COUNCIL DECISION ESTABLISHING THE SPECIFIC PROGRAMME IMPLEMENTING HORIZON 2020 - THE FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION (2014-2020)

WORK PROGRAMME 2014 – 2015

4. European research infrastructures (including e-Infrastructures)

INFORMAL DRAFT DISCUSSION DOCUMENT

18/09/2013

Important notice:
The present document is meant to facilitate the discussions towards the preparation of the work programme 2014 – 2015. It does not at this stage cover all relevant aspects and it does not prejudge the outcome of the on-going interinstitutional negotiations on Horizon 2020 or internal work on cross-cutting aspects. Hence, it remains subject to change. Information, such as indicative budgets per call/area, will be provided at later stage.

Table of Contents

Introduction to European research infrastructures (including e-Infrastructures)

Research infrastructures are facilities, resources and services that are used by the research communities to conduct research and foster innovation in their fields. Where relevant, they may be used beyond research, e.g. for education or public services. They include: major scientific equipment (or sets of instruments); knowledge-based resources such as collections, archives or scientific data; e-infrastructures, such as data and computing systems and communication networks; and any other infrastructure of a unique nature essential to achieve excellence in research and innovation. Such infrastructures may be 'single-sited', 'virtual' or 'distributed'.

Research infrastructures play an increasing role in the advancement of knowledge and technology and their exploitation. By offering high quality research services to users from different countries, by attracting young people to science and by networking facilities, research infrastructures help structuring the scientific community and play a key role in the construction of an efficient research and innovation environment. Because of their ability to assemble a 'critical mass' of people, knowledge and investment, they contribute to national, regional and European economic development. Research infrastructures are also key in helping Europe lead a global movement towards open, interconnected, data-driven and computer-intensive science and engineering. e-Infrastructures will make every European researcher *digital*, increasing creativity and efficiency of research and bridging the divide between developed and less developed regions.

Just as public infrastructures form the substrate of civil society, research infrastructures are the backbone of scientific communities. Research infrastructures have been a well-established concept in the Physical Sciences for a long time. More recently, the concept of openly accessible infrastructures has spread into all disciplines of science, from Life Science to Social Sciences and Humanities. This spread has happened not least under the influence of interdisciplinary users and the increasing importance of e-Science. Research infrastructures therefore provide research opportunities and services to researchers in many areas also addressed by other Parts of Horizon 2020,in particular the Parts "Societal Challenges", "Leadership in Enabling and Industrial Technologies" (LEIT), and "Future and Emerging Technologies" (FET). This is also reflected in the close links between several of the topics of Research infrastructures and certain Focus Areas. Furthermore production-level e-infrastructures are able to serve the computing and data needs of any project in the framework programme fostering economies of scale in the use of ICT systems by projects supported by Horizon 2020.

Activities funded under this Part foster the innovation potential of research infrastructures, for example by reinforcing partnerships with industry, transfer of knowledge and other dissemination activities, use of research infrastructures by industrial researchers, and involvement of industrial associations in consortia or in advisory bodies.

Research Infrastructure activities also contribute to widening participation to the programme by supporting the development of Regional Partner Facilities in ESFRI projects and integrating activities. The use of structural funds to build capacities and infrastructures at national level is greatly encouraged.

Call 1 - Developing new world-class research infrastructures

H2020-INFRADEV-2014/2015

This call focuses on developing new word-class research infrastructures. The aim is to facilitate and support the implementation, long-term sustainability and efficient operation of the research infrastructures identified by the European Strategy Forum on Research Infrastructures (ESFRI) as well as other world-class research infrastructures, which will help Europe respond to grand challenges in science, industry and society. In addition, the next generation of new research infrastructures can be identified through design studies. Support will be provided to:

- the conceptual and technical design of new research infrastructures, which are of a clear European dimension and interest, through a bottom-up approach (deadline and budget 2014);
- the preparatory phases of ESFRI projects, through a targeted approach (deadline and budget 2015);
- the individual implementation and operation of prioritised ESFRI projects, through a targeted approach (deadline and budget 2015);
- the implementation and operation of cross-cutting infrastructure services and solutions for clusters of ESFRI and other world class research infrastructures (deadline 2014 and budget 2014-2015).

INFRADEV 1-2014: Design Studies

Specific Challenge: New leading-edge research infrastructures in all fields of science and technology are needed by the European scientific community in order to remain at the forefront of the advancement of research, and to be able to help industry strengthen its base of knowledge and its technological know-how. The aim of this activity is to support the conceptual design and preparatory actions for new research infrastructures, which are of a clear European dimension and interest. Major upgrades of existing infrastructures may also be considered if the end result is intended to be equivalent to, or capable of replacing, an existing infrastructure.

Scope: Design studies should address all key questions concerning the technical, legal and financial feasibility of new or upgraded facilities, leading to a 'conceptual design report' showing the maturity of the concept and forming the basis for identifying and constructing the next generation of Europe's and the world's leading research infrastructures. Conceptual design reports will present major choices for design alternatives and associated cost ranges, both in terms of their strategic relevance for meeting today's and tomorrow's societal challenges, and (where applicable) in terms of the technical work underpinning the development of new or upgraded research infrastructures of European interest. All fields of science are considered.

The activities that could be performed in a Design Study project include:

- Technical work, i.e. (1) the drafting of engineering plans for the construction, as well as the creation of final prototypes for key enabling technologies and implementation plans for transfer of knowledge from existing prototypes to the new research infrastructure; (2) technical work to ensure that the beneficiary scientific communities exploit the new facility

from the start with the highest efficiency, including the introduction of new processes or software.

- Strategic work, i.e. (1) plans to integrate harmoniously the new infrastructure into the European fabric of related facilities in accordance, whenever appropriate, with the Community objective of balanced territorial development; (2) the identification of the best possible site(s) for setting up new facilities; (3) the estimated budget for construction and operation (4) the design of a workable legal (e.g. an ERIC) and governance structure; (5) the planning of research services to be provided at international level.

The main outcomes of the projects funded under this action will be conceptual design reports for new or upgraded research infrastructures,

When the Design study includes technical work it should be implemented as a *Research and innovation action*, otherwise as a *Coordination and support action*.

Expected impact:

- Funding bodies for research infrastructures become aware of the strategic and funding needs of the scientific community.
- Policy bodies at the national level (e.g. funding bodies, governments), at European level (e.g. ESFRI) and internationally (e.g. the Organisation for Economic Co-operation and Development's Global Science Forum) have a sound decision basis to establish long-range plans and roadmaps for new research infrastructures of pan-European or global interest.
- The technical work carried out under this topic will contribute to strengthening the technological development capacity and effectiveness as well as the scientific performance, efficiency and attractiveness of the European Research Area.

Type of action: Coordination and Support Action or Research & Innovation Action

INFRADEV 2-2015: Preparatory Phase of ESFRI projects

Specific Challenge: The ESFRI roadmap, updated periodically, identifies the needs of the European scientific community in terms of research infrastructures. However, inclusion in the ESFRI roadmap does not guarantee that these needed infrastructures will be built. Before proceeding with the construction and/or implementation of the identified infrastructures, many preliminary decisions need to be taken with respect to issues such as the identification of funders, the financial plan for sustainability, the governance by involved stakeholders, the site and legal form of the managing organisation, the architecture and the service policies. The aim of this activity is to provide catalytic and leveraging support for the preparatory phase leading to the construction of new research infrastructures or major upgrades of existing ones.

Scope: The preparatory phase aims at bringing the project for the new or upgraded research infrastructure to the level of legal, financial, and, where applicable, technical maturity required for implementing it. Project consortia should involve all the stakeholders necessary to move the project forward, to take the decisions, and to make the financial commitments necessary before construction can start (e.g. national/regional ministries/governments, research councils, funding agencies). Appropriate contacts with ministries and decision makers should be continuously reinforced, thus further strengthening the consortia. Operators of research facilities, research centres, universities, and industry may also be involved whenever appropriate. During the preparatory phase the Commission may act as a 'facilitator', in particular with respect to the financial engineering needed for the construction phase. The preparation of the legal agreements (including site, governance, financing of the new research

infrastructures) is one of the main activities and deliverables and must be finalised before the end of the project (e.g., through the signature of a Memorandum of Understanding).

The preparatory phase may also include technical work. In this case the project should be implemented as a *Research and innovation action* instead of a *Coordination and support action*. **Preparatory phase type I**: Proposals will address research infrastructures identified in the periodic updates of the ESFRI roadmap that are willing to set up a pan-European governance and legal structure (e.g. in the form of an ERIC).

Preparatory phase type II: Proposals will target projects that have been identified by ESFRI as requiring additional support for entering into the implementation phase. In this case a reduced grant for the continuation of the preparatory phase could be given to support a limited set of activities in particular for setting up an adequate governance and management structure, securing financial commitment and broadening the membership.

Expected impact:

Proposals will raise the technical, legal and financial maturity of projects for new research infrastructures to the level required to enable the construction work to start.

- All the technical, financial, and legal documents which are necessary for the implementation phase of a new or upgraded research infrastructure are created. Participating funding bodies are able to take their final funding decisions and to conclude the legal agreements necessary for the implementation.
- In particular, any technical work necessary for drawing up the final technical design is completed, providing a sound technical base for establishing a cost baseline and detailed financial planning.
- The financial needs of the project are mapped out to the extent necessary for funding agencies to establish their own medium- and long-term financial planning; and
- The preparation of the legal agreements for establishing the implementing / operating consortium is completed, including the project's governance and appropriately detailed internal rules.
- The technical work carried out under this topic will contribute to strengthening the technological development capacity and effectiveness as well as the scientific performance, efficiency and attractiveness of the European Research Area.

