International Cooperation in Horizon 2020

EU and USA

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Excellent Science

Horizon 2020 Pillar:	Excellent Science
Programme:	Research infrastructures
Activity/Topic:	Integrating Activities for Advanced Communities
Call Identifier:	H2020-INFRAIA-2016-2017
Topic Identifier:	INFRAIA-01-2016-2017
Topic Title:	Integrating and opening research infrastructures of European interest
Deadline(s):	30.03.2016

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2124-infraia-01-2016-2017.html

Specific Challenges: European researchers need effective and convenient access to the best research infrastructures in order to conduct research for the advancement of knowledge and technology. The aim of this action is to bring together, integrate on European scale, and open up key national and regional research infrastructures to all European researchers, from both academia and industry, ensuring their optimal use and joint development.

Scope: 'Advanced Communities' are scientific communities whose research infrastructures show an advanced degree of coordination and networking at present, attained, in particular, through Integrating Activities awarded under FP7 or previous Horizon 2020 calls.

An Integrating Activity will mobilise a comprehensive consortium of several key research infrastructures[[Exceptionally, the consortium may include only one research infrastructure providing access, if this facility is of a truly unique nature.]] in a given field as well as other stakeholders (e.g. public authorities, technological partners, research institutions) from different Member States, Associated Countries and other third countries[[Legal entities established in Australia, Brazil, Canada, China, India, Japan, Russia, Mexico and **USA**, which provide, under the grant, access to their research infrastructures to researchers from Members States and Associated countries, are eligible for funding from the Union.]] when appropriate, in particular when they offer complementary or more advanced services than those available in Europe.

Funding will be provided to support, in particular, the trans-national and virtual access provided to European researchers (and to researchers from Third Countries under certain conditions), the cooperation between research infrastructures, scientific communities, industry and other stakeholders, the improvement of the services the infrastructures provide, the harmonisation, optimisation and improvement of access procedures and interfaces.

To this extent, an Integrating Activity shall combine, in a closely co-ordinated manner:

i. Networking activities, to foster a culture of co-operation between research infrastructures, scientific communities, industries and other stakeholders as appropriate, and to help develop a more efficient and attractive European Research Area;
ii. Trans-national access or virtual access activities, to support scientific communities in their access to the identified key research infrastructures;
iii. Joint research activities, to improve, in quality and/or quantity, the integrated services provided at European level by the infrastructures.

All three categories of activities are mandatory as synergistic effects are expected from these different components.

Access should be provided only to key research infrastructures of European interest, i.e., those infrastructures able to attract significant numbers of users from countries other than the country where they are located. Other national and regional infrastructures in Europe can be involved, in particular in the networking activities, for the exchange of best practices, without necessarily being beneficiaries in the proposal.

Proposals from advanced communities will have to clearly demonstrate the added value and the progress beyond current achievements in terms of integration and services, of a new grant. The strongest impact for advanced communities is expected typically to arise from focusing on innovation aspects and widening trans-national and virtual access provision. Furthermore, in particular for communities supported in the past under three or more integrating activities, the creation of strategic roadmaps for future research infrastructure developments as well as the long-term sustainability of the integrated research infrastructure services provided at European level, need to be properly addressed. The latter requires the preparation of a sustainability plan beyond the grant lifecycle as well as, where appropriate, the involvement of funders.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), Integrating Activities should, whenever appropriate, pay due attention to any related international initiative (i.e. outside the EU) and foster the use and deployment of global standards.

Integrating Activities should also organise the efficient curation, preservation and provision of access to the data collected or produced under the project, defining a data management plan, even when they opt out of the Pilot on Open Research Data. Data management (including ethics and privacy issues), interoperability, as well as advanced data and computing services should be addressed where relevant. To this extent, proposals should build upon the state of the art in ICT and e-infrastructures for data, computing and networking, working in cooperation with e-infrastructure service providers.

Integrating Activities should in particular contribute to fostering the potential for innovation, including social innovation, of research infrastructures by reinforcing the partnership with industry, through e.g. transfer of knowledge and other dissemination activities, activities to promote the use of research infrastructures by industrial researchers, involvement of industrial associations in consortia or in advisory bodies.

Integrating Activities are expected to duly take into account all relevant ESFRI and other world-class research infrastructures to exploit synergies, to reflect on sustainability and to ensure that rationally designed, comprehensive and coherent overall concepts for European Infrastructures are being pursued.

As the scope of an integrating activity is to ensure coordination and integration between all the key European infrastructures in a given field and to avoid duplication of effort, at most one proposal per area is expected to be submitted.

Further conditions and requirements that applicants should fulfil when drafting a proposal are given in part C 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 of up to EUR 10 million would allow this topic to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

On the basis of a multiannual plan drafted taking into account the assessment and the timing of previous grants as well as strategic priorities and needs, in term of research infrastructures services, emerging from other parts of Horizon 2020, this work programme invites proposals addressing the following areas listed under the different domains. A balanced coverage of the various domains, in line with the distribution of areas per domain, is expected as outcome of this topic.

Biological and Medical Sciences

Facilities for high throughput DNA sequencing.

This activity aims at integrating the key research infrastructures in Europe as well as leading-edge research infrastructures located in third countries to open them up to European researchers. Adequate consideration should be taken of the produced data and its availability for research. In this respect, synergies with other relevant ESFRI Infrastructures, in particular ELIXIR, should be duly exploited.

Vaccine infrastructures.

This activity aims at bridging the 'translational gap' in biomedical research by providing academia- and SME- driven vaccine R&D with high quality services to support vaccine formulation, access to GMP (Good Manufacturing Practices), preclinical studies including relevant animal models, vaccine trials, compilation of regulatory dossiers and advice on production issues like upscale and quality control. Both human and veterinary vaccines, for prophylactic and therapeutic applications, should be addressed. Furthermore, work shall be carried out towards integration with the ESFRI Infrastructures EATRIS and INSTRUCT to ensure sustainability of the trans-national access services. Synergies with other relevant ESFRI Infrastructures, such as ECRIN, should be duly exploited.

Experimental facilities for animal disease and infectiology (including zoonoses).

A project under this topic must provide and facilitate access to the key experimental facilities under BSL3 conditions in Europe for animal and zoonotic infectious diseases. It will also include key collections of samples necessary for research on animal and zoonotic infectious diseases. The project should aim to integrate these facilities and resources with a long term perspective. It should also develop the necessary collaborations outside Europe, towards a global sharing of available resources.

Centres for replacement, reduction and refinement (3 Rs) of non-human primate testing.

This activity aims at integrating the key non-human primate centres in Europe promoting 3 Rs, i.e. replacement, reduction, and refinement. The proposal will contribute to the objective of 3Rs, reinforcing the implementation of ethical and good practices at European level, and the protection of animals used in scientific experiments, as framed by the directive 86/609/EEC, and by the Commission proposal for its revision, COM(2008)543. The proposal should also develop the necessary collaborations outside Europe.

Facilities and resources for plant phenotyping.

This activity aims at providing and facilitating access to the key research infrastructures in Europe for high throughput plant phenotyping. It should aim to integrate these facilities and resources with a long term perspective, improving coordination, as regards standards, protocols, access modalities, etc. The project should also develop the necessary collaborations outside Europe, towards a coordinated development of such facilities and resources. The facilities should enable more efficient European research to be conducted in plant genetics, plant physiology and bio-ecology, under controlled conditions.

Marine biological stations.

This activity aims at improving and further integrating access to a wide range of marine biology and ecology resources for research, including: marine biodiversity and associated historical time-series data; culture collections of marine biological resources; marine model organisms, including specific genetic resources; up-to-date equipment for biological research (“omics”); and rare and unique facilities for experimental biology and ecology. It should also stimulate knowledge and technology transfer to industry and to public policy-makers. Synergies with relevant ESFRI Infrastructures, in particular EMBRC, should be duly exploited.

Research Infrastructures for the control of vector-borne diseases.

This activity aims at integrating specialised facilities in Europe for the study of insect-transmitted disease with the objective to validate and roll out new control measures targeting insect vectors that pose the greatest threats to human health and animal industries. These facilities, supporting research and product development, include P3 secure insectaries for research on vectors and pathogens, large scale production of mosquitoes, facilities for the testing and evaluation of insecticides, and facilities for high-

throughput genetic analysis of insect vectors and pathogens. The facilities of this activity and associated networking and research activities will play a critical role in consolidating European leadership in the field of insect vector biology and disease control. Synergies with relevant ESFRI Infrastructures such as ELIXIR should be duly exploited.

Energy

Research Infrastructures for research on biomass conversion and biorefinery.

This activity aims at integrating the key research infrastructures in Europe for the advanced conversion technologies of biogenic feedstock. Research Infrastructures to be integrated would be laboratory and pilot-scale installations as well as demonstration plants (facilities like furnaces, gasifiers, fermenters, biorefineries, etc.) for carrying out research in the fields of: combustion and thermal gasification of solid fuels, modelling, gas cleaning, second and third generation biofuels with emphasis on marine biomass, anaerobic digestion, biomethane production from organic waste and green biorefinery (sustainable processing of biomass into a marketable spectrum of products). The issue of the use of new feedstock is an integral part of the activity. This activity will support the European Strategic Energy Technology Plan (SET-Plan, COM (2007)723).

Research Infrastructures for offshore renewable energy.

This activity aims at integrating the key research infrastructures in Europe for research, development and testing of offshore wind and ocean energy systems including electrical sub systems and grid integration through a range of TRLs (from laboratory scale TRL 1/2 through to open ocean at TRL 6/7). Trans-national access should open existing pilot and demonstration plants as well as laboratory scale installations from wave basins to large scale open sea test sites. This activity will support the European Strategic Energy Technology Plan (SET-Plan, COM (2007)723) including emerging concepts of multi-purpose platforms.

Environmental and Earth Sciences

Research infrastructures for terrestrial research in the Arctic.

This activity should integrate, as an international network for terrestrial research and monitoring in the Arctic, key research stations and large research field sites throughout the circumpolar Arctic and adjacent northern countries, aiming at implementing capacity for research, monitoring and education. The project should include work on best practises for managing stations, and (international) logistics. The network should link with marine and atmospheric networks, aiming at close cooperation.

Research Infrastructures for earthquake hazard.

This activity aims at integrating the key research infrastructures in Europe for natural and anthropogenic earthquake risk assessment and mitigation. More integrated services from seismic and engineering infrastructures would contribute to supporting the reduction of vulnerability of European citizens and constructions to earthquakes. International collaboration activities and the further integration of the research field are encouraged. Synergies with relevant ESFRI Infrastructures, in particular EPOS, should be duly exploited.

Mesocosms facilities for research on marine and freshwater ecosystems.

This activity aims at integrating leading mesocosm infrastructures in Europe enabling in particular research on impact of climate change, pollution and other disturbance on ecosystems, from Mediterranean to Arctic.

Atmospheric simulation chambers.

This activity should further integrate key instrumented environmental chambers and improve access to them for atmospheric research, including model development, while expanding to larger scientific communities and interdisciplinary research fields. It is expected that this community work towards close cooperation with relevant ESFRI Infrastructures. By developing their complementary nature, the different research infrastructures should answer broad scientific needs such as studies of the impact of atmospheric processes e.g. on regional photochemistry, global change, as well as cultural heritage and human health effects. Building on the former integrating initiatives, the development of a strategic integrating structure should also be considered.

Research infrastructures for forest ecosystem and resources research.

This activity aims at integrating and facilitating broad access to forest research facilities and methodologies with a view to enabling, coordinating and harmonising research and monitoring including investigation of the biological effects of air pollution and mitigation and adaptation to climate change. Access should be provided to data on genetic and species diversity in forest ecosystems. Support for development of forest management approaches should be part of the project, taking into account environmental and land use changes and the bio-economy.

Sites, experimental platforms and data collections of anthropogenic impacts for ecosystem functioning and biodiversity research.

This activity aims at bringing together highly instrumented experimental, analytical and modelling facilities, looking at all major European ecosystem types and all major pressures on them. It will optimise the collaborative use of these sites by a large scientific community. Efficient methods and techniques will be implemented for rapid data sharing and processing at the European level. Synergies with relevant ESFRI Infrastructures such as ANAEE should be duly exploited.

Multidisciplinary Marine Data Centres for ocean and marine data management.

This activity aims at providing and facilitating access to the key data centres in Europe for in-situ and remote sensing data for marine research (including coastal research). It must present a long-term sustainable perspective on the integration of these facilities and related resources. It should enhance and innovate the services offered to an expanded multidisciplinary community and promote the adoption of the developed protocols and standards for interoperability to other key downstream initiatives in the field. Synergies with relevant ESFRI Infrastructures should be duly exploited.

Mathematics and ICT

Integrating activity for facilitating access to HPC (High Performance Computing) centers.

This activity aims at furthering the services harmonisation and enhancement of national and regional High Performance Computing Centres of pan-European interest and at enlarging the European HPC user base preparing it to the use of the top end HPC resources such as PRACE (Partnership for Advanced Computing in Europe). It will widen trans-national access to HPC resources across different disciplines and for a wide range of applications including advanced simulation and modelling.

Material Sciences and Analytical facilities

Research Infrastructures for advanced spectroscopy, scattering/ diffraction and imaging of materials.

This activity aims at integrating the key research infrastructures in Europe to offer electronic, X-ray, optic and magnetic inspection techniques, and their combinations, for the analysis and engineering of novel materials ranging from hard to soft matter. Such infrastructures would allow the detailed understanding and optimisation of the physical, chemical and biological properties of the materials.

Synchrotron radiation sources and Free Electron Lasers.

This activity should provide and facilitate access of a wide range of user communities to the key research infrastructures in Europe based on Synchrotron and Free Electron Laser light sources. It aims to further integrate these facilities and resources with a long term perspective. It should also stimulate new scientific activities taking full advantage of new experimental possibilities offered by new light sources such as the European X-Ray Laser ("XFEL").

Facilities for research on materials under extreme magnetic conditions.

This activity aims at integrating key research facilities for high magnetic fields. The activity should enable a wider research community to perform experiments in physics and materials science.

