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ANNEX 4

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HORIZON 2020

WORK PROGRAMME 2016 – 2017

4. European research infrastructures (including e-Infrastructures).."

This draft text is submitted to the Horizon 2020 Programme Committee as the basis for an exchange of views. The text is still subject to further elaboration and final legal checking.

(European Commission Decision C (2015) xxx of xx September 2015)

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DRAFT

Introduction

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 to 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.

The EU framework programme for Research and Innovation, Horizon 2020, gives high importance to promoting world-class Research Infrastructures, facilitating researcher's access to the infrastructures they need, to further developing and deploying e-infrastructures, and to fostering the innovation potential of research infrastructures with a focus on instrumentation and on reinforcing international cooperation with strategic third country partners. Research infrastructures 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 the other parts of "Excellent Science": "Future and Emerging Technologies", "Marie Skłodowska-Curie" and "European Research Council" actions. 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.

The Horizon 2020 Work Programme for 2016-2017 has been influenced by the political priorities of the new Commission's Agenda, in particular to maximise its contribution to the strengthening of Europe's global competitiveness, the creation of new and sustainable jobs and the promotion of growth.

The Research Infrastructures Work Programme 2016-2017 will put wide emphasis on fostering the long-term sustainability of research infrastructures (including through the optimisation of assessment and evaluation procedures), on expanding the role and impact of research infrastructures in the innovation chain and on maximising the exploitation of data produced and/or collected by research infrastructures.

Research Infrastructure activities also contribute to widening participation in the programme by supporting the development of Regional Partner Facilities in ESFRI projects and integrating activities. The use of European Structural and Investment Funds to build capacities and infrastructures at national and regional level in line with the relevant smart specialisation

strategy is encouraged (further information can be found in section "Specific features for Research Infrastructures").

The projects funded under the e-infrastructure call of the Research Infrastructures Work Programme 2016-2017 will participate in the Pilot on Open Research Data in Horizon 2020 in line with the Commission's Open Access to research data policy for facilitating access, re-use and preservation of research data. Projects have the possibility to opt out of the Pilot. A related new element in Horizon 2020 is the use of Data Management Plans (DMPs) detailing what data the project will generate, whether and how it will be exploited or made accessible for verification and re-use, and how it will be curated and preserved. The use of a Data Management Plan is required for projects participating in the Open Research Data Pilot. Other projects are invited to submit a Data Management Plan if relevant for their planned research. Further guidance on the Open Research Data Pilot is made available on the Participant Portal.

The projects funded under the other calls of this Work Programme may participate in the Open Research Data Pilot in Horizon 2020 on a voluntary basis.

DRAFT

Call - Development and long-term sustainability of new pan-European research infrastructures

H2020-INFRADEV-2016/2017

This call focuses on developing new world-class research infrastructures. The aim is to facilitate and support the implementation and long-term sustainability of the research infrastructures identified by the European Strategy Forum on Research Infrastructures (ESFRI) as well as of other world-class research infrastructures. These 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 2017);
- the preparatory phases of ESFRI projects, through a targeted approach (deadline and budget 2016);
- the individual support to ESFRI projects and other world-class research infrastructures with established legal structure and governance such as an ERIC through a competitive approach (deadline 2016 and budget 2016-2017);
- a pilot action addressing the federation, networking and coordination of pan-European research infrastructures and clouds for the purpose of increasing research and science data availability and use (deadline and budget 2016).

Proposals are invited against the following topics:

INFRADEV-1-2017: 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 and technical design 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 a new infrastructure.

Scope: Design studies should address all key questions concerning the technical and conceptual feasibility of new or upgraded fully fledged user facilities (proposals considering just a component for research infrastructures are not targeted by this topic). Design studies lead 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 to be performed in a Design Study proposal include both:

- Scientific and technical work, i.e. (1) the drafting of concepts, architecture and engineering plans for the construction, taking into due account resource efficiency and environmental impacts, as well as, when relevant, the creation of prototypes; (2) scientific and technical work to ensure that the scientific user communities exploit the new facility from the start with the highest efficiency.
- Conceptual work, i.e. (1) plans to coherently integrate the new infrastructure into the European landscape of related facilities in accordance, whenever appropriate, with the Community objective of balanced territorial development; (2) the estimated budget for construction and operation; (3) plans for an international governance structure; (4) the planning of research services to be provided at international level, (5) procedure and criteria to choose the site of the infrastructure.