Type of action: Coordination and Support Action or Research & Innovation action

INFRADEV 3-2015: Individual implementation and operation of ESFRI projects

Specific challenge: The research infrastructures identified in the ESFRI roadmap have benefitted from EU support for their preparatory phase. Some of them have already moved on to the implementation phase and/or have started their operation. The initial phase is, however, the most delicate and difficult one for new pan-European infrastructures in the process to become fully operational as technologies, services and procedures need to be finalised and best tuned, financial sustainability must be proved and users' trust and awareness must be gained. This topic will address, with a targeted approach based on the prioritisation exercise of the ESFRI projects, the implementation and operation of ESFRI research infrastructures that are setting up, or have already set up, their governance and legal structure, e.g. on the basis of the European Research Infrastructure Consortium (ERIC) or any equivalent structure at European or international level.

Scope: Support will be provided for central coordination, operation, access provision, enlargement of the membership, training and innovation activities. Activities can include setting up and initial running of the central coordination office, enhancement of the technical architecture, detailed R&D and engineering work, development of innovative components, users' access, data management (including possible open access to data), inter-operability, standardisation, outreach, training and international cooperation. Specific attention will be given to the role of industry, in particular to facilitate where relevant the access of SMEs as users and partners of the research infrastructure for technological developments, e.g. through technology transfer activities as well as the development of services to industry. The activity may also support the development of Regional Partner Facilities.

Expected impact:

This activity will:

- contribute to the realisation of the Innovation Union flagship initiative's Commitment n. 5: "*to complete or launch the construction of 60% of the ESFRI projects by 2015*";
- strengthen the ERA position and role in the global research environment;
- reinforce the partnership between the Commission, Member States, Associated Countries and relevant stakeholders in establishing pan-European research infrastructures;
- enhance the role of the Union in international organisations and multilateral forums;
- support progress towards the development of global research infrastructures;
- enable researchers to address societal challenges with a global dimension such as climate change;
- foster capacity building and Research Infrastructure human capital development in targeted/relevant regions;
- raise the technological level of the European industry and SME's, thus improving their competitive position, through their involvement in research infrastructures development and service provision.

Type of action: Research & innovation action

INFRADEV 4-2014/2015: Implementation and operation of cross-cutting services and solutions for clusters of ESFRI and other relevant research infrastructure initiatives

Specific Challenge: If different research infrastructure initiatives such as ESFRI projects, other world class research infrastructures, e-infrastructures and Integrating Activity projects are developed, implemented and operate in isolation, there is a risk of fragmentation, lack of interoperability between them and parallel development of divergent solutions to same problems. In order to avoid this, there is a need in Europe to coordinate common activities, to develop and deploy common underpinning technologies and services and to implement common and efficient solutions on issues such as, for example, architecture of distributed infrastructures, distributed and virtual access management, development of common critical physical and virtual components (e.g. detectors, components for data management) and policies for data acquisition, access, deposit, sharing and re-use.

Scope: This topic will contribute to the construction and operation of the research infrastructures identified in the ESFRI Roadmap, therefore proposals must be centred around a set of ESFRI projects in a specific thematic area, broad enough to gather critical mass (e.g. Biomedical Science, Advanced Light Sources, Astronomy, or Atmospheric Sciences). While the set of ESFRI projects represents the core component around which any cluster should be

built on, other relevant world class research infrastructures, e-infrastructures and Integrating Activity projects should also be involved in a cluster.

To ensure coordination and synergies between the largest possible number of ESFRI projects and other research infrastructure initiatives in a thematic area, proposals should address a coherent set of common activities and be comprehensive.

Projects should develop synergies and complementarity, optimise technological implementation, define workflows and ensure coordination, harmonisation, integration and interoperability of data, applications and other services between the ESFRI and other research infrastructure initiatives in specific thematic areas. They could focus on issues such as policies, models and solutions for data and knowledge handling, including access, preservation and management; protection of sensitive data and sample; technological innovation and innovative processes with key industry partners; harmonised access policies; deployment and management of networks of observatories; real time observations, sampling procedures; timescales; instrumentation; standards.

Projects may address the development of skills and the specific training of staff managing and operating the research infrastructures, as well as fostering the innovation potential of research infrastructures, in complementarity with the horizontal activities supported under Call 4 (in particular topics INFRASUPP 3 and INFRASUPP 4). Activities should contribute to a faster adoption of best practices and foster the use of open standards and interoperability in data and computing services. When addressing common or interoperable data services, projects should encompass the definition of metadata, ontologies and identifiers as well as models (e.g. open web services) to process semantics at machine level. Proof of concept, prototyping and deployment of advanced data services will be supported.

Consortia should include key participants of the involved infrastructures initiatives as well as other partners needed to develop the required solutions. Projects should build upon the state of the art in ICT and e-infrastructures for data, computing and networking and work in cooperation with e-infrastructure service providers.

This topic is complementary with topics EINFRA 1, Big research data, and EINFRA 9, Virtual Research Environments - VRE, in Call 3: EINFRA 1 addresses services that are potentially transversal and generic, VREs integrate data, network and computing resources for interdisciplinary communities whereas INFRADEV 4 address interoperability of services and common solutions for cluster of ESFRI and other research infrastructure initiatives in thematic areas.

Expected impact:

- Common ready-to-use services, systems, standards or other types of components will be made available to the involved research infrastructures initiatives, thus contributing to the development of a consistent European research infrastructures ecosystem.
- Interoperability between research infrastructure services, including data services, enables novel research leading to innovation and new insights;
- The efficiency and productivity of researchers rise thanks to an easier and seamless access to complementary services provided by different infrastructures and/or to reliable and open data services and infrastructures for discovering, accessing, and reusing data;
- Research communities adopt common approaches to the data management lifecycle (data and metadata curation), which leads to economies of scale;
- Trust in a community's data improves.

Type of action: Research & innovation action

Call 2 - Integrating and opening research infrastructures of pan-European interest

H2020-INFRAIA-2014/2015

This call focuses on opening up key national and regional research infrastructures to all European researchers from both academia and industry and ensuring their optimal use and joint development. Through a targeted approach, specific types of research infrastructures or research communities will be addressed, ranging across all fields of science and technology.

Integrating Activities under the different domains target research infrastructures needed to address the Societal Challenges, in particular "Health, demographic change and well-being", "Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the bioeconomy", "Secure, clean and efficient energy", "Climate action, environment, resource efficiency and raw materials", "Smart, green and integrated transport", and "Europe in a changing world – Inclusive, innovative and reflective societies" as well as some of the Focus Areas such as "Blue Growth" and "Water Innovation". They will also target research infrastructures needed to gain leadership in the industrial and enabling technology "Nano and advanced materials, manufacturing and processing".

INFRAIA 1-2014/2015: Integrating and opening existing national and regional research infrastructures of pan-European interest

Specific Challenge:

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:

An Integrating Activity will mobilise a comprehensive consortium of several research infrastructures[1] 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 when appropriate.

Funding will be provided to support, in particular, the trans-national access and service activities provided to European researchers (and of 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.

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 developing a more efficient and attractive European Research Area;

[1] Exceptionally, the consortium may include only one research infrastructure providing access, if this facility is of a truly unique nature.

(ii) Trans-national access or service activities, to support scientific communities in their access to the identified 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. However, the focus among these categories will differ for 'Starting' and 'Advanced' Communities (see definitions below).

Integrating Activities should, whenever appropriate, give due attention to any related initiatives internationally (i.e. outside the European Union), foster the use and deployment of standards, carry out research on impacts of the involved research infrastructures (direct and indirect, on social, environmental and economic levels) as well as of the project itself.

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. Data management, interoperability (definition of metadata and ontologies) as well as advanced data and computing services should be addressed where relevant. To this extent, projects should build upon the state of the art in ICT and e-infrastructures for data, computing and networking, and either work in cooperation with e-infrastructure service providers or include them in the consortium.

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, activities to promote the use of research infrastructures by industrial researchers, involvement of industrial associations in consortia or in advisory bodies. A specific work package on innovation is therefore requested in all Integrating Activity projects.

In this work programme, Integrating Activities address two classes of different communities:

(1) 'Starting Communities' whose research infrastructures show a limited degree of coordination and networking at present. The strongest impact for these communities will be expected typically to arise from a focus on networking, standardisation and establishing a common access procedure, which lay the foundation for well-used trans-national access and service provision.

(2) 'Advanced Communities' whose research infrastructures show an advanced degree of coordination and networking at present, in particular, through Integrating Activities awarded under previous Framework Programmes. The strongest impact for these communities will be expected typically to arise from focusing on innovation aspects and on widening trans-national access and service provision. Proposals from Communities that have benefitted from EU funding for Integrating Activities before will have to clearly demonstrate the added value and the progress beyond current achievements of a continuation project.

In both cases, Integrating Activities are expected to duly take into account all relevant ESFRI research infrastructures to exploit synergies 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 project per area is expected to be funded.

Following an open bottom-up consultation with stakeholders and the analysis of the collected input by a panel of independent experts, this work programme calls for proposals addressing one or, where appropriate, more of the following areas listed under the different domains:

Biological and Medical Sciences - Starting Communities

Health information, clinical data, samples and medical images – support to population studies. This activity aims at integrating medical information, clinical data, human biological samples and imaging data generated by hospitals, health care and study centres, so as to support large cohort studies in given target population and disease areas. Operational interfaces should allow efficient and sustained flow of data, samples and images from and to established European infrastructures, such as the ESFRI ones (e.g. BBMRI, ECRIN, EURO-BIOIMAGING and ELIXIR) and give user-friendly access to these research resources while following applicable ethical requirements. Standardisation of data acquisition, in particular for imaging data, interoperability and storage aspects are amongst the issues to be addressed.