Infrastructures for Neutron Scattering and Muon Spectroscopy.

This activity should provide and facilitate wider access to the key research infrastructures in Europe for Neutron scattering and Muon Spectroscopy. It must present a long-term sustainable perspective on the integration of these facilities and related resources. The

activity should also stimulate new scientific activities taking full advantage of new experimental possibilities offered by the future European Spallation Source ("ESS").

Physical Sciences

Research Infrastructures for advanced radio astronomy.

This activity should provide and facilitate access to the key research infrastructures in Europe for advanced radio astronomy, including Very Long Baseline Interferometry. It must present a long-term sustainable perspective on the integration of these facilities and related resources. A project under this topic should also stimulate new scientific activities aimed at taking full advantage of new possibilities which will be offered by relevant initiatives on the ESFRI Roadmap.

Research Infrastructures for optical/IR astronomy.

This activity should provide and facilitate access to the key research infrastructures in Europe for optical and infrared astronomy. It must present a long-term sustainable perspective on the integration of these facilities and related resources. Furthermore, it should also stimulate new scientific activities aimed at taking full advantage of new possibilities which will be offered by relevant initiatives on the ESFRI Roadmap.

Research Infrastructures for hadron physics.

This activity must provide and facilitate access to key research infrastructures in Europe for studying the properties of nuclear matter at extreme conditions, turning advances in hadron physics experimentation into new applications. It must present a long-term sustainable perspective on the integration of relevant facilities and related resources. Furthermore, it should also target new users and stimulate new scientific activities aimed at taking full advantage of new possibilities which will be offered by relevant initiatives on the ESFRI Roadmap, in particular FAIR.

Particle Accelerators.

A project under this topic should facilitate access to state-of-the-art facilities to develop new techniques for improving the performance of existing and future accelerators. It should include accelerators for nuclear and particle physics and accelerator-based photon sources. It must present a long-term sustainable perspective on the integration of relevant facilities and related resources. A project under this topic should complement and further new scientific activities aimed at taking full advantage of new possibilities which will be offered by relevant initiatives on the ESFRI Roadmap.

Social Sciences and Humanities

Access to European Social Science Data Archives and Official Statistics.

A project under this topic should aim at a further improvement of the researcher's access to official statistics. Work should address technologies for secured trans-national access to sensitive data. Synergies with relevant ESFRI Infrastructures, in particular CESSDA, should be duly exploited.

Research infrastructures for the study of poverty, working life and living conditions.

The aim of this activity is to bring together research infrastructures serving European and international research in the fields of poverty, working life, and living conditions. It will compile historical data, and provide instruments for the analysis of the effects of employers' behaviour and the evaluation of labour market and social policies targeted to vulnerable groups as well as offer training to researchers interested in the use of these instruments.

Expected Impact:

- Researchers will have wider, simplified, and more efficient access to the best research infrastructures they require to conduct their research, irrespective of location. They benefit from an increased focus on user needs.
- Operators of related infrastructures develop synergies and complementary capabilities, leading to improved and harmonised services. There is less duplication of services, leading to an improved use of resources across Europe. Economies of scale and saving of resources are also realised due to common development and the optimisation of operations.

- Innovation is fostered through a reinforced partnership of research organisations with industry.
- A new generation of researchers is educated that is ready to optimally exploit all the essential tools for their research.
- Closer interactions between larger number of researchers active in and around a number of infrastructures facilitate cross-disciplinary fertilisations and a wider sharing of information, knowledge and technologies across fields and between academia and industry.
- For communities which have received three or more grants in the past, the sustainability of the integrated research infrastructure services they provide at European level is improved.
- The integration of major scientific equipment or sets of instruments and of knowledge-based resources (collections, archives, structured scientific information, data infrastructures, etc.) leads to a better management of the continuous flow of data collected or produced by these facilities and resources.
- When applicable, the integrated and harmonised access to resources at European level can facilitate the use beyond research and contribute to evidence-based policy making.
- When applicable, the socio-economic impact of past investments in research infrastructures from the European Structural and Investment Funds is enhanced.

Horizon 2020 Pillar: Excellent Science

Programme: Research infrastructures

Activity/Topic: Integrating Activities for Starting Communities

Call Identifier: H2020-INFRAIA-2016-2017

Topic Identifier: INFRAIA-02-2017

Topic Title: Integrating and opening research infrastructures of European interest

Deadline(s): 30.03.2016
Stage 2: 29.03.2017

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2123-infraia-02-2017.html

Specific Challenges: European researchers need effective and convenient access to the best research infrastructures in order to conduct research for the advancement of knowledge and technology. The aim of this action is to bring together, integrate on European scale, and open up key national and regional research infrastructures to all European researchers, from both academia and industry, ensuring their optimal use and joint development.

Scope: A 'Starting Community' has never been supported for the integration of its infrastructures under FP7 or Horizon 2020 calls, in particular within an integrating activity.

An Integrating Activity will mobilise a comprehensive consortium of several key research infrastructures[[Exceptionally, the consortium may include only one research infrastructure providing access, if this facility is of a truly unique nature.]] in a given field as well as other stakeholders (e.g. public authorities, technological partners, research institutions) from different Member States, Associated Countries and other third countries[[Legal entities established in Australia, Brazil, Canada, China, India, Japan, Russia, Mexico and **USA**, which provide, under the grant, access to their research infrastructures to researchers from Members States and Associated countries, are eligible for funding from the Union.]] when appropriate, in particular when they offer complementary or more advanced services than those available in Europe.

Funding will be provided to support, in particular, the trans-national and virtual access provided to European researchers (and to researchers from Third Countries under certain conditions), the cooperation between research infrastructures, scientific communities, industries and other stakeholders, the improvement of the services the infrastructures provide, the harmonisation, optimisation and improvement of access procedures and interfaces.

To this extent, an Integrating Activity shall combine, in a closely co-ordinated manner:

i. Networking activities, to foster a culture of co-operation between research infrastructures, scientific communities, industries and other stakeholders as appropriate, and to help develop a more efficient and attractive European Research Area;
ii. Trans-national access or virtual access activities, to support scientific communities in their access to the identified key research infrastructures;

iii. Joint research activities, to improve, in quality and/or quantity, the integrated services provided at European level by the infrastructures.

All three categories of activities are mandatory as synergistic effects are expected from these different components.

Access should be provided only to key research infrastructures of European interest, i.e., those infrastructures able to attract significant numbers of users from countries other than the country where they are located. Other national and regional infrastructures in Europe can be involved in the project, in particular in the networking activities for the exchange of best practises, without necessarily be beneficiaries of the action.

The research infrastructures of a 'Starting Community' usually show a limited degree of coordination and networking at present. The strongest impact of an integrating activity is expected typically to arise from a focus on networking, standardisation and establishing a common access procedure for trans-national and/or virtual access provision.

In line with the strategy for EU international cooperation in research and innovation (COM(2012)497), Integrating Activities should, whenever appropriate, give due attention to any related initiatives internationally (i.e. outside the EU) and foster the use and deployment of global standards.

Integrating Activities should also organise the efficient curation, preservation and provision of access to the data collected or produced under the project, defining a data management plan, even when they opt out of the Pilot on Open Research Data. Data management, interoperability (definition of metadata and ontologies) as well as advanced data and computing services should be addressed where relevant. To this extent, proposals should build upon the state of the art in ICT and e-infrastructures for data, computing and networking, working in cooperation with e-infrastructure service providers.

Integrating Activities in particular should contribute to fostering the potential for innovation, including social innovation, of research infrastructures by reinforcing the partnership with industry, through e.g. transfer of knowledge and other dissemination activities, knowledge sharing through co-creation, activities to promote the use of research infrastructures by industrial researchers, involvement of industrial associations in consortia or in advisory bodies.

Integrating Activities are expected to duly take into account all relevant ESFRI and other world-class research infrastructures to exploit synergies, to reflect on sustainability and to ensure that rationally designed, comprehensive and coherent overall concepts for European Infrastructures are being pursued.

As the scope of an Integrating Activity is to ensure coordination and integration between all the key European infrastructures in a given field and to avoid duplication of effort, at most one proposal per area is expected to be submitted.

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

Integrating activities for starting communities range across all areas of science and technology. Proposals should not restrict their services to too narrow research fields and should address the wider scientific communities, even multidisciplinary ones, which can be served by the involved sets of research infrastructures.

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

Expected Impact:

- Researchers will have wider, simplified, and more efficient access to the best research infrastructures they require to conduct their research, irrespective of location. They benefit from an increased focus on user needs.

- Operators of related infrastructures develop synergies and complementary capabilities, leading to improved and harmonised services. There is less duplication of services, leading to an improved use of resources across Europe. Economies of scale and saving of resources are also realised due to common development and the optimisation of operations.
- Innovation is fostered through a reinforced partnership of research organisations with industry.
- A new generation of researchers is educated that is ready to optimally exploit all the essential tools for their research.
- Closer interactions between larger number of researchers active in and around a number of infrastructures facilitate cross-disciplinary fertilisations and a wider sharing of information, knowledge and technologies across fields and between academia and industry.
- The integration of major scientific equipment or sets of instruments and of knowledge-based resources (collections, archives, structured scientific information, data infrastructures, etc.) leads to a better management of the continuous flow of data collected or produced by these facilities and resources.
- When applicable, the integrated and harmonised access to resources at European level can facilitate the use beyond research and contribute to evidence-based policy making.
- When applicable, the socio-economic impact of past investments in research infrastructures from the European Structural and Investment Funds is enhanced.

Industrial Leadership

Horizon 2020 Pillar:	Industrial Leadership
Programme:	Leadership in enabling and industrial technologies (LEIT)
Activity/Topic:	5G PPP Research and Validation of critical technologies and systems
Call Identifier:	H2020-ICT-2016-2017
Topic Identifier:	ICT-07-2017
Topic Title:	Information and Communication Technologies Call
Deadline(s):	08.11.2016

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5064-ict-07-2017.html

Specific Challenges: This challenge frames the 5G PPP initiative, whose phase 2 will be implemented under this LEIT-ICT Work Programme. The challenge is to eliminate the current and anticipated limitations of network infrastructures, by making them capable of supporting a much wider array of requirement than is the case today and with capability of flexibly adapting to different "vertical" application requirements. The vision is that in ten years from now, telecom and IT will be integrated in a common very high capacity and flexible 5G ubiquitous infrastructure, with seamless integration of heterogeneous wired and wireless capabilities. 5G Networks have to cover a wide range of services from different use case and application areas/verticals, for increasingly capable user terminals, and for an extremely diverse set of connected machines and things; to cope with an increasingly cloud-based service access (›90% of the internet traffic will go through data centres); to support a shift from the “Client-Server” model to “Anything” as a Service (XaaS), without needs of owning hardware, software or the cognitive objects themselves. Network elements will become "computing equivalent" elements that gather programmable resources, interfaces and functions based on virtualisation technologies, to implement control functionalities ad-how as a function of the use case.

This challenge includes optimisation of cost functions (capex/opex) and of scarce resources (e.g. energy, spectrum), as well as migration towards new network architectures.

A particular issue is to leverage work and results of phase 1 (WP 2014-15)[[This is not limited to results worked out under the H2020 context, but may include results from other R&I initiatives, e.g. in Member States]] and to accelerate on proof of concepts and demonstrators. Where technological maturity permits, validation of research results, of the most demanding KPI's and of the most promising 5G technology options will be supported by experimental testing conducted in the context of use case in active cooperation with the various potential "vertical" sectors driving the innovative requirements. This validation activity is also expected to be boldly leveraged in the context of the important standardisation (3G PP) and spectrum (WRC 19) milestones that will appear over this WP implementation period.

Scope:

a. Research and Innovation Actions covers three strands that complement each other. Proposal may address parts of a strand or parts that cut across several strands.

Strand 1 covers wireless access and radio network architecture/technologies:

- Novel air interface technologies i) supporting efficiently a heterogeneous set of requirements from low rate sensors including mission critical M2M communications to very high rate HD/3D TV and immersive services; ii) supporting local and wide area systems, heterogeneous multi-layer deployments, assuring uniform performance coverage, capacity, e.g. through advanced Multi Antenna Transceiver Techniques, including 3D and massive MIMO beam-forming; iii) enabling usage of frequency bands above 6GHz, for ultra-high speed access, backhaul and fronthaul, based on fully characterised channel models.
- Hardware architectures technologies and building blocks for 5G low cost low-within relevant spectrum range;
- (Radio) Network functional architectures and interfaces leading to a stable vision / reference architecture for 5G in support of the standardisation work expected to culminate under the 2017-2020 period. It provides a platform for technical coordination with other 5G initiatives. This architecture efficiently supports different deployment topologies ranging from fully distributed to fully centralised, with reduced management complexity and minimised signalling overhead. It also covers technologies like WiFi. It supports the "5G services and verticals" framework embracing the machine-type of communication services, the Internet of Things. It covers solutions that unify connection, security, mobility, multicast/broadcast and routing/forwarding management capable of instantiating any type of virtual network architecture;
- Co-operative operation of heterogeneous access networks integrating virtual radio functions into service delivery networks, including broadcast/multicast technologies (terrestrial and satellite based) and supporting Software Defined Networking (SDN) and virtualisation techniques of RAN functions, providing the environment for multi-base station attachment;
- Support of numerous devices with different capabilities, with unified connectivity management capabilities, in terms of security, mobility and routing. It includes cloud and edge computing for low latency requirements and carrier grade communications for Machine Type Communications (MTC) with resource-constrained sensor and actuator nodes with multi-year battery life operation;
- Coordination and optimization of user access to heterogeneous radio accesses including ultra-dense networks, supported by intelligent radio resource management framework. This covers the joint management of the resources in the wireless access and the backhaul/fronthaul as well as their integration with optical or legacy copper networks;
- Multi-tenancy for Radio Access Network (RAN) sharing, covering ultra-dense network deployments with the ability to allocate traffic to shared MNOs infrastructure while satisfying their SLAs. Load and deployment are key aspects. Impacts in other segments of the network (e.g., backhaul), is taken into account for joint management;
- Integration of Satellite Networks to support ubiquitous coverage, resilience, specific markets, and where appropriate further complement terrestrial technologies (e.g. in traffic off loading, backhaul, or content delivery).

