside the Schengen area.

Innovative, international alert systems can be developed further to more co-operative law enforcement and investigative efforts. Building upon lessons learned and field experience is essential.

The combination of a variety of arrays of sensors, new operational methods, and improved data management techniques can support appropriate law enforcement responses and enable better, transnational, interagency access to reliable and secure situational intelligence and information, on a real-time and cost-effective basis.

Collaboration with IATA, the air transport industry and other partners and international stakeholders in other fields of transport safety (e.g. maritime, rail) may lead to the development of new solutions.

Particular attention should be paid to personal data protection and to other ethical concerns that may arise from the development of risk-based screening at borders.

The outcome of the proposal is expected to lead to development up to Technology Readiness Level (TRL) 7; please see part G of the General Annexes.

Indicative budget: The Commission considers that proposals requesting a contribution from the EU of € 8million would allow for this topic to be addressed appropriately. Nonetheless this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

Short/Medium term:

- Enhanced situational awareness for border control practitioners, enabling the timely and proper identification of potentially dangerous people and goods, and preventing smuggling and human trafficking;
- Improved risk-management coordination and cooperation between border control (passport/persons), customs (baggage/goods) and security in transport (pre-boarding security checks on persons and baggage);

Long term:

- Improved solutions for remote detection of abnormal behaviours;
- Improved and people-respectful border automated screening systems through close cooperation with actions resulting from SEC-18-BES-2017: Acceptance of "no gate crossing point solutions".
- More effective use of intelligence to reduce risks at borders;

3.7.2. Digital Security Focus Area

Topic	DS-01-2016: Assurance and Certification for Trustworthy and Secure ICT systems, services and components
Key words	Engagement, Ethics, Gender
Type of Action	Coordination and support action Innovation action Research and Innovation action
Deadline	12-04-2016
Link	http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2425-ds-01-2016.html

Specific Challenge:

The constant discovery of vulnerabilities in ICT components, applications, services and systems is placing our entire digital society at risk. Insecure ICT is also imposing a significant cost on users (individuals and organisations) who have to mitigate the resulting risk by implementing additional technical and procedural measures which are resource consuming.

Smart systems, highly connected cyber-physical systems (CPS) are introducing a high dynamism in the system to develop and validate. Hence, CPS are evolving in a complex and

dynamic environment, making safety-critical decisions based on information from other systems not known during development.

Another key challenge is posed by domains, such as medical devices, critical infrastructure facilities, and cloud data centres, where security is deeply intertwined and a prerequisite for other trustworthiness aspects such as safety and privacy.

The challenges are further intensified by the increasing trend of using third party components for critical infrastructures, by the ubiquity of embedded systems and the growing uptake of IoT as well as the deployment of decentralized and virtualized architectures.

In order to tackle these challenges, there is a need of appropriate assurances that our ICT systems are secure and trustworthy by design as well as a need of certified levels of assurance where security is regarded as the primary concern. Likewise, target architectures and methods improving the efficiency of assurance cases are needed in order to lower their costs.

Scope:

a. Research and Innovation Actions - Assurance

Providing assurance is a complex task, requiring the development of a chain of evidence and specific techniques during all the phases of the ICT Systems Development Lifecycle (SDLC for short: e.g. design verification, testing, and runtime verification and enforcement) including the validation of individual devices and components. These techniques are complementary yet all necessary, each of them independently contributing towards improving security assurance. It includes methods for reliability and quality development and validation of highly dynamic systems.

Proposals may address security, reliability and safety assurance at individual phases of the SDLC and are expected to cover at least one of the areas identified below, depending on their relevance to the proposal overall objectives:

- Security requirements specification and formalization;
- Security properties formal verification and proofs at design and runtime
- Secure software coding;
- Assurance-aware modular or distributed architecting and algorithmic;
- Software code review, static and dynamic security testing;
- Automated tools for system validation and testing;
- Attack and threat modelling;
- Vulnerability analysis;
- Vendor (third-party) application security testing;
- Penetration testing;
- Collection and management of evidence for assessing security and trustworthiness;
- Operational assurance, verification and security policy enforcement;
- Adaptive security by design and during operation.

Proposal should strive to quantify their progress beyond the state of the art in terms of efficiency and effectiveness. Particular importance within this context should be placed on determining the appropriate metrics.

Proposals should take into account the changing threat landscape, where targeted attacks and advanced persistent threats assume an increasingly more important role and address the challenge of security assurance in state-of-the-art development methods and deployment models including but not limited to solutions focusing on reducing the cost and complexity of assurance in large-scale systems.

Proposals should include a clear standardisation plan at submission time.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

The outcome of the proposals are expected to lead to development up to Technology Readiness Level (TRL) 3 to 5; please see part G of the General Annexes.

b. Innovation Actions – Security Certification

Proposals should address the challenge of improving the effectiveness and efficiency of existing security certification processes for state-of-the-art ICT components and products including the production and delivery of the corresponding guidance materials.

In terms of effectiveness, proposals should address, amongst other factors, emerging threats, compositional certification and reuse of components in the context of certified systems and certification throughout the operational deployment of a product or a service.

In terms of efficiency, proposals should strive to reduce the cost and duration of the certification process.

Proposals may address security certification in any area of their choice. Consortia submitting proposals are expected to approach the selected topic as widely as possible including all necessary actors – e.g. industry, academia, certification laboratories - and involve the relevant certification authorities from at least three Member States in order to achieve added value at a European level.