New tools and resources for analysing and integrating genomic, epigenomic and phenomic data. This activity should link genomics, epigenomics and phenomics resources in animal, plant and microbiological research and provide tools to manage and exploit data for research and innovation in sectors such as health, food, energy and the environment. The project should integrate existing European research infrastructures active in generating and handling such biological data, and exploit synergies with ELIXIR and other relevant ESFRI infrastructures such as ISBE and ERINHA.

Plant and forestry material resources. This activity should integrate European research facilities working with plant including forestry materials, such as seed and tree banks, to provide researchers with wider and better informed access to high quality plant material, and ensure wide use of advanced technology platforms supporting crop biology, forestry, and agricultural and horticultural research in a wider sense. Synergies with relevant ESFRI infrastructures, such as ELIXIR and EMBRC, should be duly exploited.

European nanomedicine characterisation infrastructure. This activity aims at integrating European key reference facilities that have the capability to both characterise and engineer nanoparticles for medical applications. It should offer access to a coherent set of tools, resources and expertise to support chemical, physical and biological research on medical applications, supporting both academic research teams and industry (including SMEs). Synergies with relevant ESFRI Infrastructures, such as EATRIS, EURO-BIOIMAGING and INSTRUCT, should be duly exploited.

Infrastructural support to rare diseases research. This activity aims at integrating sufficient amounts of information and data concerning patients suffering from rare diseases, in order to enable the study of the aetiology of these diseases, the monitoring of their epidemiology and the development and test of diagnostic tools and preventive and therapeutic interventions. Synergies with relevant ESFRI Infrastructures, such as BBMRI, ECRIN, EATRIS, ELIXIR, and EU-OPENSCREEN, should be duly exploited.

Biological and Medical Sciences - Advanced Communities

Virus collections including high-risk human/animal pathogens and supporting facilities. This activity aims at improving the access to high-quality authenticated collections of both human and animal viruses including those requiring high-biosafety level laboratories (BSL 2/3/4), to support upstream virology and immunology research as well as translational research aiming at drug and vaccine development, and to support epidemiological studies targeting disease and epidemics control. Safe virology laboratories should be complemented with high containment animal facilities to allow to safely study livestock and transboundary

zoonotic diseases. Synergies with relevant ESFRI Infrastructures, such as BBMRI, ERINHA, MIRRI, and EBMRC, 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 easily accessible, high quality services and expertise 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. This activity should support the development of both human and veterinary vaccines, for prophylactic and therapeutic applications. Synergies with relevant ESFRI Infrastructures (such as EATRIS, ISBE, ECRIN and INSTRUCT), should be duly exploited.

Infrastructural support to translating research on biological structures into innovation in biomedicine. This activity should expand the availability of structural biology services (such as X-ray crystallography, advanced NMR and advanced imaging technologies) to new communities of users, and in particular to scientists with backgrounds other than structural biology, including from SMEs, to benefit translational research in drugs discovery, informed drugs and vaccine design and other fields like biotechnology and biomaterials. Synergies with relevant ESFRI Infrastructures (such as INSTRUCT, EUROBIOIMAGING, EU-OPENSCREEN, and EATRIS), should be duly exploited.

Energy - Starting Communities

European facilities for battery testing. This activity aims at integrating and providing access to research infrastructures supporting research on electrochemical storage devices for renewable energy (such as dry room facilities for assembly of lab cells series, electron microscopy combined with chemical analysis and calorimetric analysis, test rigs). It should support an integrated research approach along the entire value chain, from materials research to applications.

Testing of wind turbines and electrical subsystems for grid integration under laboratory conditions. This activity aims at supporting the precompetitive research that is needed to address the challenges that wind energy creates for the electrical grid, by promoting coordination within the European community and by providing access to research infrastructures, regardless of their location.

Energy - Advanced Communities

European smart grids research infrastructure. The transition towards high shares of renewable energy and the tendency to a more decentralised energy supply requires a grid with sufficient hosting capacity and the ability to manage the power fluctuation of the renewable sources. This activity should provide laboratory environments that enable the testing of different smart grid configurations considering different scenarios under safe boundary conditions without influencing end-customers of the electrical power supply.

Environmental and Earth Sciences - Starting Communities

Research infrastructures for hydrological/ hydrobiological research. This activity should bring together existing observatories of European freshwaters (river basins, continental, island and overseas territories) covering both abiotic and biotic components, i.e. addressing hydrological, hydrometeorological and hydrochemical aspects as well as biological/ecological indicators of water quality. Water Framework Directive objectives should be considered and access to the infrastructures should be clearly defined.

Research infrastructures for research on crustal fluids. This activity should link the key European analogue experimental facilities in providing one of the underpinning pillars to

EPOS (European Plate Observing System). Appropriate links with the ICDP (International Continental Scientific Drilling Program) should be made.

Research infrastructures for long-term ecosystem and socio-ecological research. This activity should bring together LTER (Long Term Ecological Research) site-based facilities, covering the widest variety of terrestrial and aquatic environments in Europe, organised in clusters, and incorporating long-term socio-ecological research platforms. The provided access and services should enable researchers addressing the broad range of ecosystem research issues (biodiversity loss, ecosystem services, climate change adaptation and mitigation, land use and management, etc.).

Research infrastructures for ocean drilling. This activity should develop a unique EU component for scientific research drilling. It should integrate with IODP (Integrated Ocean Drilling Program) and share technology (drilling and logging, sample and data curation) with ICDP. It needs to link with EMSO (European Multidisciplinary Seafloor Observation) and other crustal boreholes in creating underground and subseafloor observatory network. It should foster involvement of and links with industry in underpinning joint research projects.

European critical zone observatories. This activity should integrate research field sites and associated data management and numerical simulation tools to address threats to soil and water and in particular challenges on urbanisation, land use, soil, water and food security.

Environmental and Earth Sciences - Advanced Communities

Aerosol, clouds, and trace gases research infrastructure. This activity should further integrate state-of-the-art European ground-based stations for long term observations of aerosols, clouds and short lived gases that are essential to climate and air-quality research. New integration tools and long-term sustainability should be addressed.

Research infrastructures for environmental hydraulic research. This activity should integrate the major rare/unique environmental hydraulic infrastructures in Europe and network with the other European hydraulic infrastructures in order to optimise their use to help solve climate change adaptation problems. Particular attention to harmonising and organising the flux of data is expected.

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.

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 bioeconomy.

Mathematics and ICT - Starting Communities

Distributed, multidisciplinary European infrastructure on Big Data and social data mining. This activity should integrate large social data repositories, social data mining methods and tools, and supercomputing facilities for conducting large-scale analytical processing. This integrated infrastructure should enable performing complex processes to extract social knowledge. The project should also address training in social data mining, to foster the availability of skilled data scientists.

Mathematics and ICT - Advanced Communities

Integrating activity for facilitating access to HPC (High Performance Computing) centers. This activity aims at furthering the integration and the services harmonisation and enhancement of national and regional High Performance Computing centers 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).

Engineering, Material Sciences, and Analytical facilities - Starting Communities

Advanced frontier research in nano-electronics. Nanotechnology and particularly nano-electronics are priority areas of European technology development. The growing interest on 'more than Moore' and beyond CMOS concepts requires long-term vision and focused investment of resources. This activity aims at integrating the corresponding infrastructures, based on frontier research and linked with matching technology platforms, to enable a smooth and consistent transition of the European industry to a new era of nano-electronics.

Engineering, Material Sciences, and Analytical facilities - Advanced Communities

Advanced nanofabrication. This activity aims at furthering the integration of, and access to, infrastructures for micro- and nanofabrication and metrology employing laboratory-scale methods.

Fabrication and characterisation of advanced materials based on large-scale bright sources. This activity aims at furthering the integration of nanoscale design, growth, fabrication and analysis by linking them up with advanced nano-foundry and characterisation facilities, including unique, pioneering and state of the art metrology facilities built on large-scale bright sources of electromagnetic radiation and/or particle beams.

Functional materials for special applications. This activity aims at furthering the integration of, and access to, facilities for the development and treatment of functional materials using advanced technologies, such as ion-beam technology.

Facilities for research on materials under extreme conditions: ultra-low temperature. This activity aims at integrating facilities in ultra-low temperature physics and enabling the related European community to perform nanophysics experiments at ultra-low temperatures and to develop user-friendly automated refrigerators and instrumentation.

Large-scale testing facilities for engineering applications. This activity aims at improving and providing access to the European research infrastructures such as wind tunnels and other industrial test benches for transport and particularly for aeronautics, including support for developing future norms for public transportation and safety.

Physical Sciences - Starting Communities

European laboratory astrophysics. Laboratory Astrophysics is a rapidly growing field, not least because the knowledge of fundamental physical properties and processes at nuclear, atomic and molecular levels is crucial for the interpretation of data from ground- and space-based observatories as well as solar-system probes. This activity aims at coordinating and integrating joint efforts of separate laboratories, for all aspects of generation, collection, distribution, curation, and access to data or samples.

Research infrastructures for high-energy astrophysics. This activity aims at opening up existing facilities for developing, calibrating and testing both generic technologies as well as individual instruments developed for space missions in an environment representative of space conditions. Access should be provided in particular to scientists without national access to testing and calibration facilities, at the same time stimulating scientific and technological exchanges among European teams.

Science at deep-underground laboratories. This activity aims at achieving a high level of integration of facilities for deep underground research by simultaneously establishing common access procedures, promoting the common planning of experiments, and by coordinating technological efforts in order to optimise use and access to resources and to avoid duplication.

Integrating gravitational wave research. This activity aims at integrating the communities of researchers studying gravitational waves and their astrophysical sources: both laser and atom interferometers with their extreme technological requirements; observations of graviational-wave sources through electromagnetic waves and high-energy particles; numerical/theoretical studies of such sources. It should address also the computing and data handling needs of these communities.