Strand 2: High capacity elastic - optical networks

The objective is to support very high traffic and capacity increase originating from an (5G) heterogeneous access networks with matching capabilities from the core and metro environments, at ever increasing speeds and in more flexible and adaptive form. It covers new spectrally efficient, adaptive transmission, networking, control and management approaches to increase network capacity by a factor of >100 while at the same time providing high service granularity, guarantees for end-to-end optimization and QoS - reducing power consumption, footprint and cost per bit and maintaining reach. The integration of such new optical transport and transmission designs with novel network control and management paradigms (e.g., SDN) are expected to enable programmability.

Disruptive approaches for a massive capacity scaling may impact network infrastructure, and system architectures which need to be assessed for integration and migration aspects.

Strand 3 covers the "Software Network", including work on:

- Software network architecture to support an access agnostic converged core network and control framework enabling next generation services (including services for vertical sectors) and integrating next generation access and devices. The architecture leverages the SDN/NFV paradigm and is able to integrate/manage next generation transport and optical technologies, both for backhaul and fronthaul, to flexibly meet increasing system capacity requirements;
- A unified management of connectivity, with end to end security mobility and routing (including multicast/broadcast) beyond current concepts (e.g. tunnelling) for flexible introduction of new services. This aims at a unified physical infrastructure and includes corresponding abstractions – (virtual) resources, functions, hardware etc. – for control and orchestration. Solutions to provision SDN networks across administrative boundaries (e.g. multiple operators, customer networks, datacentres) and interoperability issues between multiple SDN control domains are in scope;
- Solutions (e.g API's and corresponding abstractions) that allow re-location or anycast search of services and their components, as a function of the context. This includes problems involved in portability of virtual network functions and naming of deployed functions and services. It supports co-existence of multiple network domains and easy migration;
- Scalability and efficiency related to increasing deployment of software-based network equipment and functions as well as corresponding more diverse services and usages. These include ease of deployment of multitenant networks, cost and energy efficiency, "five 9" reliability, flexibility and perceived "zero latency" where relevant;
- Realisation of the "plug and play vision" for computing, storage and network resources through appropriate abstraction, interfaces, and layering. It covers the full network infrastructure from core network to heterogeneous access, also with integration of the 5G architecture with legacy infrastructure. The target is for a Network Operating System (NOS) with hardware and user interfaces to manage and orchestrate unified access to computing, storage, memory and networking resources. The approach towards a NOS may also be considered in the context of experimental facilities, in view of integrating multiple heterogeneous European experimental facilities. The goal is to allow proper testing and comparison of the different 5G technological components. OSS solutions are preferred;
- Management and security for virtualised networks and services to support service deployment decisions related with location and lifecycle management of network functions, and flexible configuration of network nodes. Network analytics tools, knowledge reasoning and cognition, may be extended towards network operations to cope with complex, heterogeneous, and dynamic networks featuring large numbers of nodes, and to correlate all monitoring sources in order to create a real-time supervision of Quality of Service and Quality of Experience. Management of security (privacy where appropriate) across multiple virtualised domains is a key aspect to be cobered by this call.

For the 3 strands above, projects will be implemented as a programme and be expected to actively contribute key horizontal results to the integration process led by the programme level CSA. Therefore all grants awarded under this topic will be complementary to each other and to the grant agreement(s) under the topic ICT-08-2017 a). The respective options of Article 2, Article 31.6 and Article 41.4 of the Model Grant Agreement will be applied [[http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/amga/h2020-amga_en.pdf]]. International cooperation with clear EU industrial benefits may be considered, preferably with nations having launched strategic 5G initiatives (e.g. China, Japan, South Korea, Taiwan, **USA**).

The Commission considers that proposals requesting a contribution from the EU of between EUR 5 and 8 million would allow this area to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts, in particular for proposals targeting significant experiment/demonstrations activities in relation to well identified use cases justifying higher amounts.

b. Coordination and Support Actions

5G PPP projects will be implemented as a programme through the use of complementary grants and the respective options of Article 2, Article 31.6 and Article 41.4 of the Model Grant Agreement [[http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/amga/h2020-amga_en.pdf]] will be applied. This calls for activities to ensure a sound programmatic view of the implemented 5G Research and Innovation Actions (RIA) and Innovation Actions (IA) results. The proposed support actions shall liaise with the 5G RIA and IA actions to exploit synergies in the implementation of the activities that include:

- Programme level integration through management and orchestration of 5G PPP project cooperation for horizontal issues of common interests (security, energy efficiency, spectrum, standardisation, societal impact of 5G…) in support of the commitments of the 5G PPP contractual arrangement and mapping the strategic programme of the 5G industrial Association;
- Portfolio analysis, coverage, mapping and gap analysis, roadmaps for key PPP technologies and for experimental requirements and facilities, also taking into account national developments;
- Proactive support to the emergence of a 5G PPP "5G vision", to key international co-operation activities. A clear proactive strategy is expected to channel relevant 5G PPP project outcomes towards key SDO's like 3G PP (standardisation work expected to start in 2016) and to valorise relevant spectrum work in the context of future WRC's;
- Organisation of stakeholder events, including reaching out to users and key verticals;
- Monitoring of the openness, fairness and transparency of the PPP process, including sector commitments and leveraging factor;
- Maintenance of the "5G web site".

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

Expected Impact:

a. Research and Innovation Actions

- Overarching impact: 40% of the world communication infrastructure market for EU headquartered companies;
- Demonstrated progress towards core 5G PPP KPI's: 1000x capacity, 1ms latency, 90% energy savings, 10x battery lifetime, service creation in minutes, better/increased/ubiquitous coverage, 10 times to 100 times higher typical user data rate, 10 times lower energy consumption for low power Machine type communication, Lowered EMF levels compared to LTE solutions;
- Novel business models through innovative sharing of network resources across multiple actors;
- Finer grained management of optical metro and core capacity and capacity increase by a factor of 100 (only for Strand 2);
- Optimised optical backhaul architectures and technologies (only for Strand 2);
- Ubiquitous 5G access including in low density areas (only for Strand 1 and 2);
- Definition of 5G network architecture and of core technological components (only for Strand 1 and 3);

- Proactive contribution to the 3G PP standardisation activity on 5G, and to other standardisation activities, e.g. ONF, ETSI-NFV, IEEE; proactive contribution to the WRC 19 preparation for 5G spectrum.
- Proof-of-concept and demonstrators beyond phase one and validating core functionalities and KPI's in the context of specific use cases with verticals closely associated to the demonstrations and validation. Indicative sectors include: automotive, connected cars; eHealth; video/TV broadcast; Energy management; very high density locations and events (only for Strand 1 and 3);
- Novel connectivity paradigms, beyond the Client server model and enabling massive edge network deployments (only for Strand 1 and 3);
- Network function implementation through generic IT servers (target) rather than on non-programmable specific firmware (today) (only for Strand 3);
- OS like capabilities to orchestrate network resources (only for Strand 3);
- Trustworthy interoperability across multiple virtualised operational domains, networks and data centres;
- Solutions for the management of multi domain virtualised networks with coverage of security architectures based on industry characterised threat models.

b. Coordination and Support Actions
   - Maximised output and exploitation of 5G PPP project results in key domains (standardisation, spectrum) through managed projects cooperation on horizontal issues;
   - Constituency building, stakeholder support, support to key international cooperation events; dissemination, support to core international cooperation activities, to relevant stakeholder events;
   - Definition of future R&I actions through roadmapping.

Horizon 2020 Pillar: Industrial Leadership

Programme: Leadership in enabling and industrial technologies (LEIT)

Activity/Topic: 5G PPP Convergent Technologies

Call Identifier: H2020-ICT-2016-2017

Topic Identifier: ICT-08-2017

Topic Title: Information and Communication Technologies Call

Deadline(s): 08.11.2016

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5062-ict-08-2017.html

Specific Challenges: Network and service providers are faced with increasing challenges to manage convergence technologies. On the one hand, technological versatility increases service provision capabilities, with ever raising possibilities to dimension service offer to context and user specific SLA's. On the other hand, convergence technologies are getting increasingly complex, with ever larger integration of multiple technological heterogeneous hardware and software components, and more difficult properties to characterise at scale. The challenge thus tackles scalability and usability of mixed network technological approaches that can benefit from previous research, towards validation of deployment at scale.

Scope:

a. Innovation actions

Strand 1: Ubiquitous 5G access leveraging optical technologies

5G access networks have to dramatically grow in user capacity, quality of service, responsiveness, energy efficiency and number of connected devices while keeping a sustainable cost.

The objective is to develop and assess new optical access network solutions based on integrated optical device prototypes. Novel integrated devices and subsystems may cover new optical transmission, switching and information processing techniques to support key access functionalities such as beam forming, high accuracy cm/mmWave generation and massive MIMO deployments. They may also be based on new network concepts and control architectures. Co-operative radio-optical approaches are seen as very promising, also to cover intelligent interference cancellation. Techniques to map 5G channels to optical transport and a co-design of the optical and wireless interfaces and protocols are also targeted, to increase capacity and reduce latency, especially in highly dense 5G scenarios. The work draws on existing scientific and research results in the field and includes scalable demonstrators validated through typical usage scenario.

Strand 2: Flexible network applications

The work leverages the current intense research activities in relation to Virtualised Network Functions (VNF) and targets development of a multiplicity of VNF's useful to operators, service providers and users. Service providers or third party providers should be able to assemble these virtualised 5G functions as "network apps" from an NFV hosting infrastructure, to deploy them in the relevant network nodes, to orchestrate and customise resources to provision user services. The target is for a cloud like 5G infrastructures, supporting network services, resource and service orchestration. This

environment also provides an open source development framework for control functionalities and application developments. It also provides the link between the network –terminal functions and the app/content providers towards standards developments. The platform will be opened to third party developers to demonstrate network "apps".

For the strands above, projects will be implemented as a programme and will be expected to actively contribute key horizontal results to the integration process led by the programme level CSA. Therefore all grants awarded under part a) of this topic will be complementary to each other and to the grant agreement(s) under the topic ICT-07-2017. The respective options of Article 2, Article 31.6 and Article 41.4 of the Model Grant Agreement will be applied [[http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/amga/h2020-amga_en.pdf]]. International cooperation with clear EU industrial benefits may be considered, preferably with nations having launched strategic 5G initiatives (e.g. China, Japan, South Korea, Taiwan, **USA**).

The Commission considers that proposals requesting a contribution from the EU of between EUR 5 and 8 million would allow this area to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Minimum one action per strand will be selected.

b. Research and Innovation Actions – Cooperation in access convergence

This activity takes advantage of the supporting 5G research and demonstration facilities offered by Taiwan towards collaborative 5G research with the EU, and aims at developing and demonstrating an integrated convergent access across different air interface technologies and the fronthaul/backhaul/core network. Test beds making use of facilities offered by Taiwanese partners are targeted. It demonstrates the capabilities of new spectrum access schemes, including for co-working with the network. A system demonstrator showing applications potential is thus favoured, e.g. for high speed moving vehicles.

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

Expected Impact:

a. Innovation Actions

- Validated access network architecture with integrated optical technologies for the realisation of critical access and transport control function (only for Strand 1);
- Demonstration of technological applicability to dense access scenarios supporting the 1000 capacity increase objective (only for Strand 1);
- Demonstrated scalability, close to operational context, of the proposed technological approach (only for Strand 1);
- Contribution to standards, notably 5G and optical access (only for Strand 1);
- Optical access interface with 10 times lower energy consumption (only for Strand 1);
- Open environments for creation of network apps (only for Strand 2);
- Open repository of network apps that may be validated and leveraged by third party developers (only for Strand 2);
- Validation at scale of the VNF aggregation capability of the proposed environment (only for Strand 2).

b. Research and Innovation Actions – Cooperation in access convergence

- Contribution to the ITU-R objectives for the next generation mobile network including requirements on data rates, mobility, connection density, latency, energy efficiency, spectrum efficiency, and traffic volume density

- Contribution to the 1000 fold mobile traffic increase per area, in the context of the target application
- Contribution to the 1ms latency objective in the context of the target application
- Results exploitation in the context of standardization and spectrum requirements

Horizon 2020 Pillar: Industrial Leadership

Programme: Leadership in enabling and industrial technologies (LEIT)

Activity/Topic: IoT Pilots

Call Identifier: H2020-EUB-2017

Topic Identifier: EUB-02-2017

Topic Title: EU-Brazil Joint Call

Deadline(s): 14.03.2017

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2080-eub-02-2017.html

Specific Challenges: In order to make use of the rich potential of the Internet of Things (IoT) in real-world scenarios, technologies and tools developed so far need to be demonstrated in controlled environments with the ultimate goal of validation. Given the specific nature of this Call, widely replicable pilots are targeted in view of solving specific societal challenges, in the context of EU-Brazil cooperation.

Given the considerable amount of work carried out on M2M/IoT and Cyber Physical Systems architectures (e.g. IoT-A), platforms (e.g. FIWARE, CRYSTAL, SOFIA) and standards (e.g. oneM2M) over the last few years, pilots are encouraged to exploit this previous work where applicable. The goal is to further demonstrate the generic applicability of these architectures, platforms and standards and to identify where standards are missing or should evolve, as well as relevant pre-normative activities.

Pilots aim at validating IoT approaches to specific socio-economic challenges in real-life settings. Pilots' objectives include user acceptability, technology assessment and optimisation, business model validation, approaches to sustainability and replicability. They should be implemented through close cooperation between users and suppliers with the active involvement of relevant stakeholders on the demand side.

Scope:

Research and Innovation Actions

IoT finds applicability in a broad range of industry, business and public services scenarios. Specific focus will be on implementing pilots incorporating the whole value-chain, and involving all relevant stakeholders, in particular end-users. Where relevant, institutional involvement may be appropriate.