Proposals are encouraged to work towards moderate to high assurance level protection profiles as a way to validate their results.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

The outcome of the proposals are expected to lead to development up to Technology Readiness Level (TRL) 6 to 7; please see part G of the General Annexes.

c. Coordination and Support Actions

To complement the research and innovation activities in security assurance and certification in this topic, support and coordination actions should address the following:

Building trustworthiness: economic, legal and social aspects of security assurance and certification

- Study in depth the economic and legal aspects related to assurance and certification (including European-wide labelling), EU and International regulatory aspects;
- **Explore and identify the interplay of relevant social, cultural, behavioural, gender and ethical factors with ICT systems with regards to their trustworthiness and security, actual or perceived**
- Identify barriers and incentives in the market for certified products in the consumer and/or enterprise market;
- Produce a comprehensive cost/benefit model for security assurance and certification;

Engage with multidisciplinary communities and stakeholders.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- European ICT offering a higher level of assurance compared to non-European ICT products and services.
- ICT products and services more compliant with relevant European security and/or privacy regulations.
- ICT with a higher level of security assurance at marginally additional cost.
- Facilitation of mutual recognition of security certificates across the EU.
- Increased market uptake of secure ICT products.
- Increased user trust in ICT products and services.
- Reduction of negative externalities associated with deployment of insecure ICT.
- More resilient critical infrastructures and services.
- Progress beyond the state-of-the-art in the effectiveness and efficiency of the areas addressed by the proposals.

Topic	DS-08-2017: Privacy, Data Protection, Digital Identities
Key words	Engagement
Type of Action	Innovation action
Deadline	24-08-2017
Link	https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2428-ds-08-2017.html

Specific Challenge:

The use of modern telecommunications and on-line services involve users' personal information.. For example, using search engines exposes the query terms used, which can be both sensitive and identifying, as illustrated by the exposure of search terms; social networking services expect users to reveal their social connections, messages and preferences, that could lead to direct privacy violation if exposed. Browsing the web also leaves traces of where users have gone, their interests, and their actions - meta-data that can be used to profile individuals.

The implementation the draft General Data Protection Regulation (GDPR - currently in the law-making process) presents both technological as well as organisational challenges for organisations which have to implement novelties such as the right to data portability, the right to be forgotten, data protection impact assessments and the various implementations of the principle of accountability.

Many services on the Internet depend on the availability of secure digital identities which play a crucial role in safeguarding the data and privacy of citizens as well as protecting them and other actors such as private companies or public services from various online threats. At the same time, many European countries already have or are in the process of developing an electronic identity (eID) scheme. Most of these projects are built to be at a very high security level, which makes them very suitable for diverse eGovernment processes. But in turn they may lack usability for commercial applications.

Scope:

Innovation Actions: Proposals may cover one of the strands identified below.

Privacy-enhancing Technologies (PET)

Novel designs and tools to provide users with the functionality they require without exposing any more information than necessary, and without losing control over their data, to any third parties. PET should be available in a broad spectrum of products and services, with usable, friendly and accessible safeguards options. PET should be developed having also cost effective solutions.

Comprehensive and consistent Privacy Risks Management Framework should be available, in order to allow people to understand their privacy exposure (i.e. helping people to understand what happens to their data when they go online, use social networks etc).

Open source and externally auditable solutions are encouraged in order to maximise uptake and increase the trustworthiness of proposed solutions.

General Data Protection Regulation in practice

Tools and methods to assist organisations to implement the GDPR taking into account the final provisions of GDPR and guidance from relevant authorities (Data Protection Authorities, Art 29 WP or its successor).

Proposals may also address the need to provide support (procedures, tools) for entities to understand how to operate without requiring unnecessary information (so as to promote privacy respecting practices), in particular when the issue is mainly related to the fact that organizations (businesses, service providers, and government agencies) often require too much information from their target customer/user.

Secure digital identities

With a view to reducing identity fraud while protecting the privacy of citizens, proposals should develop innovative, secure and privacy enhancing digital identity platforms beyond national eID systems.

Activities may leverage existing European electronic identification and authentication platforms with clearly defined interfaces based on the General Data Protection Regulation (GDPR).

Proposals may:

- Leverage evidence-based identities (using adequate correlation of multiple soft proofs of identity, as opposed to the usage of a central register);
- Provide a function for so called “qualified anonymity”, which means, that the online service does not have any information about the user but a pseudonym. The real identity of the user can only be revealed under specific conditions such as at the request of legal authorities;
- Consider cost-effective and user-friendly verification methods for mobile identity documents.

For all strands, proposals should identify and address the societal and ethical dimensions of the strand they choose to cover taking into consideration the possibly divergent perspectives of pertinent stakeholders.

Proposals have to address the specific needs of the end-user, private and public security end users alike. Proposals are encouraged to include public security end-users and/or private end users.

The Commission considers that proposals requesting a contribution from the EU between EUR 2 and 3 million would allow these areas to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

The outcome of the proposals are expected to lead to development up to Technology Readiness Level (TRL) 6 to 7; please see part G of the General Annexes.

Expected Impact:

- Support for Fundamental Rights in Digital Society.
- Increased Trust and Confidence in the Digital Single Market
- Increase in the use of privacy-by-design principles in ICT systems and services