Physical Sciences - Advanced Communities

Detectors for future accelerators. This activity aims at furthering the integration of, and access to, the key research infrastructures in Europe for the development of advanced detector technologies.

Research infrastructures for nuclear physics. This activity aims at furthering the integration of, and access to, the key research infrastructures in Europe for studying the properties of exotic nuclei or of nuclear matter at extreme conditions.

European planetary science. This activity aims at furthering the integration of the key research infrastructures in Europe for studying planetary science by drawing in new partners and by providing access to the facilities and to a larger number of users, taking into account the multi- and trans-disciplinary nature of the field.

Social Sciences and Humanities - Starting Communities

Generations and gender: a cross-national longitudinal data infrastructure for research on social cohesion and social inclusion. This activity aims at coordinating and integrating national research infrastructures built on longitudinal survey data by implementing common collection procedures and standards, harmonising micro- and macro-level information, and stimulating optimal use of these sources by researchers in demography, sociology, economics and other social sciences.

Research infrastructures for studying the role of intangible investment for economic growth. This activity aims at bringing together research infrastructures in order to sustain and further develop the empirical analytical framework that includes intangible capital in sources-of-economic-growth analysis.

Social Sciences and Humanities - Advanced Communities

Contemporary European history: European Holocaust research infrastructure. This activity aims at building upon existing research infrastructures and expanding them to include new material and new techniques in order to open distributed access of researchers to scattered material.

European research infrastructures for restoration and conservation of cultural heritage. This activity aims at bringing together facilities, located in research centres, universities and important culture institutions of different countries, for the restoration and conservation of cultural heritage overcoming fragmentation, rationalising resources and advancing the international role of European cultural heritage research.

Expected impact:

Integrating Activities are the main instrument to realise the Innovation Union flagship initiative's Commitment n. 4: "*Opening of Member State operated research infrastructures to the full European user community*", with a structuring impact on the ERA and on the way research infrastructures operate, evolve and interact with similar facilities and with their users. In particular:

- 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.
- A new generation of researchers is educated that is ready to exploit in the best way all the essential tools needed for their research.
- 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.
- 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.
- Innovation is fostered through a reinforced partnership of research organisations with 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.

Type of action: Research & innovation action

Call 3 - e-Infrastructures

H2020-EINFRA-2014/2015

This call focuses on e-infrastructures and is motivated by the following priorities:

- Integrating e-infrastructure resources and services across all layers (networking, computing, data, software, user interfaces), in order to provide seamless services tailored to user needs. Integration will be facilitated by agreeing and deploying common or interoperable core services and service building blocks, which is the main aim of topic EINFRA 7, by avoiding rigid boundaries between computing and data (in EINFRA 1 and 5), and by user-driven integration in Virtual Research Environments (topic EINFRA 9).
- Implementing the e-infrastructure to ride the wave of "big data", on the basis of the policy orientations provided by the High-Level Group on Scientific Data[2] and the "framework for action" published in March 2013[3], through topics EINFRA 1, 2 and 3.
- Providing support to the e-infrastructure for Open Access as defined in the Communication on Scientific Information[4] through EINFRA 1 and EINFRA 2, in particular for the implementation of the Open Access mandate (covering all Horizon 2020 publications output) and the Open Data Pilot, and for federating researcher electronic identities as defined in the ERA Communication[5] through EINFRA 7. Actions in EINFRA 1 and 2 will provide services to support project participants in any area of Horizon 2020 for managing the life cycle of data they collect or produce within their projects (e.g. deposition, storing, access to and preservation).
- Implementing the e-infrastructure part of the EU strategy on High Performance Computing (HPC)[6], in particular the provision of services, the infrastructure for computing applications (Centres of Excellence) and a network of HPC Competence Centres for SMEs through topics EINFRA 4, 5 and 6. A Public-Private Partnership (PPP) in HPC (expected by the end of 2013) will provide the framework for the implementation of the HPC strategy, addressing in particular the Centres of Excellence in computing applications and the development of HPC technologies towards exascale (supported in the FET part of the Excellent Science pillar).
- Implementing the recommendations of the GÉANT Expert Group[7] aiming at developing GÉANT as the European communications commons and as a global hub for research, innovation and education, through topic EINFRA 8.
- Software cuts across almost all topics. Strategic software is addressed in EINFRA 1 (e.g. sub-topic 7 on database software for extremely large datasets) and computing application codes are addressed in EINFRA 5.

---

2 http://cordis.europa.eu/fp7/ict/e-infrastructure/docs/hlg-sdi-report.pdf

3 http://cordis.europa.eu/fp7/ict/e-infrastructure/docs/framework-for-action-in-h2020_en.pdf

4 COM(2012)401 final, http://ec.europa.eu/research/science-society/document_library/pdf_06/era-communication-towards-better-access-to-scientific-information_en.pdf

5 COM(2012) 392 final, http://ec.europa.eu/research/science-society/document_library/pdf_06/era-communication-partnership-excellence-growth_en.pdf

6 Communication "High-Performance Computing: Europe's place in a Global Race" http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2012:0045:FIN:EN:PDF

7 http://cordis.europa.eu/fp7/ict/e-infrastructure/docs/geg-report.pdf

- Mainstreaming innovation and the development of human capital in all topics that are relevant.

Proposals addressing e-infrastructure services development (all topics in Call 3 except EINFRA 3 and 6) will combine, in a closely co-ordinated manner, Networking, Service and Joint Research Activities.

EINFRA 1-2014 – Managing, preserving and computing with big research data

Specific challenge: Development and deployment of integrated, secure, permanent, on-demand service-driven and sustainable e-infrastructures incorporating advanced computing resources and software are essential in order to increase the capacity to manage, store and analyse extremely large, heterogeneous and complex datasets, including text mining of large corpora. These e-infrastructures need to provide services cutting across a wide-range of scientific communities and addressing a diversity of computational requirements, legal constraints and requirements, system and service architectures, formats, types, vocabularies and legacy practices of scientific communities that generate, analyse and use the data.

Scope: Proposals should address at least one of the first five (5) activities, or activities 6,7 or 8 individually. Proposers are encouraged to leverage on prior work on open prototype services and to use discoverable service catalogues, common APIs, service-level agreements (SLAs) and transparent billing.

(1) Establishing a federated pan-European data e-infrastructure to provide cost-effective and interoperable solutions for data management and long term preservation. The needs for data access, replication, annotation, search, compute, analysis and reuse of information across disciplines should be accommodated in different research and education contexts. All these functions should expose standard interfaces for interoperation with other data sources to aggregate them or to be aggregated. Sustainability is of paramount importance, therefore robust business models should be proposed to encourage investment from all stakeholders. Foreseen challenges are technical, legal and organisational, including engaging e-infrastructure operators and other service providers (such as those receiving support under topics EINFRA 2, 3, and 7);

(2) Services to ensure the quality and reliability of the e-infrastructure, including certification mechanisms for repositories and certification services to test and benchmark capabilities in terms of resilience and service continuity of e-infrastructures;

(3) Federating institutional and, if possible, private data management and curation tools and services used across or at some point of the full data lifecycle, including approaches for identification of open data sources and data collected with sensitive or restricted access features. Services and tools should be federated on the basis of an open architecture and should offer or coordinate support to the development of Data Management Plans;

(4) Large scale virtualisation of data/compute centre resources to achieve on-demand compute capacities, improve flexibility for data analysis and avoid unnecessary costly large data transfers.

(5) Development and adoption of a standards-based computing platform (with open software stack) that can be deployed on different hardware and e-infrastructures (such as clouds providing infrastructure-as-a-service (IaaS), HPC, grid infrastructures…) to abstract application development and execution from available (possibly remote) computing systems. This platform should be capable of federating multiple commercial and/or public cloud

resources or services and deliver Platform-as-a-Service (PaaS) adapted to the scientific community with a short learning curve. Adequate coordination and interoperability with existing e-infrastructures (including GÉANT, EGI, PRACE and others) is recommended

(6) Support to the evolution of EGI (European Grid Infrastructure) towards a flexible compute/data infrastructure capable of federating and enabling the sharing of resources of any kind (public or private, grid or cloud, etc.) in order to offer computing and storage services to the whole European scientific community. The proposal will address operations for supplying services (IaaS, PaaS, SaaS) at European level, engagement of and tailoring of services to new user communities and dissemination activities.

(7) Proof of concept and prototypes of data infrastructure-enabling software (e.g. for databases and data mining) for extremely large or highly heterogeneous data sets scaling to zetabytes and trillion of objects. Clean slate approaches to data management targeting 2020+ 'data factory' requirements of research communities and large scale facilities (e.g. ESFRI projects) are encouraged.

(8) Enable the creation of a platform and infrastructure for mining text aggregated from different sources/publishers that responds to the needs of users (researchers). This includes the definition of technical requirements (e.g. on interoperability, metadata standards and aggregation of new services) as well as addressing legal and contractual issues to serve the needs of text mining communities. The project should also provide consulting and counselling services to solve problems related with the legal framework and permissions to text mine collections, and to advise researchers on the benefits and practice of text mining. The development of the proposed platform and services should be informed by the studies on policy and licencing issues associated with Text and Data Mining that will be funded from the Call on "Science with and for Society" (GARRI.5.2014 - Scientific Information in the Digital Age: Text and Data Mining).Therefore, the successful proposals in these two calls are expected to engage in a mutual dialogue and establish synergies in their work.

This topic is complementary with topic INFRADEV 4 in Call 1, as it addresses services that are potentially transversal and generic, whereas INFRADEV 4 addresses interoperability of services and common solutions for cluster of ESFRI and other research infrastructure initiatives in thematic areas.