The joint call would support three pilots each addressing a distinct area among the following areas of interest for EU-Brazil collaboration:

- Environmental monitoring
  Environmental and carbon footprint –as well as energy and water consumption- can be drastically reduced by an optimised management both along and across value-chains.Sensors can be used to measure and monitor a series of distinct environmental variables. The data collected across different areas can in turn be used for data analytics and decision-making. A pilot combining a system approach to integrate a large number of sensors across a large set of variables will test the acceptability and scalability of the selected IoT platform and test how to optimise results and reduce costs, as well as validating standards and interoperability.

- Utilities: smart water management
  Smart water management can reduce leakages, optimise watering and irrigation and improve water consumption both in cities and for agricultural purposes.A pilot focusing on integrated solutions enabling real-time interconnection of heterogeneous sensors and actuators, geo-localisation and data fusion including data from meteorological forecast will test the acceptability and scalability of the selected IoT platform. High reliability and low maintenance costs are key parameters as well as the possibility to replicate the pilot in other locations.

- Utilities: energy management at home and in buildings
  [[Proposers interested in this area are also encouraged to read Topics EE7 and EE12 dealing with energy efficiency and LCE 1, LCE 2 and LCE 5 dealing with the distribution grid and storage under the Energy Work Programme.]]
  A group of IoT use cases in the area of the residential smart grid that involve the use of a home energy management system (HEMS) that would exploit automation and self-learning capabilities to monitor and steer local energy consumption (electricity and carbon fuels) and generation. This includes the better steering of HVAC units according to thermostats, weather forecasts, dynamic electricity pricing, and availability of (locally) generated renewable energy.

- Smart assisted living and wellbeing
  A group of IoT use cases which use intelligent devices (e.g. wearables, sensors, smartphones, and intelligent home appliances) to autonomously generate reports on an individual's physical activity, overall vital signs and well-being. It allows the use and sharing of generated data for personal use or report to specific services (e.g. doctors, nurses, dieticians and sport coaches) through connected devices. It also enables "smart assisted living": the remote follow-up of vulnerable people (children, elderly, hospital patients, etc.) and the automated notification of emergency services, family, etc. when necessary.

- Smart manufacturing: customisation
  A group of IoT use cases that enable the production of customised outputs. Such production systems combine the low unit costs of mass production processes with the flexibility of individual customisation. This includes:
  - Continuous Additive Manufacturing;
  - Flexible automation for robot manufacturing;
  - Robot systems for additive manufacturing;
  - Production of one-of-a-kind customer designs; and dynamic production systems and shop floors - mobile robot for efficient and flexible use in cleanrooms.

The Commission considers that proposals requesting a contribution from the EU up to EUR 1.5 million would allow this specific challenge to be addressed appropriately by three distinct projects. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Three projects in three different areas are expected.

Expected Impact: Pilots should empower citizens, both in the public and private spheres, and businesses, as well as improve the associated public services where appropriate. Pilots are not only expected to validate technologies and architectures for a specific set of use cases requirements, but also the related business models to guarantee the sustainability of the approach. Security and privacy aspects relating to access to and processing of collected information need to be properly taken into consideration.

Improved sharing of information, approaches and solutions, as well as expertise through:

- pilots on both sides and across the **Atlantic**, involving end-users.
- establishing common benchmarks;
- contributing to standardisation and to open-source and open-data repositories
- linking with ongoing work in the IoT Focus Area.

Horizon 2020 Pillar: Industrial Leadership

Programme: Leadership in enabling and industrial technologies (LEIT)

Activity/Topic: Micro- and nanoelectronics technologies

Call Identifier: H2020-ICT-2016-2017

Topic Identifier: ICT-31-2017

Topic Title: Information and Communication Technologies Call

Deadline(s): 25.04.2017

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5068-ict-31-2017.html

Specific Challenges: While the state-of-the-art micro/nano-electronics technologies and their manufacturing are being further advanced towards market-readiness in the context of the ECSEL Joint Undertaking, it is essential to prepare for the future of the electronics industry the next wave of industry-relevant technologies to extend the limits (technological and/or economic) mainstream technologies will be facing in the medium term[[Graphene is covered by the eponym FET Flagship initiative]]. This is essential to maintain and increase Europe's longer-term capacity in the design and manufacturing of these technologies and to strengthen the competitiveness and market leadership of the many industries innovating through these technologies.

Scope:

a. Research and Innovation actions

The work must be in the scope of one of the following topics:

- the development of new approaches to scale functional performance of information processing and storage substantially beyond the state-of-the-art technologies with a focus on ultra-low power and high performance. Work may address materials, processes, device and component architectures, system micro-architectures (processor and memory), security, design, modelling, simulation and nano-characterization, and must consider integration, systemability and manufacturability. Technologies exploiting the quantum effects in solid-state devices are also relevant. Advanced explorative technology development at TRL 2-3 is called for.
- 3D sequential integration (at transistor scale) possibly mixed with 3D parallel integration (at circuit level) for system solutions to increase functionalities and capabilities. Work could address interconnects (intra-layer and vertical structures), design challenges (3D design kits and tools, power models and optimization), prototyping and test methods. Proposals at TRL 2-3 are called for.

International cooperation with clear EU industrial benefits may be considered preferably with nations that have substantial research in the area (e.g. Japan, South Korea, Taiwan, and the **USA**).

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.

b. Innovation action[[Access actions (including EuroPractice-type actions) are addressed under ICT-4]]

In Equipment Assessment Experiments, suppliers of innovative high-tech equipment install, assess and validate their prototypes or products that have left the R&D phase in environments that are very close to real-life conditions in cooperation with end-user. Proposals at TRL 6-7 are called for.

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.

c. Coordination and Support actions

In view of promoting the attractiveness of careers in micro/nanoelectronics towards young people, a dedicated pan-European challenge event should be proposed to showcase the possibilities offered by state-of-the-art hardware technologies (similar to the European code week for software apps). The sustainability of this event should also be addressed.

The Commission considers that proposals requesting a contribution from the EU of about EUR 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: Proposals should address the following impact criteria and provide metrics to measure and monitor success

a. Research and Innovation actions

The actions will aim at contributing to the future growth in Europe of the micro-/nanoelectronics and related industries.

- The proposals must describe how the proposed developments of new/enabling technologies will contribute to the target of doubling the economic value of semiconductor component production in Europe within the next 10 years as set by the Electronics Leaders Group in their strategic roadmap[[https://ec.europa.eu/digital-agenda/en/electronics-roadmap-europe]] and implementation plan[[https://ec.europa.eu/digital-agenda/en/news/european-industrial-strategic-roadmap-micro-and-nano-electronic-components-and-systems-0]].
- The proposals must outline a realistic roadmap for further progressing on the TRL range beyond the project timeframe and a concrete business perspective describing expected markets for the industrial partners and impact for European industry and society at large.

b. Innovation actions

- Proposals should clearly demonstrate the route from assessment to first use of the equipment. The user requirements of the equipment to be assessed should represent significant improvements to existing equipment in terms of capability, precision, efficiency or other characteristics opening new avenues of deployment.

c. Coordination and Support actions

- The actions will raise the awareness of young people for the potential offered by a technological career thereby attracting more students to the field.
- The proposed event should have ambitious targets in the number of participations (reach-out to thousands of students) and the scope of the activities (designs and prototypes) to be showcased.

Societal Challenges

Horizon 2020 Pillar: Societal Challenges

Programme: Climate action, environment, resource efficiency and raw materials

Activity/Topic: Raw materials policy support actions

Call Identifier: H2020-SC5-2016-2017

Topic Identifier: SC5-15-2016-2017

Topic Title: Greening the Economy

Deadline(s): 08.03.2016

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2202-sc5-15-2016-2017.html

Specific Challenges: The EU is highly dependent on raw materials that are crucial for a strong European industrial base, an essential building block of the EU's growth and competitiveness. In order to secure the sustainable access to primary and secondary raw materials, including metals, industrial minerals, construction raw materials, wood, and particularly Critical Raw Materials (CRMs) for the EU economy, there is a need to tackle a number of specific non-technology challenges at local, regional, national EU and global levels, as well as gaps in the knowledge on raw materials to foster the supply from the EU sources.

While the challenge to secure the raw materials supply is of a global nature, the actions to respond to the challenge are usually implemented at regional and local levels. There is a need to identify and bring together the EU regions with raw materials production capacity and common Smart specialisation objectives to exploit synergies, gain the trust of citizens and jointly improve the framework conditions, availability and performance of the industry, social aspects, stimulate investment and exchange of knowledge, foster innovation and competitiveness of industries in the raw materials value chains etc.

Specifically, the supply of CRMs to EU is at risk as they are often mined as by-products and still have global recycling rates below 1% after decades of use. There is a need for an expert group covering all the CRMs and as much as possible of their value chains, which would be able to comprehensively map CRM sources, provide recommendations for sourcing and better use of CRMs, including improving the European standards for efficient treatment of WEEE and waste batteries and other end-of-life products, while building on the experience and knowledge of existing specific groups, such as ERECON[[http://ec.europa.eu/growth/sectors/raw-materials/specific-interest/erecon/index_en.htm]] and CRM-Innonet.

One of the major challenges regarding the EU knowledge base on primary and secondary mineral raw materials is the quality, harmonisation of the collected data and information sharing at the different levels within the EU. There is a need to optimise collection of data in Member States.

A specific challenge for the primary raw materials sector is an access to land within the land-use planning in parity with other activities. Most of the EU is densely populated and there are therefore conflicts of land-use caused by the competing interests of different activities and interest with economic requirements such as urbanization, nature conservation, agriculture, infrastructure etc.

For the secondary raw materials sector a proper collection of waste is a pre-condition for optimal recovery of materials from waste, which varies across the EU, Member States and their local governments who apply many different waste collection systems from co-mingled collection systems to separate collection. Decision-makers need more information about the overall performance of different systems, including their economic performance, and a better understanding of the conditions that are necessary for shifting to alternative, better-performing waste collection systems.

Scope: Projects should include a work-package to cluster with other projects financed under this topic and – if possible – with other relevant projects in the field funded by Horizon 2020, in support of the EIP on Raw Materials.

Proposals shall address only one of the following issues:

a. Expert network on Critical Raw Materials (2016): The proposed action should develop primarily an EU expert network or structure of networks covering all CRMs and where possible, include the stakeholders covering as much of the value chains as possible. [[The latest public EU list of Critical Raw Materials, expected to be updated in 2016/2017 (otherwise the list of 2014 is applicable (COM(2014) 297)).]] In case the new list will not be available at the deadline of the call, proposals should demonstrate the flexibility of incorporating new CRMs in the scope of the project. Proposals should build on the experience and knowledge gained from similar initiatives such as the ERECON [[http://ec.europa.eu/growth/sectors/raw-materials/specific-interest/erecon/index_en.htm]] a network on Rare Earth Elements, and CRM_InnoNet.

   In order to support decision making of the producers and users of raw materials and the policy makers the projects should cover all the following points:

   - map, comprehensively assess and quantify estimated amounts of existing primary and secondary sources of and alternatives to the different CRMs. ;
   - estimate the expected EU demand of various CRMs in the future and identify major trends;
   - provide policy and technology recommendations for actions improving the production of the various primary and secondary CRMs and actions for their potential substitution, in order to secure their supply and decrease the relative dependence upon their imports;
   - provide a plan for transparent consultation with relevant external stakeholders and effective communication of the findings to the professional and general public across the EU;
   - In the case of secondary CRMs, the mapping information on Waste Electrical and Electronic Equipment (WEEE) and waste batteries and other relevant end-of-life products within the EU is crucial, as well as the need to contribute to the further development of European standards for the treatment of WEEE in order to optimise the recovery of CRMs, identifying the most relevant WEEE categories and additional standardisation needs for the further development of CENELEC standards under the European Commission Mandate M/518 EN.

   The Commission considers that for this sub-topic, 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 submission and selection of proposals requesting other amounts. Up to one action for this topic part shall be funded.

b. Good practice in waste collection systems (2017): Proposals should cover all the following points:

   - map and assess existing waste collection systems in a representative set of EU Member States for a wide range of waste streams, including packaging and paper waste, and end-of-life products (e.g. electrical and electronic equipment, batteries, transport vehicles, tyres, construction products, furniture);

- where feasible assess advantages and disadvantages of different approaches – including environmental and socio-economic impacts – with quantified costs and benefits;
- identify good practices and key elements for effective and efficient waste collection systems, as well as the barriers for implementation and possible solutions to overcome bottlenecks taking into consideration the adaptability of solutions to different regions of the EU;
- validate the identified key elements, good practices, and the measures to overcome obstacles by consulting stakeholders through a participatory approach involving citizens[[See the paragraph on engaging society in the introduction to this Work Programme.]] and plan targeted dissemination actions.

The Commission considers that for this sub-topic, proposals requesting a contribution from the EU of up to 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. Up to one action for this topic part shall be funded.

c. Optimising collection of raw materials data in Member States (2017): Proposals should cover all the following points:
   - map and analyse the current situation of collection of data and data sources in all Member States;
   - provide recommendations for improvement of data sets and for EU level harmonization with justified benefits for the EU and the Member States and taking into account the INSPIRE Directive;
   - demonstrate the applicability of recommendations on a number of improved data sets at Member States level. Improved data sets related to primary mineral raw materials should include for example: data on mineral occurrences and deposits; economic and technical data on mineral exploration and extraction; data on the environmental and social dimensions of extraction and, minerals intelligence data. Data sets related to secondary mineral raw materials should build on raw materials flows at Member state level (Materials Systems Analysis) and be presented in a form of Sankey diagrams. Other data sets on minerals secondary raw materials could also be considered.
   - involve all mandated key players for primary and secondary mineral raw materials in Member States, including in particular data providers and relevant public authorities and bodies.
   - ensure that information on how data and best practices will be shared and made accessible to the wider EU raw materials community.