Expected impact:

- Increased availability of scientific data for scientific communities independently of them having already embraced or not e-science; this will be measured by cross-border data traffic over the research networks in Europe as a proxy.
- Better optimisation of the use of IT equipment for research.
- Avoiding lock-in to particular hardware or software platforms in the development of science.
- Scientific communities embrace storage and computing infrastructures as state-of-the-art services become available and the learning curve for their use becomes less steep; this will be measured by the storage capacity available for pan-European use as well as by the number of users of EGI and other production e-infrastructures in this area.
- Through the development of large pooled and interoperable text mining infrastructures, efficiencies of scale will reduce the overall costs, and more open licensing schemes will spread the use of such licenses and boost the exchange of text mining resources and practices.

Type of action: Research & Innovation Action

EINFRA 2-2014 – e-Infrastructure for Open Access

Specific challenge: Europe needs a robust e-infrastructure supporting Open Access policies, also for Horizon 2020. This infrastructure, based on already existing e-infrastructures (institutional and thematic repositories, aggregators, etc.), should support reliable and permanent access to digital scientific records. A key element will be capacity building to link literature and data in order to enable a more transparent evaluation of research and reproducibility of results. Such an action will include an analysis of alternative means of public support to Gold Open Access in order to identify the optimal approach.

Scope: Proposals should address all the following activities:

(1) Service-driven data e-infrastructures responding to general and specific requirements of researchers and research organisations for open access to and deposit of scientific information (including journal articles, books, monographs, conference proceedings, thesis, grey literature, software and data, as well as services linking literature, data and software). These e-infrastructures will further develop the research capacity through a coordinated and participatory architecture linking institutional and thematic repositories across Europe with scientific information to be used by humans and machines. An essential part of this service-driven approach will be researcher helpdesks designed to support the producers and users of scientific information, as well as human networks to support data sharing and implementation of Open Access policies in Europe. The e-infrastructure should be incorporated as a legal entity within the first year of the project. Relevant indicators on the take-up of open access in Europe including for both publications and data should be elaborated and reported upon regularly. The project will promote a limited set of biblio- and webometrics that reflect open access policies. It will collect bibliometric data on publications, citations, data citations, etc. on all Horizon 2020 scientific output and produce both standard and on-demand statistics.

(2) Developing proof of concept and prototyping new services in support of open science (e.g. new forms of publishing, innovative services based on data mining, new forms of peer review etc.), assisting researchers and educators in everyday tasks. This includes piloting a mechanism to stimulate publishing in open access journals by paying authors part or all of the article processing charges they incurred after the end of their grant agreement with the Commission; this service should contribute to the development of a sustainable and competitive market for scientific open access publishing. Proposals should consider barriers (including legal) to data sharing in the context of these new services and assess the possibility of pan-European information sharing agreements considering the authentication and authorization infrastructure described in topic EINFRA 7.

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

It is expected that one proposal will be selected. Expected impact: The intellectual capital of Europe is available to researchers, business and citizens to generate economic and scientific advances now, and that capital is safely preserved for further exploitation by future generations. Open Access publications resulting from Horizon 2020 funded research are available and easily findable online. Accurate science metrics for Horizon 2020 can be produced with almost no effort. Most of the European institutional repositories (at least 80%)

as well as the principal thematic repositories are part of the same interoperable repository network.

Type of action: Research & Innovation Action

EINFRA 3-2014 – Towards global data e-infrastructures – Research Data Alliance

Specific challenge: European contribution to the development of global data infrastructures needs to ensure Europe's role as a global player. This can be achieved by strengthening and consolidating Europe's contribution to the Research Data Alliance (RDA), ensuring that RDA fosters research data interoperability and exchange at global level. RDA is an open international forum to create consensus on solutions and best practices to specific problems hampering data exchange and interoperability.

Scope: Proposals will support all of the following points:

(1) definition, operation and monitoring of the governance structures of the Research Data Alliance (RDA); secondment and exchange of staff where appropriate;

(2) active participation of European stakeholders (organisations and individual experts) in RDA and leadership initiatives in strategic working group activities; EU industry involvement and innovation will be promoted in particular;

(3) engaging scientific communities having underdeveloped data infrastructures in defining the best practices for data exchange and interoperability; and

(4) establishing coordination mechanisms at European level (national research funders, European education and research associations) and with international organisations dealing with standardisation, research data and education issues (IETF, W3C, CODATA, OECD, UNESCO, …).

Expected impact: Europe will be in a leading position in enabling the use of the world's store of research data in multi-disciplinary, data intensive global scientific collaborations. It will help the development and adoption of relevant international open standards based on the best practices of a large spectrum of research communities. It will engage research communities at early stages of standards development and address common data requirements for new services bringing together users and technology providers. It will promote sustainable models for research data sharing and install trust in the adopted solutions.

Type of action: Coordination and Support Action

EINFRA 4-2014 – Pan-European High Performance Computing infrastructure and services

Specific challenge: In order to create a world-class infrastructure, and to provide state-of-the-art services and access to this infrastructure to users, independently of location, the HPC resources in Europe need to be further pooled, integrated and rationalised.

This topic contributes to the implementation of the EU strategy on High Performance Computing (HPC), in particular by providing access to the best supercomputing facilities and services for both industry and academia, and complements the activities of the Public-Private Partnership (PPP) in HPC in order to implement the HPC strategy.

Scope: Proposals should address the following activities:

(1) Provide a seamless and efficient Tier-0 service to users Europe-wide based on promoting research excellence and innovation; this includes peer-review procedures for the allocation of computing time; transparent billing; and specific services adapted to the needs of ESFRI projects, Horizon 2020 projects/programmes, large institutional users or industry. Tier-0 are those services provided at pan-European level with machines devoted to the pan-European infrastructure more than 50% and having a minimal performance to be periodically defined by the consortium;

(2) Carry out activities (training, service prototyping, software development etc.) that build on national HPC capabilities (Tier-1) and are necessary to support Tier-0 services or a functional European HPC ecosystem;

(3) Ensure openness to new user communities and new applications; promote industrial take-up of HPC services in particular by SMEs;

(4) Implement inclusive and equitable governance and a flexible business model to ensure long term financial sustainability; the business model should allow financial or in-kind contributions by research projects/programmes, institutions, industry and regions or countries; based on an auditable cost model for the operation of HPC Centres providing European services with different financing sources;

(5) Develop and maintain the strategy for the deployment of a rich HPC ecosystem with different machine architectures - evolving towards exascale - including the implementation roadmap at EU and national level and the specifications and technical requirements for a varied set of Tier-0 systems ensuring a broad coverage of user needs;

(6) Working in synergy with:

- the Centres of Excellence (see topic EINFRA 5 – CoEs for computing applications);
- the European Technology Platform for HPC; the pan-European HPC infrastructure will provide technical specifications to guide research activities for future exascale prototypes and systems;

(7) Design and execute training and skills development programmes tailored to the needs of research in academia and industry in order to stay at the forefront of scientific breakthroughs, as well as introduction of scientific computing and HPC in academic curricula;

(8) Develop an international cooperation policy and associated activities.

The infrastructure should provide core and basic services in coordination with other e-infrastructure providers to promote interoperability and a seamless user experience, in accordance with topic EINFRA 7. Interworking with other computing infrastructures such as clouds and grids should be ensured.

Expected impact:

- Improved services and procedures to access the infrastructure and the common services, and improved allocation schemes to ensure openness to new user communities and applications
- Increased amount of computing cycles available to researchers at European level through user-friendly and efficient procedures, helping Europe to stay at the forefront of scientific breakthroughs and innovation;
- Increased number of industrial organisations (in particular SMEs), EU projects and institutional users benefiting from access to services including training in HPC;

- Increased investment in HPC infrastructure in Europe (national, regional and EU);
- Long term financial sustainability through flexible business models and inclusive governance;
- Linking demand and supply in the European HPC ecosystem, with improved collaboration of the procurers with technology developers and suppliers to foster innovation;

Type of action: Research & Innovation Action

EINFRA 5-2015 – Centres of Excellence for computing applications

Specific challenge: Establishing a limited number of Centres of Excellence (CoE) is necessary to ensure EU competitiveness in the application of HPC for addressing scientific, industrial or societal challenges. CoEs will develop a culture of excellence, both scientific and industrial, placing computational science and the harnessing of 'big data' at the centre of scientific discovery and industrial competitiveness. CoEs may be 'thematic', addressing specific application domains such as medicine, life science or energy; 'transversal' on computational science (e.g. algorithms, analytics, numerical methods etc.); or 'challenge-driven', addressing societal or industrial challenges (e.g. ageing, climate change, clean transport etc.); or a combination of these types.

This topic will be carried out in the frame of the Public-Private Partnership (PPP) in HPC, contributing to the implementation of the EU strategy on High Performance Computing (HPC), in particular to achieving excellence in HPC application delivery and use.

Scope: The CoE's are expected to be:

(1) integrated: encompassing not only HPC software but also relevant aspects of hardware, data management and storage, connectivity, security, etc.;

(2) multidisciplinary: with domain expertise co-located alongside HPC system, software and algorithm expertise;

(3) user-driven, with the application users and owners playing a decisive role in governance; and

(4) distributed with a possible central hub, federating capabilities around Europe, exploiting available competences, and ensuring synergies with national/local programmes;

Proposals for CoEs will address:

- Provision of services such as: developing, optimising (including if needed re-design) and scaling HPC application codes towards peta and exascale computing; testing, validating and maintaining codes and managing the associated data; quality assurance; co-design of hardware, software and codes; consultancy to industry and SMEs; research in HPC applications; and addressing the skills gap in computational science.
- Working in synergy with the European Technology Platform for HPC and with the pan-European HPC infrastructure, including by identifying suitable applications for co-design activities relevant to the development of HPC technologies towards exa-scale.
- Sustainability embracing a wide range of service models and funding from a mixture of sources, including through sponsorship by industry or hybrid public-private models. Clear business plans need to be presented in the proposal.