   The Commission considers that for this sub-topic proposals requesting a contribution from the EU of up to 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. Up to one action for this topic part shall be funded.

d. Linking land use planning policies to national mineral policies (2017): Proposals should cover all the following points:
   - review and analyse how exploration and extraction of mineral raw materials in Member States are integrated in land use planning and practices at all levels of implementation (national, regional, local) seeking the harmonization and convergence in national approaches towards minerals policies and land-use planning policies and practices;
   - consider how to best link land-use planning with the concept of safeguarding valuable mineral deposits (such as mineral deposits of public importance) in order to ensure the current and future access to the deposits and to avoid 'land sterilization';
   - take into account the following relevant issues: a) the integration of land use and subsurface planning, b) the assessment of different options for land use where there

is no pre-exclusion, c) the INSPIRE Directive, d) information needed in the process, e) e-procedure, f) smart regulation, g) the infrastructure planning and approaches;

- involve civil society, practitioners, land-use planners and mining public authorities at local, regional and national levels[[See the paragraph on engaging society in the introduction to this Work Programme.]] and should develop a dissemination strategy;
- provide recommendations and publish guidance documents to promote a harmonized approach and good practise sharing among Member States in order to ensure a more effective access to raw materials;
- build on the report 'Recommendations on the framework conditions for the extraction of non-energy raw materials in the European Union' (2014) of the Ad-Hoc Working Group on exchange of best practices on mineral policy and legal framework, information framework, land-use planning and permitting.

The Commission considers that for this sub-topic, proposals requesting a contribution from the EU of up to 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. Up to one action for this topic part shall be funded.

e. EU network of mining and metallurgy regions (2017): The purpose is to create a sustainable EU network of regions dedicated to mining (including exploration), processing and metallurgy aiming at improving related framework conditions, social aspects and industry competitiveness.

While the issues of recycling, re-use and product life cycles are covered by the topic CIRC-03-2016: 'Smart Specialisation for systemic eco-innovation/circular economy' in the call 'Industry 2020 in the Circular Economy', the focus of this topic is on mining and metallurgy.

Specifically, this network should cover all the following points:

- establish coherent co-ordination and support mechanisms among a representative number of EU regions, and identify and engage the other relevant EU regions;
- establish the right raw materials framework conditions based on good practices in the addressed regions, including administration, land use planning, investment conditions, training and attracting skilled workforce;
- define Social Licence to Operate (SLO)[['Social Licence to Operate' (SLO) - the level of acceptance or approval by local communities and stakeholders of mining companies and their operations, also known as public acceptance and trust.]] guidelines and develop a toolbox improving communication and transparency during the permitting and licensing procedures and in the production cycle (from exploration, mine operation to rehabilitation and residues and tailings management) by mobilising all the concerned EU's stakeholders (relevant authorities municipalities, mining and other relevant companies, civil society organisations and local communities) which can be affected by a mining project[[See the paragraph on engaging society in the introduction to this Work Programme.]].
- explore and promote in and across the regions potential synergies between raw materials, value chains, market and societal players in order to create new business opportunities and economic growth;
- plan and establish operational synergies between R&I investments (public and private) and the European Structural and Investment Funds (ESIF) to strengthen competitiveness of the industry, through different improve R&I infrastructure and capacity and to foster market uptake and replication of innovative solutions in the relevant fields;
- perform communication activities across the EU to present, challenge and validate the outputs of the project;
- involve relevant competent authorities, private sector, research and academic organisations, civil society and experts in relevant social sciences and humanities. Participation of regional authorities from all the regions addressed in the proposal is compulsory;

- identify synergies and collaborate closely with the relevant established or new initiatives at the EU and national levels, such as EIP on Raw materials and KIC on Raw materials[[http://eit.europa.eu/eit-community/eit-raw-materials]] and link to circular economy and resource efficiency policies;
- use a multidisciplinary approach, involving in particular social sciences and humanities, in order to better understand the different aspects of Social Licence to Operate (SLO) in mining in a given cultural context. Proposals should also benchmark the EU SLO guidelines and initiatives with those developed internationally (Canada, Australia, **USA**, etc.).

The Commission considers that for this sub-topic, 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 submission and selection of proposals requesting other amounts. Up to one action for this topic part shall be funded.

f. EU network of regions on sustainable wood mobilisation (wood supply) (2017): The objective is to create a European network of regions for improved and sustainable supply of primary wood raw material that will contribute to improved industrial competitiveness and rural development, whilst preserving EU forest ecosystems and forests' capacity to deliver all their economic, social and ecological functions, and ensuring consistency with relevant EU policy goals (e.g. EU Bioeconomy Strategy, 7th Environmental Action Programme, EU Biodiversity Strategy, EU Forest Strategy, EU Nature legislation; EU climate policy). The network's activities shall cover all the following points:

- establish coherent co-ordination and support mechanisms among a geographically and socio-economically representative number of regions, and identify and engage other relevant EU regions;
- plan and establish operational synergies between R&I investments (public and private) and the European Structural and Investment Funds (ESIF), notably European Agricultural Fund for Rural Development (EAFRD), to facilitate uptake and replication of innovative solutions;
- identify, exchange and widely disseminate good practices (replicable between the regions) in the area of sustainable wood mobilisation with an aim to establish the right framework conditions. This should build on the European Commission/Forest Europe/UNECE/FAO 'Good practice guidance on sustainable mobilisation of wood in Europe' and relevant projects (such as SIMWOOD), and contribute to the strategic orientations of the EU Forest Strategy[[COM(2013)659 of 20.09.2013]];
- explore and promote potential synergies between materials, value chains, markets and societal players in order to create new business opportunities and economic growth;
- identify synergies and collaborate closely with the relevant established or new initiatives at the EU and national levels, such as the EIPs on Raw Materials and for Agricultural Productivity and Sustainability.

The areas of focus for the regional network activities should at minimum cover the following aspects of framework conditions:

(a) forest ownership and land tenure, sustainable forest management, administration, co-ordination and planning, including silvicultural measures;

(b) infrastructure and logistics;

(c) organisation and transparency of the markets;

(d) financing sourcing, legal and fiscal measures; and

(e) education, training and skills.

Participation of competent regional authorities relevant to sustainable wood mobilisation is required, notably in the context of establishing operational synergies in the research and innovation area. Participation of relevant competent authorities and actors for sustainable wood mobilisation, e.g. chambers of agriculture and forestry, forest owners/managers associations, academia, research technology platforms/centres, and EU stakeholder organisations, is encouraged.

The Commission considers that for this sub-topic, proposals requesting a contribution from the EU of up to 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. Up to one action for this topic part shall be funded.

Expected Impact:

The project is expected to contribute to:

a)

- achieving the objectives and the implementation of both the Raw Materials Initiative[[http://ec.europa.eu/growth/sectors/raw-materials/policy-strategy/index_en.htm]] and the EIP on Raw Materials, in particular in terms of the access to critical raw materials (CRMs);
- better informed decision making by the EU and Member States policy makers and the producers and users of raw materials regarding the supply of raw materials;
- development of European standards for the treatment of WEEE, waste batteries and other relevant end-of-life products that would help towards optimising the recovery of critical raw materials;
- increased recovery rates in the EU as regards CRMs from WEEE, waste batteries and other relevant end-of-life products;
- in longer term reduced EU dependency on imports of CRMs;
- improved awareness of relevant external stakeholders and general public across the EU about importance of the critical raw materials for society, challenges related to their supply and about proposed solutions.

b)

- achieving the objectives of the EIP on Raw Materials in terms of waste management framework conditions;
- better-informed decision-making at EU, national and local levels with regards to waste management framework conditions;
- better performing waste collection systems in EU Member States, including socio-economic and environmental impacts;
- in longer term, reduced EU dependency on imports of raw materials.

c)

- achieving the objectives of the EIP on Raw Materials, particularly in terms of the EU Raw Materials Knowledge Base;
- improving the quality assurance and accessibility of primary and secondary mineral raw materials data in the EU;
- adding to transparency of Member state and EU mineral raw materials data and information;
- facilitating better informed decision-making for raw materials policy at EU and Member State levels, as well as for facilitating investment decisions by industry.

d)

- achieving the objectives of the EIP on Raw Materials, particularly in terms of improving conditions for sustainable access and supply of raw materials in the EU;
- more transparent and efficient exploration and mining permitting and licensing processes in the EU;
- better land-use planning based on a better knowledge of identified or potential deposits and their potential environmental impacts at EU level;
- bringing mineral resources in parity with other natural resources within land use planning whilst implementing the environmental acquis.

e)

- achieving the objectives of the EIP on Raw Materials in terms of improving conditions for sustainable access and supply of raw materials in the EU;
- creating a longer term sustainable network;
- establishing operational synergies between R&I investments and ESIF to improve R&I infrastructure and capacity and to foster market uptake and replication of innovative solutions in the relevant fields;
- improved framework conditions at regional level leading to a more transparent and secure environment for investment in new mining and metallurgy projects in the EU and economic growth in the regions;
- improving awareness of the importance of raw materials for our society and about new ways of mining taking into account environmental, health and safety considerations;
- helping stakeholders to make informed decisions about new mining and metallurgy projects in the EU through engagement of local communities, facilitating social agreements, improving the awareness, gaining citizens' acceptance and trust in a sustainable raw materials production in the EU;
- effective implementation and widespread use of the Social Licence to Operate (SLO) guidelines and toolbox in practice.

f)

- achieving the objectives on sustainable wood supply of the EIP on Raw Materials, the EIP for Agricultural Productivity and Sustainability, the new EU Forest Strategy and the EU Bioeconomy Strategy;
- improving knowledge and framework conditions for sustainable wood mobilisation that result in increased supply of primary wood raw materials to the forest-based bioeconomy, whilst preserving EU forest ecosystems and forests' capacity to deliver all its functions;
- innovation at regional and local levels leading to increased wood-based industrial competitiveness and rural development;
- creation of clusters of regions with common interests on wood mobilisation;
- establishing operational synergies between R&I investments and ESIF to improve R&I infrastructure and capacity and to foster market uptake and replication of innovative solutions in the relevant fields for sustainable wood mobilisation.

Horizon 2020 Pillar: Societal Challenges

Programme: Climate action, environment, resource efficiency and raw materials, Secure, clean and efficient energy

Activity/Topic: Sustainable urbanisation

Call Identifier: H2020-SCC-2016-2017

Topic Identifier: SCC-04-2016

Topic Title: SMART AND SUSTAINABLE CITIES

Deadline(s): 08.03.2016

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/4083-scc-04-2016.html

Specific Challenges: In a globalised world, cities all over the world are facing broadly similar challenges. Finding solutions and defining optimal pathways towards sustainable urbanisation receives high priority in the Research and Innovation (R&I) policy of the majority of the countries worldwide. In this context, aligning R&I agendas to underpin sustainable urbanisation and implementing them through international collaboration will promote synergies, and thus an optimal use of the available expertise, capacity and resources, avoid duplication and ensure robust outcomes of global relevance. The opening of JPI Urban Europe to third country partners is increasingly finding interest among its members and among third countries. The Belmont Forum provides an excellent platform for international collaboration in the area of sustainable urbanisation.

Scope: Proposals should pool the necessary financial resources from the participating national (or regional) research programmes with a view to implementing a joint call for proposals resulting in grants to third parties with EU co-funding in this area. Proposers are encouraged to include other joint activities including additional joint calls without EU co-funding. Actions should build on the international strategy of the JPI Urban Europe and launch in collaboration with the Belmont Forum at least one international call on sustainable urbanisation.

Participation of legal entities from international partner countries and/or regions, in particular with countries participating in the Belmont Forum, is encouraged in the joint call as well as in other joint activities including additional joint calls without EU co-funding. Participants from countries which are not automatically eligible for funding[[http://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/international-cooperation_en.htm]] may nonetheless request a Union contribution (on the basis of the ERA-NET unit cost) for the co-ordination costs of additional activities.

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:

Actions are expected to lead to:

- the alignment of research and innovation agendas in the area of sustainable urbanisation and co-ordinated streamlining of the implementation of the respective calls;
- enhanced excellence and global relevance of research and innovation activities on sustainable urbanisation and increased visibility at international level;
- strong and lasting alliance with the funding agencies of key international partners for research and innovation actions on sustainable urbanisation (e.g China, Japan, Brazil, Mexico, **USA** etc.);
- linking of possible European and international demonstration actions on re-naturing cities to induce a wider, worldwide application of nature-based solutions.

Horizon 2020 Pillar: Societal Challenges

Programme: Europe in a changing world - inclusive, innovative and reflective Societies

Activity/Topic: Inequalities in the EU and their consequences for democracy, social cohesion and inclusion

Call Identifier: H2020-SC6-REV-INEQUAL-2016-2017

Topic Identifier: REV-INEQUAL-05-2016

Topic Title: REVERSING INEQUALITIES AND PROMOTING FAIRNESS

Deadline(s): 04.02.2016

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2299-rev-inequal-05-2016.html

Specific Challenges: While a core value of all democratic countries in the EU is equality, inequalities have increased in recent decades. Democracies seem powerless to stop the trend and may sometimes even seem to encourage such inequalities. There is however considerable controversy on whether and how rising inequalities impact upon democracy and social and political inclusion. Inequalities are not only economic and social phenomena, but they also empower and constrain individuals' and groups' political capacities and therefore provide indicators as to how we live together as a community and organise politically. Faced with the growing feeling among citizens that the political institutions in European democracies have become less powerful and allow for inequalities to grow instead of reducing them, it is important to enquire to what extent the increase in social and economic inequalities affects the cohesion of society, the future of our democratic systems and the European project as a whole. It is often claimed and/or assumed that a flourishing middle class constitutes the backbone of European democracy and that its demise at the centre leads to the rise of more polarised, and possibly populist, politics which threatens to undermine the stable and predictable democratic state which emerged gradually after WWII and became characteristic and indeed an essential prerequisite of European Integration. Given that high concentrations of wealth and income among a small proportion of society impacts negatively on social cohesion, the EU and its Member States have to reassess and reappraise the democratic effectiveness and functioning of their political systems. The specific challenge is to consider and evaluate the political ramifications of increasing social and economic inequalities and polarisation for democracy in Europe and the types of policy interventions available, including in terms of democratic revival and participatory and inclusive innovations. Whenever relevant, comparative work on case studies outside EU is encouraged.

Scope: The research to address this challenge should in particular focus on the following key dimensions. Proposals can comprehensively address one dimension or combine them. They may include additional aspects which are relevant to addressing the specific challenge.