- Creating communities around specific codes that impact the target sectors, involving ISVs (independent software vendors) where appropriate, and exchange of best practices in particular for SMEs.
- A governance structure driven by the needs of the users. Commercial management expertise will be needed along with technical expertise to manage industry clients and supply chains.

8-10 CoEs are expected to be funded in this topic in order to test the concept. A follow up Call is expected in the future that will build on the results and lessons learnt from the present Call.

International co-operation is encouraged where there are clear mutual benefits and the partners have the relevant HPC capacity.

Expected impact:

- Improved access to computing applications and expertise that enables researchers and industry to be more productive, leading to scientific excellence;
- Improved competitiveness for companies and SMEs through access to CoE expertise and services;
- European leadership in applications that address societal challenges or are important for industrial applications through better code performance and better code maintenance and availability;
- More scientists and engineers trained in the use of computational methods and optimisation of applications.

Type of action: Research & Innovation Action

EINFRA 6-2014 – Network of HPC Competence Centres for SMEs

Specific challenge: HPC competence centres have been set up in some Member States to facilitate access of industry and in particular SMEs to HPC services. As yet these centres do not cover the whole of Europe. Supporting one network of HPC competence centres will promote access to services anywhere in Europe and enable the dissemination of best practice in HPC use for SMEs. This topic contributes to the implementation of the European HPC strategy, in particular to foster the use of HPC by SMEs.

Scope: Proposals should address at least the following activities:

(1) networking of existing HPC competence centres providing HPC services to exchange best practices and pool technical, expertise or business resources;

(2) awareness raising and visibility activities of the benefits of HPC for SMEs;

(3) identification of the pool of SMEs and available expertise in the different business areas at European level, and mechanisms to match SME needs and the available expertise;

(4) training (in synergy with the activities carried out by other organisations providing specific training for SMEs in HPC);

The aim is to support one network which will address coordination, outreach, training and the exchange of best practice and software components between the participating national and regional competence centres, complementing their current activities and services with actions

of a clear European added-value that cannot be performed at local level. Direct support to adoption of HPC by individual SMEs is not expected to be carried out by this network.

This action will be complementary to the actions carried out in the ICT Work Programme 2014-2015 in the Specific call for manufacturing, (FoF) ICT Innovation for Manufacturing SMEs (I4MS).

Expected impact:

- The Network of HPC Competence Centres will be a reference for best practices for supporting SME competitiveness through access to HPC;
- Increased number of SMEs that are aware of the potential and/or become users of HPC;
- Establishment of a focal point at European level for expertise in HPC use by SMEs;
- Increase in the size of the HPC market (services, ISVs, computers).

Type of action: Coordination and support Action

EINFRA 7-2014 – Provision of core services across e-infrastructures

Specific challenge: Support to harmonise and/or deploy core e-infrastructure services is crucial for their effective use by both production e-infrastructures and e-infrastructures under development. Core services are considered those that 1) enable e-infrastructure interoperation and 2) are common across a broad range of e-infrastructures and research communities.

Scope: Proposals will address one of the two following actions (one proposal per action will be funded):

(1) Development and promotion of the uptake of a Digital Identifier e-infrastructure for digital objects (articles, datasets, collections, software, nomenclature, etc), contributors and authors which cuts across geographical, temporal, disciplinary, cultural, organisational and technological boundaries, without relying on a single centralised system but rather federating locally operated systems to ensure interoperability. The requirements of all relevant stakeholder groups (researchers, libraries, data centres, publishers, etc.) will be addressed;

(2) Deployment and promotion of a pan-European identity federation for researchers, educators and students, in compliance with existing identity inter-federation efforts. The action will involve (research and education) institutions in EU Member States, existing identity federations, e-infrastructure providers and libraries. It should aim to overcome technical, organisational and legal obstacles for the implementation of an integrated and interoperable authentication and authorisation infrastructure (AAI) and to lower barriers for entry of organisations not already participating in identity federations, e.g. by providing scalable policy negotiation mechanisms, as well as legal guidance notably in data protection. It should also encourage the use of security token translation services to enable interoperability of different AAIs, as well as accounting services for enabling interoperability and aggregation in recording the usage of resources securely and reliably, including for the highly distributed heterogeneous infrastructures envisaged for global research data. Guest identities and alternative methods of identification (e.g. social media identities) are encouraged e.g. in order to allow public access at large. Assessment of penetration of existing identity federations at national level and development of training activities for data

professionals on issues related to AAI enabled collaboration and data sharing (data privacy, intellectual property, cultural barriers, etc.) should be foreseen.

Expected impact:

- The interoperability of e-infrastructure services is improved, therefore access to resources and collaboration between scientists are facilitated;
- Duplication of efforts for developing services common to many e-infrastructures is reduced;
- Extensive use of Digital Identifiers opens new prospects for advanced services for science and education and for encouraging openness and building trust;
- The federation of identities allows a European-wide single sign-on service enabling researchers to collaborate within secure and trusted virtual research environments where scientific resources and content can be accessed, used, stored and shared.
- The deployment of the AAI infrastructure should facilitate sharing of information resources at pan-European level.
- Expansion of the coverage of national identity federations for network, services and applications; all research institutions are able to participate in identity federations even with low level of technical or organisational preparedness.

Type of action: Research & Innovation Action

EINFRA 8-2015 - Research and Education Networking – GÉANT

Specific challenge: GÉANT is recognised as the European communications commons that supports the rise of compute- and data-intensive collaborative research and education through innovative services, operational excellence and global reach. There is a clear need to further develop and maintain GÉANT in this role.

Scope: GÉANT will:

(1) Provide cost-effective and reliable services for very high-speed connectivity, identity inter-federation, resource virtualisation, mobility and trust in order to support knowledge communities, ensuring digital continuum of services to users anywhere in the EU.

(2) Enable talent anywhere in the world to cooperate with their peers in Europe through interoperable services, as well as extend beyond the traditional researcher base into wider public services where appropriate.

(3) Advance the state-of-the-art of the communication commons by constant development of both innovative multi-domain services and their use, and by translating this innovation into a competitive European ICT sector, for instance through: specific open calls; pre-commercial procurement; public-private partnerships between industry, academia and user communities to develop, experiment with or validate novel technologies in the telecom and internet domains; and exploring with industry possibilities of service provisioning through aggregation of demand and brokerage, new business models, best practices or coordination.

(4) Cope with the changing environment by structuring the governance of the European communications commons for accountability, measurability, transparency and sustainability; focusing on flexible services geared towards users; stimulating development of GÉANT's human capital (including training and exchange schemes); and aligning the regulatory, standardisation and policy framework to enable full exploitation of the communications commons.

GÉANT should provide core and basic operation services including identity federation, in coordination with other e-infrastructure providers to promote interoperability and a seamless user experience.

The long-term cooperation between the Commission and the selected consortium will be formalised within an initial four-year Framework Partnership Agreement (FPA). This agreement shall specify the common objectives, the nature of actions planned and the general rights and obligations of each party. The FPA may be continued for an additional two years[8].

Within this framework, the EC may award annual grant agreements[9] with the selected consortium.

Expected impact: By 2020 GÉANT is the European communications commons where talent anywhere is able to collaborate with their peers around the world and have instantaneous and unlimited access to any resource for knowledge creation, innovation and learning, unconstrained by the barriers of the pre-digital and the present digital world. Europe is the hub for research networking excellence world-wide. The GÉANT governance is able to cope with the changing environment and the GÉANT community collaborates intensively with European industry and academia, produces innovative solutions grounded on business needs and drives the internet evolution.

Type of action: Specific Grant Agreement established under the GÉANT FPA and implemented as a Research & Innovation Action

EINFRA 9-2015 – e-Infrastructures for virtual research environments (VRE)

Specific challenge: There is yet considerable potential and room for development in the use of virtual research environments. The objective is to address this challenge by supporting capacity building in interdisciplinary research communities to empower researchers through development and deployment of service-driven digital research environments, services and tools tailored to their specific needs. These virtual research environments (VRE) should integrate resources across all layers of the e-infrastructure (networking, computing, data, software, user interfaces), should foster cross-disciplinary data interoperability and should provide functions allowing data citation and promoting data sharing and trust.

Scope: Each VRE should abstract from the underlying e-infrastructures using standardised building blocks and workflows, well documented interfaces, in particular regarding APIs, and interoperable components. Over time VREs will be composed of generic services delivered by e-infrastructures and domain specific services co-developed and co-operated by researchers, technology and e-infrastructure providers, and possibly commercial vendors.

The VRE projects should clearly identify and build on requirements from real use cases, e.g. for integration of heterogeneous data from multiple sources and value-added services for computing, simulation, and data exploration, mining and visualisation. They should re-use tools and services from existing infrastructures and projects at national and/or European level as appropriate.

[8] As per Article 178 of the Rules for Participation of the Financial Regulation

[9] Awarding of specific grants will follow the rules and procedures established in the Financial Regulation

Where data are concerned, projects will define the semantics, ontologies, the 'what' metadata, as well as the best computing models and levels of abstraction (e.g. by means of open web services) to process the rich semantics at machine level (the so called 'how' metadata). They may also support proof of concept, prototyping and deployment of advanced data services and environments, providing a toolset and desktop with easy to use functionalities and access to top-of-the-range connectivity and computing.

VREs may target any area of science and technology, especially interdisciplinary ones, including ICT, mathematics, web science and social sciences and humanities. Focusing on the ICT infrastructures needed for addressing the Societal Challenges is especially encouraged. Proposals should indicate the number of researchers they target as potential users.