1. The relation between democracy and the 'middle class'
   Over the last decade, a polarisation of income by education has been noticed in most EU Member States as well as in **North America**. Recent research has found that the share of employment in jobs located in the middle of the skills distribution has declined considerably. At the same time, the proportion of employment at the upper and lower ends of the occupational skills distribution has increased substantially. In the face of this

evolution, the so-called 'decline of the middle class' has come to the forefront of the debate. As 'middle class' is itself a contested concept, research should attempt to define it more precisely on the basis of relevant comparative and historical work and also be open a critical reassessment of the continued appropriateness of the notion. It should also test whether the common assumption that increasing inequalities and a growing polarisation between 'rich' and 'poor' are likely to lead to an erosion of the middle class. It will also critically reappraise the claim that a solid and flourishing middle class is a precondition for and guarantor of a thriving democracy. Research should also consider the implications of a declining middle class on levels of trust and cohesion in the EU as well as traditional democratic and political structures more broadly.

2. Increasing inequalities and their impact on classical and non-classical political participation
   As analysed by European research projects, the links between income, voter turnout, institutional factors, psychological factors and other forms of democratic participation and citizenship are complex.[[See, for instance, the projects PIDOP (http://www.fahs.surrey.ac.uk/pidop/) and MYPLACE (http://www.fp7-myplace.eu/), as well as the policy review "An even closer union among the peoples of Europe? Rising inequalities in the EU and their social, economic and political impacts", European Commission 2015.]] Historically, the rise in inequalities has coincided with a decline in voter turnout and membership of political parties in most Western democracies. A potential further evolution is therefore that, as inequalities increase, several segments of the population in European democracies cease to engage in public participation and become depoliticised, indifferent or even hostile to democracy, at least in its current forms. Research should study correlations between increasing inequalities in its various dimensions and electoral participation and consider causalities in both ways. Due regard should be had also to participatory action repertoires beyond participation in elections. Civil society, civic culture and social participation are important in this regard, but research should be open towards genuinely alternative and innovative, including digital, forms of participation in public discourses too. The impact of these forms of participation on (shared) identities should also be considered. Research should compare, and if opportune contrast, the impact of heightened inequalities between traditional democratic participation on the one hand and engagement in alternative, including more ad hoc action repertoires on the other. Particular attention should be paid to links between non-institutionalised forms of participation and inequalities with regard to education whereby marginalized and vulnerable groups should be taken into account. Research should combine qualitative and quantitative methods and develop causal explanations rather than mere correlations.

3. Young people and the future of European democracies
   While young people seem to have a fairly substantial interest in politics and political issues, this seems to translate less and less into comparable levels of engagement with formal politics and the political system in the orthodox sense. This is an alarming sign for the future of European democracies. A more differentiated policy approach is needed, taking into account and responding to social structural inequality affecting young people as well as diversity. Young people's conceptualisation and access to power should also be studied. Research should explore new ways of political engagement and interaction, with the aim of countering the de-politicisation of socially excluded young people. On the basis of qualitative and quantitative empirical work on young people and their links to democracy, it should assess how to "reinvent" democracy in Europe and make our political systems evolve, whereby existing action repertoires and the role of technology may also be considered. Finally, it should also look at how children in Europe, as future citizens, consider the central values of democracy such as equality and solidarity and how such views can determine their future political participation and level of support to various forms of democracy.

The Commission considers that proposals requesting a contribution from the EU in the order of EUR 2.5 million for each dimension would allow this specific challenge to be addressed

appropriately. This does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Research will increase the knowledge base on the effects of increasing socio-economic inequalities and ensuing polarisation between different parts of the citizenry and European democracy(ies). The relationships, understandings and interplay between democracy, politics and inequalities will be considerably elucidated. Research will make recommendations on the future role of a shrinking middle class for democracy and social cohesion and the ramifications this will have for political engagement and social cohesion. Research will also inform policy makers on how more novel, including ad hoc and digitally supported participation repertoires may or may not qualify to substitute for more traditional democratic, especially electoral, participation. Most importantly, research will provide a critical assessment of current democratic practices in order to build more inclusive and reflective societies and reinvigorate democracies. Research will also inform policy makers of different future scenarios of the development of democracy and political participation in Europe in the light of varying trends in inequalities, putting particular emphasis on implementing new democratic models.

Horizon 2020 Pillar: Societal Challenges

Programme: Europe in a changing world - inclusive, innovative and reflective Societies

Activity/Topic: Better integration of evidence on the impact of research and innovation in policy making

Call Identifier: H2020-SC6-CO-CREATION-2016-2017

Topic Identifier: CO-CREATION-08-2016/2017

Topic Title: CO-CREATION FOR GROWTH AND INCLUSION

Deadline(s): 04.02.2016

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/3075-co-creation-08-2016_2017.html

Specific Challenges: 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.

Horizon 2020 Pillar: Societal Challenges

Programme: Europe in a changing world - inclusive, innovative and reflective Societies

Activity/Topic: Centres/Networks of European research and innovation

Call Identifier: H2020-SC6-ENG-GLOBALLY-2016-2017

Topic Identifier: ENG-GLOBALLY-09-2016

Topic Title: ENGAGING TOGETHER GLOBALLY

Deadline(s): 14.04.2016

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2310-eng-globally-09-2016.html

Specific Challenges: 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.

Delegation Exception Footnote: This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders. It is excluded from the delegation to Research Executive Agency and will be implemented by the Commission services.

Horizon 2020 Pillar: Societal Challenges

Programme: Europe in a changing world - inclusive, innovative and reflective Societies

Activity/Topic: The Asia-Pacific as a strategic region for Europe

Call Identifier: H2020-SC6-ENG-GLOBALLY-2016-2017

Topic Identifier: ENG-GLOBALLY-06-2017

Topic Title: ENGAGING TOGETHER GLOBALLY

Deadline(s): 02.02.2017

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2307-eng-globally-06-2017.html

Specific Challenges: The Asia-Pacific is a large and diverse region, encompassing **Industrialised Countries**, emerging economies and developing countries. Perhaps due to this diversity, and save a few specific cases, the European Union has lacked a strategic approach towards the region, despite strong economic interests and heightened security concerns in the area. Several EU Member States have adopted an active bilateral approach towards key partners, but the European Union has mostly failed to speak with one voice in relevant fora. Nowadays the multiple and complex challenges shared by the two regions, ranging from climate change and sustainable development to conventional and non-conventional security challenges, are opening up new opportunities for the EU to become more involved in the region beyond economic cooperation although differences remain in areas like human rights or democratic governance. In order to re-think its role and strategy for the Asia-Pacific, and to fully tap the potential for action at European level, the European Union needs to be supported by sound research showing the concrete implications of further engaging with and in the region in a number of sectorial and geographic areas.

Scope: The research to address this challenge should in particular focus on the following key dimensions. It is expected to either comprehensively address one of these dimensions or to combine them. The research may also cover other issues relevant for addressing the specific challenge.

1. Regional integration in South-East Asia and its consequences for Europe

   South-East Asia has seen, since 1967, the most ambitious project of regional integration outside of Europe, pursued through the Association of Southeast Asian Nations (ASEAN). It has followed a different integration path to Europe, based on dialogue and non-interference rather than convergence and law. The region has an immense social, cultural and economic potential, but it still faces the challenge of developing a regional identity with both an internal dimension (how to nourish a sense of belonging) and an external dimension (how to engage with foreign powers, such as China, India, the United States, Japan and the EU). The process of nation-building in the ten ASEAN countries and other non-ASEAN countries is incomplete or nascent. It is also confronted with widespread poverty, disruptive migration flows, inter-ethnic conflicts and even territorial disputes. For the EU to engage effectively in South-East Asia and manage the variety of countries and cultures present in the region, it is necessary to understand what 'region' means to the peoples of these countries within and beyond the ASEAN context. Research is thus necessary on the mobility of people, knowledge, ideologies, cultures, goods and capital

within the region and their influence on the emergence of a South-East Asian identity which would help the EU and its Member States to forge coherent, adapted and culturally relevant foreign policies with all countries in the region.

To that effect, research should also underpin the implementation of the Joint Communication on EU-ASEAN relations in the different sectors and in particular in the field of sectorial cooperation.[[JOIN(2015)22 Joint Communication to the European Parliament and the Council - The EU and ASEAN: a partnership with a strategic purpose.]]

2. Governance in and of the Pacific as a challenge for Europe

One of the major strategic challenges in the Asia-Pacific region relates to the governance of the Pacific itself (including Overseas Countries and Territories). The Pacific Islands region represents a unique diversity of nation-state formations and regional and intergovernmental mechanisms, which is experiencing major challenges regarding the protection of its exceptional natural environment, threatened in particular by climate change. The small islands developing states (SIDS) of the Pacific therefore have a central role in the contestation over, competition for, and conservation of some of the world's key resources, far surpassing their modest size in terms of land mass and population. As the second largest donor of development assistance to the region, the EU's interests and activities in the Pacific are highly significant and hold important potential for the future. However, the region's new geopolitical currency is a willingness to seriously engage with emerging definitions of an equal, two-way partnership relation in Pacific terms that expands beyond the monetary dimension of cooperation. The EU is thus at a cross-road in its engagement with the Pacific. Research should examine the emerging governance structures in the region, in terms of sovereignty, state-making, policy autonomy and aid dependency, by paying close attention to issues such as trade and transport, fisheries management, climate change, biodiversity, social inclusion, democracy, blue/green growth and and political CFSP aspects. Research should also comparatively analyse the role and impact of external actors in the region, prominently focussing on the European Union and its Member States but also take account of the influence of, and the interplay with global (China, **USA**) and regional (Australia, New Zealand) powers in the region. Building on existing research, lessons should be drawn from the Pacific experience for devising new approaches, as well as on how Europe can effectively respond to the strategic challenge posed by the Pacific.

The participation of partners from third countries and regions in the targeted geographic areas in proposals submitted to this topic is strongly encouraged.

The Commission considers that proposals requesting a contribution from the EU in the order of EUR 2.5 million for each dimension would allow this specific challenge to be addressed appropriately. This does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Research under this topic is expected to provide a comprehensive overview of the strategic challenges that Europe faces in the various zones of the Asia-Pacific region, and on a range of relevant subjects. Based on this, it will inform different foreign policy actors, processes and initiatives at EU and Member State-level either with a sectorial or geographic focus, especially by providing essential insights on the legal, cultural and socio-economic aspects surrounding their implementation.

Horizon 2020 Pillar:	Societal Challenges
Programme:	Food security, sustainable agriculture and forestry, marine and maritime and inland water research
Activity/Topic:	Standards and regulations
Call Identifier:	H2020-BBI-PPP-2015-02
Topic Identifier:	BBI.S1-2015
Topic Title:	BIO BASED INDUSTRIES JOINT UNDERTAKING
Deadline(s):	03.12.2015

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/1151-bbi.s1-2015.html

Specific Challenges: Existing bio-based industries and value chains have emerged often independently from each other. As a consequence, each has its own terminology in describing process parameters and properties of raw materials and products. This disparity in terminology and in standards hampers the integration of actors across sectors and hence the creation of new value chains. In addition, in spite of progress made by the European Committee for Standardisation (CEN) in the development of a coherent and harmonised standardisation frame for bio-based products, there is still a need to spread the use of the developed standards with a view to capitalise on their market pull potential. This calls for cooperation on the international level, especially with **Industrialised Countries**, e.g. by exchange of Best Practices and experiences in order to reach more coherent approach to bio-based products globally. Regulations governing the use of biomass in the various application sectors differ among the sectors and between the EU and the national levels. This may deter industries from investing in new facilities and even in research and innovation towards new products and applications. The specific challenge is twofold:

1. To boost the use of instruments, in particular common standards, reducing barriers to trade in bio-based products among value chains and across the EU and hence expand their market potential.
2. To address regulatory hurdles across sectors hindering investments into existing and new value chains, products and applications as well as the establishment of a level playing field for bio-based products.

Scope:

Proposals should address the following elements:

- An evaluation of existing standards and regulations across the sectors and value chains, in order to identify conflicts and barriers to growth and to propose simple and applicable alternatives that facilitate investments in new value chains and products and increase the market uptake of bio-based products and processes.
- Analysis of EU, national and regional legislation, to identify legislative barriers that hamper integration of actors across sectors and value chains in their efforts to establish new value chains utilising biomass in a cascaded manner. Special attention should be given to legislation governing the industrial use of biomass, for example waste legislation. The analysis should also identify Best Practices in removing legislative barriers in the process towards a bioeconomy.

- Supporting the CEN work (TC411 and other Technical Committees) to optimise the industrial applicability and use of the developed standards in order to further specify bio-based products characteristics and communication thereof for the various application sectors. These will be of significant help in B2B and B2C communication.
- Build on and coordinate with other, on-going projects that address the same topic of standards and legislation, in particular those of Horizon 2020's Societal Challenge 2: Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy.
- Address needed regulations updates to reflect relevant new technological developments.

It is considered that proposals with a total eligible budget 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 with another budget.

Expected Impact:

- Contribute to more coherent policy environment, better interrelations between regional, national, EU and global bioeconomy policies.
- Contribute to the removal of barriers to investments to grow towards a bioeconomy, for example link to waste legislation.
- Specific proposals to amend existing regulations or for new regulations to promote the factual cooperation in joint projects by actors across sectors and value chains.
- Concrete support of CEN TC411 to improve horizontal aspects for better integration across boundaries.
- New standards providing increased commonality between different bio-based industrial sectors
- Commonly agreed vocabulary throughout value chains, from feedstock suppliers to biorefining to downstream actors in the application sectors.

Increased use of standards and labels with positive long-term effects on the overall development of the European bio-based products market.

Horizon 2020 Pillar: Societal Challenges

Programme: Health, demographic change and wellbeing

Activity/Topic: Healthcare Workforce IT skills

Call Identifier: H2020-SC1-2016-2017

Topic Identifier: SC1-HCO-13-2016

Topic Title: Personalised Medicine

Deadline(s): 16.02.2016

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2444-sc1-hco-13-2016.html

Specific Challenges: Healthcare systems require a robust supply of both highly proficient eHealth/IT professionals as well as an overall workforce that has a sufficient level of IT skills to make the optimum use of eHealth information technology. There is a shortage in the EU of eHealth workers across the full spectrum of job roles, spanning clinical, social care, informatics, and administration. There is a dearth of structured education and training opportunities to address this shortage.

Scope: Proposals should focus on mapping, quantifying and projecting the need, supply and demand of workforce skills and competencies to develop IT skills and training programmes for the healthcare workforce taking into account the EU-**US** collaboration underway in this area under the EU-**US** MoU eHealth Roadmap[[http://ec.europa.eu/digital-agenda/en/news/trans**Atlantic**-ehealthhealth-it-cooperation-roadmap]] and other international cooperation in this area. The work should identify how key factors and trends will be investigated, the different scenarios the system and eHealth workforce face, quantify and model these futures as well as describe how the most robust policies to deliver the desired impacts and outcomes will be investigated. They should also demonstrate knowledge of systematic workforce investigations including skills and competences existing curricula and training, identify gaps and propose solutions to bridge them. A series of case studies in some of the areas where IT already has an impact on the provision of health services, will support the proposed solutions in the most critical areas for example in primary health care, monitoring of chronic diseases, high risk patient care and geriatry. A familiarity with the ICT Skills' European eCompetence Framework for healthcare is also important.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 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:

- Mapping of the current knowledge structure, identification and quantification of the main trends and gaps, catalysts and barriers in IT skills and training needs of the healthcare workforce for optimum use of eHealth solutions;
- Improved access to training programmes, including continuous professional development, and upgrading of skills for all types of actors in healthcare workforces;
- Assessment of the effectiveness of training strategies and requirements for provision of programmes in different scenarios;

- Strengthened international collaboration in the area of healthcare professionals IT skills including contributions to the actions of the EU-**US** MoU eHealth Roadmap and better informed policy decisions.

Horizon 2020 Pillar: Societal Challenges

Programme: Health, demographic change and wellbeing

Activity/Topic: EU-**US** interoperability roadmap

Call Identifier: H2020-SC1-2016-2017

Topic Identifier: SC1-HCO-14-2016

Topic Title: Personalised Medicine

Deadline(s): 16.02.2016

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2443-sc1-hco-14-2016.html

Specific Challenges: In order to implement the EU-**US** interoperability roadmap, activities including inter-alia piloting and standardisation activities need to be put in place. Further actions would be needed to implement recommended measures, taking into account the importance to have a convergent EU-**US** approach.

Scope: The main objective remains to achieve one single international standard for the patient summary and the possibility to establish pilots that will validate the principles established within the roadmap. The proposal should focus on the need to develop an interoperability framework taking into account the EU-**US** collaboration underway in this area under the EU-**US** MoU eHealth Roadmap[[http://ec.europa.eu/digital-agenda/en/news/trans**Atlantic**-ehealthhealth-it-cooperation-roadmap]] and other international cooperation in this area. Consortium partners should demonstrate familiarity with trans**Atlantic** cooperation, standardisation process and ability to implement the activities outlined in the EU-**US** roadmap.

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:

- Improved international interoperability of eHealth Systems in the **US** and in Europe.
- Accelerated establishment of interoperability standards in eHealth and of secure, seamless communication of health related data.

Horizon 2020 Pillar: Societal Challenges

Programme: Secure societies - Protecting freedom and security of Europe and its citizens

Activity/Topic: Pan European Networks of practitioners and other actors in the field of security

Call Identifier: H2020-SEC-2016-2017

Topic Identifier: SEC-21–GM-2016-2017

Topic Title: SECURITY

Deadline(s): 25.08.2016
Stage 2:

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2324-sec-21-gm-2016-2017.html

Specific Challenges: In Europe, practitioners interested in the uptake of security research and innovation (e.g. firefighters, police and intelligence communities, border guards, custom authorities, explosive specialists, forensic laboratories, medical emergency teams, etc.) are dedicated to performing their duty and to focusing on their operation. In general, practitioners' organisations have little means to free workforces from daily operations, and to dedicate time and resources to monitor innovation and research that could be useful to them. They have little opportunities to interact with academia or with industry on such issues. All stakeholders – public services, industry, academia – including those who participate in the Security Advisory Group, recognize it as an issue.

Scope:

Practitioners are invited to associate in 4 different categories of networks:

1. Practitioners (end-users) in the same discipline and from across Europe (some examples: firefighters; police and intelligence bodies; border guards, coast guards, and custom authorities; explosive specialists; forensic laboratories; medical emergency teams; think-tanks on security; etc.) can get together to:
    1. monitor research and innovation projects with a view to recommending the uptake or the industrialisation of results,
    2. express common requirements as regards innovations that could fill in capability and other gaps and improve their performance in the future, and
    3. indicate priorities as regards domains requiring more standardization;

2. Practitioners (end-users) from different disciplines and concerned with current or future security or disaster risk and crisis management issues in a particular geographical area can get together to:
    1. monitor research and innovation projects with a view to recommending the uptake or the industrialisation of results,
    2. express common requirements as regards innovations that could fill in capability and other gaps and improve their performance in the future, and
    3. indicate priorities as regards common capabilities, or interfaces among capabilities, requiring more standardization.

Geographical priorities include:

- the Mediterranean region (including the Black Sea): to enable an EU joint network concept for border protection and other security- and disaster-related tasks, so that the entities in the network share information, collaborate better, and establish joint border surveillance scenario. The network should provide with human infrastructure organizing operations more efficiently and enable the coordinated use of interconnected information systems and national infrastructure in the whole region;
- the Arctic and North **Atlantic** region: to prepare to cope as a network with the security threats that will result from the opening of the Northern passages, which are very important for the development of the region, but from which seaborne disasters are likely to arise. The current lack of infrastructure makes dealing with catastrophic incidents quite a challenge. The region needs to prepare, taking into account geographical specificities (climate-related, demographic, topologic, and in relation with the functioning of space-based systems;)
- the Danube river basin: to enable an EU joint network concept for disaster resilience, so that the countries of the region, which faces natural disasters, particularly flooding in a repetitive manner, can benefit at most from the EU civil protection mechanism;
- the Baltic region: to enable innovative border control cooperation e.g. with respect to smuggling and other security related issues, to the trafficking in human beings, to maritime surveillance, and to macro-regional risk scenarios and gaps identification; to support the Baltic Sea Maritime Functionalities flagship initiative

These networks should gather the largest number of Member States or Associated Countries.

3. Entities from around Europe that manage demonstration and testing sites, training facilities, including simulators or serious gaming platforms in the area of CBRN and for first responders or civil protection practitioners, can get together to: 1) establish and maintain a roster of capabilities and facilities, and 2) organize to share expertise, and 3) plan to pool and share resources with a view to optimize investments.

   Opinions expressed and reported by the networks of practitioners should be checked against what can be reasonably expected, and according to which timetable, from providers of innovative solutions.

4. In addition, support will be given in 2017 to a consortium of formally nominated NCPs in the area of security research. The activities will be tailored according to the nature of the area, and the priorities of the NCPs concerned. The network should focus on issues specific to the "Secure societies ..." challenge and follow up on the work of SEREN 3.[[http://cordis.europa.eu/project/rcn/194868_en.html]]

Indicative budget: The Commission considers that proposals requesting a contribution from the EU of about € 3.5 million per action for a duration of 5 years (recommended duration) for Parts a), b) and c); about € 2 million per action for a duration of 3 years (recommended duration) for Part d) would allow for this topic to be addressed appropriately. Nonetheless this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Common understanding of innovation potential, more widely accepted understanding, expression of common innovation and standardization needs among practitioners in the same discipline.
- More articulated and coordinated uptake of innovative solutions among practitioners from different disciplines who are often called to act together to face major crisis.
- More efficient use of investments made across Europe in demonstration, testing, and training facilities for first responders.

- Synergies with already established European, national and sub-national networks of practitioners, even if these networks are for the time being only dedicated to aspects of practitioners' work unrelated to research and innovation (in general, to the coordination of their operations).
- An improved and professionalised NCP service, consistent across Europe, thereby helping simplify access to Horizon 2020 calls, lowering the entry barriers for newcomers, and raising the average quality of proposals submitted.

Delegation Exception Footnote: This activity directly aimed at supporting the development and implementation of evidence base for R&I policies and supporting various groups of stakeholders is excluded from the delegation to the Research Executive Agency and will be implemented by the Commission services.

Horizon 2020 Pillar: Societal Challenges

Programme: Secure, clean and efficient energy

Activity/Topic: Measuring, monitoring and controlling the risks of CCS, EGS and unconventional hydrocarbons in the subsurface

Call Identifier: H2020-LCE-2016-2017

Topic Identifier: LCE-27-2017

Topic Title: COMPETITIVE LOW-CARBON ENERGY

Deadline(s): 05.01.2017

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2157-lce-27-2017.html

Specific Challenges: Carbon capture and storage (CCS), enhanced geothermal systems (EGS) and unconventional gas development impact on the subsurface. Subsequently, advanced and cost effective monitoring of the containment of underground CO2 and natural gas is vital for the sustainable management of the subsurface and its resources.

In CCS, the safe and permanent geological storage of CO2 requires a continuous and sophisticated monitoring of the storage complex. For enhanced geothermal systems, the use of supercritical CO2 has been proposed as a circulating heat transmission fluid. The CO2 would bring the advantage of a low viscosity and hence low flow resistance as compared to water, and could achieve permanent storage of CO2 as a supplementary benefit. In both CCS and EGS, robust monitoring is a key prerequisite for the safe and sustainable storage or circulation of significant volumes of CO2 in the subsurface.

Technological progress, in particular the combination of horizontal drilling with multiple stages of hydraulic fracturing, has enabled the development of unconventional hydrocarbon resources. This has resulted in new opportunities, but also bears environmental and public health risks, which need to be better understood, monitored, managed and communicated appropriately. These risks relate mainly to water pollution (in particular stemming from insufficient underground characterisation, inappropriate well casing, the use of chemicals in the fracking process, and waste management), but also air emissions as well as local impacts linked in particular to transport, land and water use.

Research is needed to better understand and quantify possible (natural and engineered) leakage pathways for natural gas, the rates of leakage into aquifers and escape at surface, the impacts that leakage can have on fresh groundwater resources, soil and biodiversity, and the time frame in which emissions will return to baseline values. In addition, the effective detection and quantification of leakage requires a scientifically robust method for determining natural background concentrations of CO2 and natural gas in the soil and at the surface.

Uniform, unbiased and independent data are needed to improve environmental stewardship in all three aforementioned geo-energy applications.

Scope: The exact scope of this topic will be further specified in the course of 2016, taking account of, inter alia, the review of the effectiveness of the Commission Recommendation of 22 January 2014 on minimum principles for the exploration and production of hydrocarbons (2014/70/EU) (such as shale gas) using high-volume hydraulic fracturing, as well as preliminary findings

from four projects on environmental impacts of unconventional gas funded under Horizon 2020 2014-2015 Work Programme.

Expected Impact: To be further specified in the course of 2016. This topic may provide European and **North American** researchers with a platform to enhance and deepen trans**Atlantic** dialogue on environmental and public health issues related to these three applications.

Horizon 2020 Pillar: Societal Challenges

Programme: Secure, clean and efficient energy, Food security, sustainable agriculture and forestry, marine and maritime and inland water research, Climate action, environment, resource efficiency and raw materials

Activity/Topic: Impact of Arctic changes on the weather and climate of the Northern Hemisphere

Call Identifier: H2020-BG-2016-2017

Topic Identifier: BG-10-2016

Topic Title: Blue Growth - Demonstrating an ocean of opportunities

Deadline(s): 17.02.2016

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5123-bg-10-2016.html

Specific Challenges: 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 Trans**Atlantic** 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[[Please note that participants from developed countries are not eligible for Horizon 2020 funding.]]. 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.

Horizon 2020 Pillar: Societal Challenges

Programme: Secure, clean and efficient energy, Food security, sustainable agriculture and forestry, marine and maritime and inland water research, Climate action, environment, resource efficiency and raw materials

Activity/Topic: An integrated Arctic observation system

Call Identifier: H2020-BG-2016-2017

Topic Identifier: BG-09-2016

Topic Title: Blue Growth - Demonstrating an ocean of opportunities

Deadline(s): 17.02.2016

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5122-bg-09-2016.html

Specific Challenges: 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 Trans**Atlantic** 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[[(COM(2012)497)]], actions will contribute to implementing the Trans**Atlantic** 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[[Please note that participants from developed countries are not eligible for Horizon 2020 funding.]]. 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 inter-operability 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 Trans**Atlantic** 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.

Horizon 2020 Pillar: Societal Challenges

Programme: Secure, clean and efficient energy, Food security, sustainable agriculture and forestry, marine and maritime and inland water research, Climate action, environment, resource efficiency and raw materials

Activity/Topic: The effect of climate change on Arctic permafrost and its socio-economic impact, with a focus on coastal areas

Call Identifier: H2020-BG-2016-2017

Topic Identifier: BG-11-2017

Topic Title: Blue Growth - Demonstrating an ocean of opportunities

Deadline(s): 14.02.2017

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5126-bg-11-2017.html

Specific Challenges: 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 co-operation 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[[(COM(2012)497)]], actions will contribute to implementing the Trans**Atlantic** 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[[Please note that participants from developed countries are not eligible for Horizon 2020 funding.]].

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.

Horizon 2020 Pillar: Societal Challenges

Programme: Smart, green and integrated transport

Activity/Topic: Behavioural aspects for safer transport

Call Identifier: H2020-MG-2016-2017

Topic Identifier: MG-3.5-2016

Topic Title: 2016-2017 Mobility for Growth

Deadline(s): 20.01.2016
Stage 2: 29.09.2016

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2090-mg-3.5-2016.html

Specific Challenges: 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.