This topic is complementary with topic INFRADEV 4 of Call 1, as VREs integrate data, network and computing resources for interdisciplinary research communities, whereas INFRADEV 4 addresses interoperability of services and common solutions for cluster of ESFRI and other research infrastructure initiatives in thematic areas.

Expected impact: VREs are expected to result in more effective collaboration between researchers and higher efficiency and creativity in research as well as in higher productivity of researchers thanks to reliable and easy access to discovery, access and re-use of data. They will accelerate innovation in research via an integrated access to potentially unlimited digital research resources, tools and services across disciplines and user communities and enable researchers to process structured and qualitative data in virtual and/or ubiquitous workspaces. They will contribute to increased take-up of collaborative research and data sharing by new disciplines, research communities and institutions.

Type of action: Research & Innovation Action

Call 4 - Support to Innovation, Human resources, Policy and International cooperation

H2020-INFRASUPP-2014/2015

This call focuses on fostering the innovation potential and developing the human resources of research infrastructures especially in areas that suffer from shortages in supply or where new skills and professions need to emerge, e.g. in 'data science'. It will also aim at reinforcing European research infrastructures policy and international cooperation.

In addition to this call, innovation and development of human resources are mainstreamed in all relevant parts of the work programme. Similarly, development of policy and international cooperation are encouraged 'bottom up' in any project where these activities appear relevant. Support to the global Research Data Alliance is envisaged separately in call 3.

INFRASUPP 1 - 2014 – Innovation support measures

Specific challenge: Research infrastructures, as providers of advanced services and as procurers of leading-edge technologies, have an innovation potential that has not always been sufficiently exploited in the past. There is a clear innovation potential associated with procurement from industry during the construction of a new research infrastructure. However, enterprises (including SMEs) may not realise that they have the opportunity to benefit from this potential simply due to a lack of awareness. Moreover, users from industry typically constitute a very small fraction of a research infrastructure's users, again because they may not be aware of the availability of research infrastructures or of an infrastructure's potential relevance to their own R&D activities. There is therefore a need to stimulate innovation both from within the research Infrastructures themselves and in their supplier industry.

Scope: Proposals should address the following areas:

1. Development of a portal of calls, tenders and future needs and technology transfer opportunities in research infrastructures of pan European interest;
2. Networking of procurement professionals to encourage exchange of good practices across research infrastructure sectors;
3. Awareness campaign towards industry (including SMEs) on the potential of research infrastructures for their activities in selected R&D areas;

As a first step a repository with the innovation capabilities, purchasing plans, and industrial linkages of the various research infrastructures should be set up, creating an initial point of contact for interested innovation actors. To facilitate the process, the creation of a registry of research infrastructures innovation capabilities and of topical/sectorial research infrastructure industry forums is envisaged to gather and to consolidate the views from industrial sector actors. This should be complemented by thematic knowledge networks that analyse and highlight specific innovation aspects.

The Commission expects to fund a single proposal under this heading.

Expected impact:

Research infrastructure projects (including ESFRI roadmap initiatives) actively participate in the innovation process and fully exploit their innovation potential. Support provided to industry (including SMEs) in the construction and usage of research infrastructures will lead to enhanced competitiveness of the involved actors. Thereby they will contribute to the technological development and exploitation capacity of the European Research Area. In particular this activity will:

- increase the involvement of industry (including SMEs) in the development of research infrastructures, raising the technological level and competitiveness of European companies;
- raise the awareness of industry (including SMEs) regarding opportunities offered by research infrastructure to improve their products, e.g. as experimental test facilities, innovation hubs, knowledge-based centres;
- support the integration of research infrastructures into local, regional and global innovation systems.

Type of action: Coordination and Support Action

INFRASUPP 2 - 2015 – Innovative procurement pilot action in the field of scientific instrumentation

Specific challenge: Europe has not always exploited the strong innovation potential that research infrastructures have towards their supplier industry. Acting as early adopters of advanced technologies research infrastructures can trigger innovation in companies supplying high-tech components (e.g. new stronger magnets or lasers). The aim of this action is to foster the innovation capacity of research infrastructures by stimulating R&D partnership with industry so as to develop Union capacities and industrial supply in high-tech areas such as scientific instrumentation.

Scope: The activity will support a pilot action in the field of scientific instrumentation exploiting the innovation potential of research infrastructures using Pre-Commercial Procurement (PCP) and/or Public Procurement of Innovation (PPI) schemes.

a. Feasibility studies
Proposals will focus on analysing and exploring the use of PCP or PPI procurement for common purchasing operations of a set of research infrastructures. Activities can include analysis of the state of the art and of the market offer.

b. Pre-commercial procurement in the field of scientific instrumentation (PCP)
Proposals will define requirements and terms of reference for common procurement of scientific instrumentation and organise joint PCP procurement encouraging research, development and validation of breakthrough solutions that can bring radical scientific and efficiency improvements in research infrastructures services.

c. Joint public procurement of innovative scientific instrumentation (PPI)
Proposals will focus on organizing joint procurement of innovative instrumentation by research infrastructures to enhance their services, better serving their communities.

The Commission expects to fund at least two projects under this topic.

Expected impact:

This activity will stimulate research infrastructure projects (including ESFRI roadmap initiatives) to actively participate in the innovation process and to fully exploit their innovation potential. Support provided to industry (including SMEs) in the construction of research infrastructures will lead to enhanced competitiveness of the involved. Thereby they will contribute to the technological development and exploitation capacity of the European Research Area.

It will lead to economies of scale through common procurement by sets of research infrastructures.

The feasibility of Pre-commercial Procurement (PCP) and Public Procurement of Innovation (PPI) for the purchasing operations of research infrastructures will be explored in a pilot action.

Type of action:

a. Coordination and Support Action
b. Pre-Commercial Procurement
c. Public Procurement for Innovative solutions

INFRASUPP 3 - 2014 – Strengthening the human capital of research infrastructures

Specific challenge: The complexity of research infrastructures and the exploitation of their full potential require adequate skills for their managers, engineers and technicians, as well as users. Research infrastructures are built and operated at the cutting edge of what is technologically feasible, involving a high associated risk that needs to be managed. They may involve a multitude of partners in a consortium that fund and perform their construction and operation, either because they are distributed research infrastructures, or because certain problems are of a scale that can only be tackled by means of European and international cooperation. This renders their governance and the associated financial and legal issues a complex problem. Comparable issues are not usually faced by research institutions that do not operate research infrastructures, or in fields that do not yet have a long tradition of using research infrastructures. The skills and expertise specifically needed to construct, operate and use research infrastructures successfully therefore are not widely available.

The Union funding will support the training of staff managing and operating research infrastructures of pan-European interest, the exchange of staff and best practices between facilities, and the adequate supply of human resources in key disciplines, including the emergence of specific education.

While the human capital dimension will be embedded under other lines of activity of the research infrastructures work programme, specific actions will be needed to foster coordination across domains and types of infrastructures.

Scope: The activity will support the training of staff managing and operating research infrastructures. A proposal under this topic should build on the past activities and the experience gained in the RAMIRI (Realising and Managing International Research Infrastructures) projects. It should engage with universities and prepare curricula and courses specifically for pan-European research infrastructures to address their intercultural and interdisciplinary nature as well as their diversity (global, highly distributed, single site etc.). A significant use of interactive online training material should be considered.

Expected impact: This activity will improve and professionalise the training of the staff managing and operating research infrastructures of pan-European interest, strengthen the human capital of the involved research infrastructures, stimulating their efficient management and therefore promoting their development and competitiveness at national, European and international level.

Type of action: Coordination and Support Action

INFRASUPP 4 - 2015 – New professions and skills for e-infrastructures

Specific challenge: The changing methods of (digital) science and research require that researchers, professors and students receive adequate support in computing and networking, as well as in handling, analysing and storing large amounts of digital content. Formal education for emerging professions of e-infrastructure operators, research technologists (including those possessing computational skills, e.g. in parallel programming), data scientists or "data librarians" hardly exists today. Professional recognition of these communities and the development of appropriate curricula, training and skills are crucial to ensure effective services to institution staff and students. Training opportunities should be available at all levels and for all communities potentially engaged in research and innovation related activities.

Scope: Proposals should address one or more of the following areas:

(1) Defining or updating university curricula for the e-infrastructure competences mentioned above, and promoting their adoption.

(2) Developing and executing training programmes (including for lifelong learning) for the above mentioned professionals working as part of a team of researchers or supporting research teams.

(3) Support the establishment of these professions as distinct professions from that of a researcher. Create a reference model which defines their competencies, supported by case studies and best practices relating to e-infrastructures skills, human resources management, support tools and related institutional practices. Develop alternatives means for recognising non-research contributions by research technologists and data scientists.

(4) Support networking and information sharing among already practicing e-infrastructure experts, research technologists, computation experts, data scientists and data librarians working in research institutes and in higher education.

(5) Awareness raising activities; establish and promote e-infrastructures community champions to advocate on new jobs and skills needs at schools, universities and scientific communities.

Expected impact: The number of high level education institutions offering degrees for e-infrastructure experts, research technologists, data scientists and data librarians will increase. Graduates and practitioners in these fields will have access to degrees, programmes and information sharing tools to improve their skills. The majority of European researchers will thus have access to training on e-infrastructures to develop related skills. The number of individuals able to design, develop and maintain e-science tools and services as well as to support researchers with computational and data expertise will increase significantly.

Type of action: Coordination and Support Action

INFRASUPP 5 - 2014 – Policy measures for research infrastructures

Specific Challenge: In the context of the recent communication for a reinforced ERA partnership for excellence and growth[10] and the commitments of the Innovation Union flagship initiative[11], the focus of this action is related to the effective investment and use of research infrastructures.