Horizon 2020 Pillar: Societal Challenges

Programme: Smart, green and integrated transport

Activity/Topic: Protection of all road users in crashes

Call Identifier: H2020-MG-2016-2017

Topic Identifier: MG-3.2-2017

Topic Title: 2016-2017 Mobility for Growth

Deadline(s): 26.01.2017
Stage 2: 19.10.2017

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2109-mg-3.2-2017.html

Specific Challenges: The continued introduction of active safety systems has the potential to reduce accidents. Nevertheless, the risk of collision and particular crash situations will still remain. An approach will be needed that will ensure improved crash safety in those circumstances. A number of societal trends add to this challenge such as the ageing population, an increase in the number of powered and non-powered two-wheelers and the introduction of green, light, sub-compact cars.

An important step forward will be to develop fully integrated safety systems and deploy them so that they provide better protection for all road users. Emerging new vehicle types and the possible use of Cooperative Intelligent Transport Systems (C-ITS) would need to be considered. The application of advanced safety features and the development of personal safety equipment can also be seen as ways to reduce fatalities and injuries to pedestrians, cyclists and riders of Powered Two Wheelers (PTWs). In addition, simulation tools (including new virtual human body models) will need to be developed to assess new safety systems and determine their effectiveness and potential impact.

With respect to competitiveness, user protection has been an area where European industry has exhibited technology leadership, but this is now being increasingly challenged worldwide.

Scope:

Proposals should focus on one or several of the following aspects:

- Vehicle based systems such as: solutions for improved crash compatibility; optimisation of restraint systems by including pre-crash information; and methods and requirements to assess safety performance in traffic of extremely low-mass vehicles.
- Personal protection such as: development and testing of focused personal safety equipment for various road user categories, to warn them adequately and/or protect them in the most safety critical situations; and integrated assessment methods for the overall safety of road users and solutions that enhance their protection.
- Crash simulation such as: computationally efficient and robust crash simulation tools; implementation of virtual testing; and development of virtual human body models of road users and situations not currently available.

Proposed actions should focus on fully integrated safety systems.

Consideration should be taken of gender aspects such as body structure and stature and other demographic factors such as the disabled (persons of reduced mobility), ageing, obesity, etc.

Participation of SMEs with proven experience in these areas is encouraged.

Links with Member State initiatives in this area are 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 Departement 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: By providing an integrated approach to safety systems, actions are expected to make a direct contribution to the reduction of fatalities and severity of injuries, as well as the number of injured persons. They will deliver measures that will make the 'triangle' of European road users, vehicles and infrastructure safer. In this way, actions are expected to contribute to important savings in the health system linked with the reduction of accidents and injuries.

Proposers are expected to demonstrate how the project results will have a significant impact on road safety casualties and injuries and how they will make an effective contribution to the standardisation of products and testing techniques.

A credible strategy is expected to demonstrate the future full scale manufacturing of critical products developed in the project in Europe.

Societal Challenges, Industrial Leadership

Horizon 2020 Pillar: Societal Challenges, Industrial Leadership

Programme: Climate action, environment, resource efficiency and raw materials, Food security, sustainable agriculture and forestry, marine and maritime and inland water research, Leadership in enabling and industrial technologies (LEIT)

Activity/Topic: EO Big Data Shift

Call Identifier: H2020-EO-2017

Topic Identifier: EO-2-2017

Topic Title: Earth Observation

Deadline(s): 01.03.2017

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2232-eo-2-2017.html

Specific Challenges: Effective access to Copernicus dedicated mission data and Copernicus service information by public and private users is a sine qua non condition for the achievement of Copernicus' objectives.

In this context, Copernicus faces important challenges. First, the multiplicity of Copernicus partners involved in Copernicus dissemination activities requires both flexible and effective coordination. At the moment Copernicus dissemination infrastructure is built around different dissemination platforms operated by Member States (as in the collaborative ground segment), ESA, EUMETSAT, and service operators, which are in the process of being made interoperable. Second, the sheer volume of data and information to be disseminated and used, puts Copernicus at the forefront of the big data challenges. This new paradigm requires a change of approach to data curation and dissemination, in the form of a technological leap to both ingest processing and make available the increased volume of Copernicus data and information considering both temporal and spatial resolutions. As a reward, the Big Data paradigm offers new perspectives for data intensive activities where Europe could still close its technological gap with the **US** with huge industrial implication.

The free, full and open data policy will support the development of a strong Earth observation downstream service industry if an effective and scalable dissemination system is implemented to meet the Big Data exploitation challenges and to address the full data cycle needs (e.g. standardised data query, retrieval, data exchange methods, processing). Therefore, Europe needs to foster a Copernicus dissemination infrastructure spurred by a vibrant European downstream sector taking advantage of the timely availability of the Copernicus data and information to provide innovative Earth observation information products on a worldwide basis based on European Internet platforms using advanced big data technologies and serving a worldwide market.

Scope: Two main strands of activities are expected to be addressed: (i) the evolution of the Copernicus data infrastructure; and (ii) the adaptation of big data technologies to Copernicus user scenarios (i.e. data discovery and analytics to store and extract information).

Proposals should take into account needs emerging from ongoing linked actions within Copernicus including the dissemination platform; access to data and the Collaborative

Ground Segment. To that end an information document will be made available as part of the general call package.

In particular:

i. the evolution of the Copernicus data infrastructure should foster innovative business models for data exploitation allowing for numerous new users. Projects should should propose scenarios for the platforms for EO data use processing and storage. This new paradigm requires a change of approach to data curation, processing, dissemination and the way data are used. Cross-fertilisation with other big data domains is needed to ensure that EO data exploitation can benefit other domains/sectors (and that tools are in place), and that lessons learnt in other sectors can be benefitted from. The latter includes for instance experiences in strategies for co-locating or distributing processing to different levels, dissemination of data and archiving including products for merging different sources e.g. data co-registration and fusion in temporal and spatial domains.

ii. Big Data, activities shall bridge the gap between Earth observation and information technology sectors taking into account the user needs for EO Big Data and aiming at developing innovative solutions. taking into account the needs of 1) non-expert users like policy makers involved in societal challenges, 2) experts involved, and 3) small and medium innovative enterprises. Activities shall be complementary to activities enabled by the ICT and research infrastructures work programmes which address generic challenges in the area of data mining, open linked data, web ontology, digital earth[[For example e-infrastructure for Research: Network (GÉANT), processing (PRACE), data network, Federation of research infrastructure with single sign on (eduGAIN).]].

Activities are expected to address any aspect of the data lifecycle which can solve EO big data challenges , in particular data management activities (e.g. collection, processing including online processing, quality control, documentation, dissemination, cataloguing, preservation, usage tracking, integration) and usage activities (e.g. discovery, reception, analysis, product generation, user feedback, tagging, knowledge extraction, decision making). Activities are also expected to extensively use flexible coverage and open processing standards.

In projects to be funded under this topic participation of industry, in particular SMEs, is encouraged.

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:

- Make access to the Copernicus data and information easy and user friendly through scalable dissemination and exploitation platforms based on international standards;
- Foster the establishment of interoperable access facilities to all EU Member States;
- Link the Copernicus interoperable data with the EU Open Data Portal, as appropriate
- Implement sustainable industrial solutions to meet the Big Data challenges;
- Provide user community tools within the dissemination platforms including best-practices;
- Ensure resilience of the overall dissemination and exploitation system.
- Optimise the use of Copernicus data by non-traditional user communities to meet societal challenges.

Horizon 2020 Pillar:	Societal Challenges, Industrial Leadership
Programme:	Food security, sustainable agriculture and forestry, marine and maritime and inland water research, Leadership in enabling and industrial technologies (LEIT), Climate action, environment, resource efficiency and raw materials
Activity/Topic:	Advancing basic biological knowledge and improving management tools for commercially important fish and other seafood species
Call Identifier:	H2020-SFS-2016-2017
Topic Identifier:	SFS-21-2016-2017
Topic Title:	Sustainable Food Security – Resilient and resource-efficient value chains
Deadline(s):	17.02.2016
Stage 2:	13.09.2016

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/5136-sfs-21-2016-2017.html

Specific Challenges: 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.

Horizon 2020 Pillar:	Societal Challenges, Industrial Leadership
Programme:	Food security, sustainable agriculture and forestry, marine and maritime and inland water research, Leadership in enabling and industrial technologies (LEIT), Climate action, environment, resource efficiency and raw materials
Activity/Topic:	Towards a science-based regionalisation of the Common Fisheries Policy
Call Identifier:	H2020-SFS-2016-2017
Topic Identifier:	SFS-20-2017
Topic Title:	Sustainable Food Security – Resilient and resource-efficient value chains
Deadline(s):	14.02.2017
Stage 2:	13.09.2017

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/6054-sfs-20-2017.html

Specific Challenges: 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"[[See definition of the 'multi-actor approach' in the introduction to this Work Programme part (see text box).]] 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.

Horizon 2020 Pillar:	Societal Challenges, Industrial Leadership
Programme:	Secure societies - Protecting freedom and security of Europe and its citizens, Leadership in enabling and industrial technologies (LEIT), Health, demographic change and wellbeing
Activity/Topic:	EU Cooperation and International Dialogues in Cybersecurity and Privacy Research and Innovation
Call Identifier:	H2020-DS-2016-2017
Topic Identifier:	DS-05-2016
Topic Title:	Digital Security Focus Area
Deadline(s):	25.08.2016

Participant Portal Weblink:
http://ec.europA.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/2422-ds-05-2016.html

Specific Challenges: Recognising the increasing importance of securing our European Digital Society against cybersecurity threats, a significant increase in related Research and Innovation activities has been observed such as the development of local cybersecurity and privacy innovation clusters, as well as investment driven at regional and national level.In order to maximise thematic synergies between H2020, EU and national efforts in the area of cybersecurity R&I, a better overview of these activities is needed.

Globally, an exchange of views and possible cooperation around cybersecurity and privacy research and innovation approaches, policies and best practices with like-minded third countries is also necessary in order to bring relevant elements of comparison and allow European stakeholders (public and private) to actively participate in those discussions which will determine the future global cyber security landscape.

Scope: Proposals may cover one of the three strands identified below.

1. Synergies between H2020, EU Member States and associated countries R&I activities and cybersecurity innovation clusters.

   Proposals should address two main challenges:

   - Foster and promote European cybersecurity and privacy research and innovation
   - Maximise synergies between R&I actions at EU and national levels;

   Proposals shall be of a 4 year duration to cover projects from 2014-2015 and 2016-2017 WPs.

   Proposals should therefore:

   - Identify Cybersecurity innovation clusters across EU Member States and promote their interaction and cooperation;
   - Map the cybersecurity and privacy end-users landscape and identify their specific needs which should be addressed through innovative solutions while taking into consideration all relevant prior work in this area (in particular from FP7 and CIP);

- Organise an annual workshop bringing together participants from the EU clusters and participants in EU funded research and innovation projects;
- In order to address both the technology supply and end-users demand side in cybersecurity and privacy, Digital Security and Privacy in ICT are recognised as challenges across individual H2020 pillars challenges and are addressed in many relevant R&I areas. For example, in LEIT-ICT these issues are addressed in embedded systems, micro-electronics, smart cards, 5G, cloud computing, big data, IoT…). In order to achieve maximum possible synergies and cross-fertilization between relevant research and innovation activities, it is needed to cluster the many projects encompassing security and privacy R&I into a Digital Security and Privacy Cluster for H2020;
- Produce a detailed report of Member State national cybersecurity and privacy related Research & Innovation programmes and research agendas in order to identify the areas where EU funding may achieve maximum impact;
- Identify new opportunities for cybersecurity innovation in Europe by looking at emerging trends and disruptive technologies (such as quantum cryptography);
- Provide input into the work of the NIS Platform WG3 Strategic Research agenda, ENISA and national cybersecurity and privacy R&I road mapping initiatives at Member State level;
- Identify and synthesize relevant policy, regulatory, economic, aspects including education and skills;
- Identify and support standardisation efforts of proposals in the Digital Security Calls and propose actions to be included in the European Commission's ICT Standardisation Rolling Plan.
- Identify and connect relevant market agents, capitalising on European strengths in the cybersecurity sector, including business drivers, technology enablers, and deployment challenges, from both supply and demand sides

2. International dialogue with Japan
    - Encourage and facilitate an exchange of views between the relevant EU and Japanese stakeholders on matters relating to cybersecurity and privacy R&I trends and challenges; identify and map the relevant legislation and policies in place stimulating the innovation and deployment of cybersecurity solutions.
    - Support the EU-Japan ICT dialogue in the area of cybersecurity;
    - Identify opportunities for future cooperation between the European research and innovation ecosystems (including standardisation) and policy makers and the corresponding institutional and private Japanese entities.
    - In line with the EU's strategy for international cooperation in research and innovation, 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

3. International dialogue with the **USA**
    - Encourage and facilitate an exchange of views between the relevant EU and the **US** stakeholders on matters relating to cybersecurity and privacy R&I trends and challenges; identify and map the relevant legislation and policies in place stimulating the innovation and deployment of cybersecurity solutions.
    - Identify opportunities for future cooperation between the European research and innovation ecosystems (including standardisation) and policy makers and the corresponding federal and private **US** entities.
    - Launch a multistakeholder reflection between European and **US** institutional, research and think tanks addressing the international, technical as well as socio-political challenges in cybersecurtity;

- In line with the EU's strategy for international cooperation in research and innovation, 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 Commission considers that proposals requesting the following contributions from the EU would allow these areas to be addressed appropriately:

- up to EUR 2 million for strand 1
- upt to EUR 0,5million each for strands 2 and 3

Nonetheless this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Identify and prioritise R&I topics across the EU.
- Foster and promote European cybesecurity innovation activities
- Increase the international visibility of EU activities in cybersecurity.
- Identify potential European and international common approaches in addressing cybersecurity challenges from a R&I as well as a governance and institutional perspective.

Delegation Exception Footnote: This activity directly aims at supporting the development and implementation of evidence base for R&I policies and at supporting various groups of stakeholders, public-public partnerships with Member States and associated countries as well as the promotion of coherent and effective cooperation with third countries. It is excluded from the delegation to the Research Executive Agency and will be implemented by the Commission services.