Scope: The proposals will address one of the following areas:

- Support partnerships between relevant policy makers, funding bodies or advisory groups such as ESFRI & e-IRG; support cooperation and exchange of good practises between managers of research infrastructures and stakeholder networks; support survey, monitoring and assessment of the implementation and operation of research infrastructures with a view to provide advice and guidance to policy makers. Particular attention should be paid to the exchange of good practices between ESFRI projects and other world class research infrastructures as well as to the development of support actions underpinning the European strategy on research infrastructures. The proposals will build on the past experience and achievements gained in FP7 projects such as CoPoRi (Communication and Policy development for Research infrastructures).
- Support the development of a comprehensive database targeted at policy-makers on research infrastructures of more than national relevance in Europe. The database should be useable as a tool to support the development of a European strategy on research infrastructures. As such, the set of information to be collected should be agreed and validated by the Member States. The proposers should develop and update a portal where detailed information on the research infrastructures will be made available. The proposers should also carry out a comparative analysis of the research infrastructures landscape between Europe and strategic third country partners such as USA, Canada, Australia and the BRICS countries. The project should build on the experience gained in the FP7 MERIL (Mapping of European Research Infrastructure Landscape) project.

The Commission expects to fund up to one proposal for each area to avoid duplication of efforts.

Expected impact: This activity will:

- Strengthen the development of a consistent and dynamic European Research Area policy for research infrastructures;
- Facilitate the exchange of experiences and good practises between the national and/or regional policies and programmes;
- Enhance partnerships between policy makers and funding bodies and promote the development of appropriate monitoring tools for decision making;
- Support to ESFRI and thus contributing to the realisation of the Union flagship initiative on the implementation of 60% of the ESFRI projects by 2015;
- Contribute to the emergence of sustainable approaches, in the field of e-infrastructures, for the provision of cross-disciplinary research services;

[10] COM (2012) 392 final

[11] COM(2010) 546 final

- Encourage the pooling of resources between infrastructure operators at European level in order to face the grand challenges and to foster a culture of co-operation between them, spreading good practices and encouraging infrastructures to develop in complementary ways.

Type of action: Coordination and Support Action

INFRASUPP 6 - 2014 – International cooperation for research infrastructures

Specific Challenge: Following the recent communication of the Commission on International Cooperation in Research and Innovation[12], the research infrastructures activity will focus on a number of key third countries seen as strategic for the development, exploitation and management of world-class research infrastructures. The G8+O5 countries plus Australia, singularly or in their entirety, for the purposes of the Group of Senior Officials (GSO) on Global Research Infrastructures, are also included, without excluding the possibility of cooperation with other interested third countries or regional bodies such as the African Union.

Scope: In this context, the research infrastructure action will focus its activities on international cooperation in three different but complementary ways, as required: bilaterally with a single third country at policy level; multi-laterally with different third countries, targeting specific research and innovation aspects of research infrastructures of common interest in one area of science and technology; multi-laterally with different third countries if a specific effort is required in the context of a specific world class research infrastructure. Support to activities decided in the context of the Group of Senior officials on Global Research Infrastructures may fall in the latter two categories.

Proposals will address one of the following areas:

- Facilitate the development of global research infrastructures and the cooperation of European RI with their non-European counterparts, ensuring their global interoperability and reach, and to pursue international agreements on the reciprocal use, openness or co-financing of infrastructures, on the basis of the recommendations of the Group of Senior Officials on Global Research Infrastructures;
- Support bilateral cooperation on research infrastructures with Africa. The proposal will build on the past experience and achievements gained in the FP7 project PAERIP (Promoting African – European Research Infrastructure Partnerships).
- Support bilateral cooperation on research infrastructures with Russia. The proposal will in particular help develop cooperation between European research infrastructures and the Russian Megascience facilities[13], including the underpinning e-infrastructure.
- Support multilateral cooperation with European Neighbourhood Policy countries and Western Balkan Countries. The proposal will aim at developing regional roadmaps of research infrastructures jointly with stakeholders and policymakers and help them develop

[12] EC communication on 'Enhancing and focusing EU international cooperation in research and innovation: a strategic approach' (COM(2012) 497).

[13] The following 6 projects have been selected by the Russian authorities as Megascience projects: Fourth Generation Special-purpose Synchrotron Radiation Source (SSRS-4 project); International project "IGNITOR"; Exawatt Center for Extreme Light Studies (XCELS project); Nuclotron-based Ion Collider Facility (NICA project); Super C-τ Factory; The Scientific and Research Reactor Complex PIK

closer cooperation with research infrastructures of pan-European interest through training, data management and trans-national access.

- Support multilateral cooperation on research infrastructures in one or several of the following areas: Arctic research, marine science, biodiversity, food research and medicine. Particular emphasis will be made on cooperation with USA, Canada (including for implementing the Transatlantic Research Alliance, launched by the Galway Statement on Atlantic Ocean Cooperation) and Russia, without excluding other relevant countries such as Australia and New Zealand.

The proposals supporting bilateral and multi-lateral cooperation with research infrastructures in third countries should in particular:

- Identify and promote opportunities (access and data sharing) available to European scientists in these research infrastructures;
- Help developing better coordination and cooperation of European research infrastructures with their non-European counterparts; ensuring their global interoperability and reach, and to pursue international agreements on the reciprocal use, openness or co-financing of infrastructures;

Exchange good practices between user communities and managers of research infrastructures as regard for instance benchmarking performance of technology platforms, harmonisation of tests, standards, reference materials, interoperability and data handling.

Expected impact:

This activity will help to:

- Develop cooperation with key international partners for research infrastructures
- Contribute to the development of a competitive high performance ERA in the global research environment
- Reinforce partnership between the Commission, the Member States and relevant stakeholders in this field;
- Enhance the role of the Union in international organisations and multilateral fora;
- Support progress towards the development of global research infrastructures
- Contribute to address societal challenges with a global dimension such as climate change;
- Contribute to capacity building and research infrastructures human capital development in targeted/relevant regions.

Type of action: Coordination and Support Action

INFRASUPP 7 - 2014 – e-Infrastructure policy development and international cooperation

Specific Challenge: To optimise e-infrastructures investments in Europe it is essential to coordinate European, national and/or regional policies and programmes for e-infrastructures, in order to develop complementarities, and promote cooperation between e-infrastructures and activities implementing other Union policies (such as regional, cohesion, industrial, health, employment, or development policy). To promote sound policy development it is essential to ensure stakeholder consultation, monitor take-up and assess the impact of past actions. To promote innovation it is necessary to identify it and spin it out from projects. The cooperation

of European e-infrastructures with their non-European counterparts also requires facilitation, to ensure their global interoperability and reach.

Scope: Proposals will support one or more of the following actions:

(1) Dissemination of information on the e-infrastructure programme and of project results, including coordination among projects;

(2) Stakeholder initiatives, including a user forum to provide orientations for e-infrastructure service interoperability and integration;

(3) Policy coordination with the major national and European policy makers, including the collection of information needed for policy making e.g. through consultation actions and surveys as well as the wider use of e-infrastructures for public services and society;

(4) Support to monitoring results and assessing impact of the Horizon 2020 e-infrastructure activities, including through metrics and indicators;

(5) Monitor and analyse the take-up of digital science and e-infrastructures by researchers and possible other users, such as citizens and the education sector, per country, region and research domain or community;

(6) Support to technology transfer from the e-infrastructures projects to the market;

(7) Support to cooperation with developing countries and regions to promote connectivity, global e-infrastructure services, identification of use cases and promising applications of particular interest for developing regions.

Expected impact: A consistent and dynamic European policy for research infrastructures is developed and is coordinated EU-wide. Support actions provide solid ground for future choices and help in decision making and deployment of e-infrastructures. Impact and results analysis is available in real time and can inform policy choices. Novel technology and services with market potential are identified and spun off to the market. Support measures for international cooperation address specific issues regarding reciprocal use, openness or co-financing of e-infrastructures, as well as ensure Europe's persistent presence and influence in the global e-infrastructure.

Type of action: Coordination and Support Action

INFRASUPP 8 - 2014 – Network of National Contact Points

Specific Challenge: Facilitate trans-national co-operation between NCPs for research infrastructures with a view to identifying and sharing good practices and raising the general standard of support to programme applicants, taking into account the diversity of actors that make up the constituency of the community.

Scope: Support will be given to a network of formally nominated NCPs in the area of research infrastructures. The activities will be tailored according to the nature of the area, and the priorities of the NCPs concerned. Various mechanisms may be included, such as benchmarking, joint workshops, enhanced cross-border brokerage events, specific training linked to this Part as well as to gender dimension of Research and Innovation, and twinning schemes. Special attention will be given to enhance the competence of NCPs, including helping less experienced NCPs rapidly acquire the know-how accumulated in other countries. The focus throughout should be on issues specific to research infrastructures.

Proposals can only include NCPs from EU Member States, and Associated Countries, who have been officially appointed by the relevant national authorities. The consortium should have a good representation of experienced and less experienced NCPs.

If certain NCPs wish to abstain from participating, this fact should be explicitly documented in the proposal. These NCPs are nevertheless invited and encouraged to participate in the project activities, and are eligible for reimbursement of their participation. Participation of NCPs from third countries is welcome, but these NCPs are not eligible for reimbursement for their participation.

The Commission expects to receive and fund a single proposal under this heading.

Expected impact:

- An improved and professionalised NCP service across Europe, thereby helping simplify access to Horizon 2020 calls, lowering the entry barriers for newcomers, and raising the average quality of proposals submitted.
- A more consistent level of NCP support services across Europe.

Type of action: Coordination and Support Action