The main output of a design study will be the conceptual design reports for a new or upgraded research infrastructure of strategic importance for Europe.

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

Expected impact:

- 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 Group of Senior Officials on Research Infrastructures – GSO) 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: Research and innovation actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

INFRADEV-2-2016: 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 identified in the ESFRI roadmap to the level of legal, financial, and, where applicable, technical maturity required for implementing it.

Proposal consortia should involve all the stakeholders necessary to move the project forward, to take the decisions, and to make the financial commitments, before construction can start

(e.g. national/regional ministries/governments, research councils, funding agencies, in particular, but not limited to, from the countries that have already declared their commitment in the application to ESFRI). 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. Technical work should be carried out when necessary to complete the final technical design, providing a sound technical base for establishing a cost baseline and detailed financial planning. The financial needs of the project should be mapped out to the extent necessary for funding agencies to establish their own medium- and long-term financial planning.

The preparation of the legal and financial agreements (including site, governance, internal rules, 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).

If the preparatory phase includes technical work it should be implemented as a *Research and innovation action*, otherwise it will be a *Coordination and support action*. The detailed list of activities that can be included in a preparatory phase proposal is given in part A of the section "Specific features for Research Infrastructures".

Proposals will address research infrastructures which enter the ESFRI roadmap in 2016 and that are willing to set up a pan-European governance and legal structure (e.g. in the form of an ERIC or any suitable structures at European or international level).

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

Expected impact:

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

- Funding bodies are able to take funding decisions and to conclude the legal agreements necessary for the construction of new research infrastructures.
- 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.
- A landscape of first-class sustainable RIs and services, open to researchers, industry, and other interested groups such as policy makers and the public, is progressively established, which will impact on the acceleration of scientific discovery as well as on innovation and competitiveness.

Type of action: Coordination and support actions or Research and innovation actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

INFRADEV-3-2016/2017: Individual support to ESFRI projects and other world-class research infrastructures

Specific challenge: The new research infrastructures under development at European level, such as those identified in the ESFRI roadmap, are advancing in their implementation phase and/or starting 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 financial sustainability must be proved and the trust and awareness of users must be earned.

Scope: Under the 2016-2017 work programme this topic will target the long-term sustainability of new research infrastructures, ESFRI projects and other world-class research infrastructures in Europe, with established governance and legal structure, notably on the basis of the European Research Infrastructure Consortium (ERIC) or any suitable structure at European or international level. Support will be provided to activities aimed at ensuring long-term sustainability, including enlargement of the membership, European coverage, international cooperation[1], limited pilots for testing and improving user services to increase reliability and create trust, definition of service level agreements and business/funding plan, outreach, and technology transfer activities. Proposals should explain complementarities with previous or current EU grants.

Specific attention will be given to the interaction with industry and SMEs. Activities may also foster the development of Regional Partner Facilities. The detailed list of activities that can be supported under this topic is given in part B of the section "Specific features for Research Infrastructures".

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

Expected impact:

This activity will:

- contribute to providing Europe with a comprehensive landscape of sustainable Research Infrastructures helping to respond to challenges in science, industry and society;
- 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 fora;
- support progress towards the development of global research infrastructures;
- enable researchers to address societal challenges with a global dimension;
- foster capacity-building and Research Infrastructure human capital development in targeted/relevant regions.

Type of action: Coordination and Support actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

INFRADEV-4-2016 – Towards a European Research and Science Cloud

Specific challenge: Research Infrastructures such as the ones on the ESFRI roadmap and others, are characterized by the very significant data volumes they generate and handle. These data are of interest to thousands of researchers across scientific disciplines and to other potential users via Open Access policies. Effective data preservation and open access for immediate and future sharing and re-use is a fundamental component of today's research

[1] In line with the strategy for EU international cooperation in research and innovation (COM(2012)497)

infrastructures and Horizon 2020 actions. In this context, European research stakeholders make increasing use of cloud services to effectively handle such data.

Scope: The aim of this topic is the launch of a pilot action that should demonstrate how wide availability of scientific data and data-analysis services for European researchers can be ensured through a cloud infrastructure. The action will be based on the recommendations of the High Level Expert Group for the European Research and Science Cloud.

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

The action should build on existing infrastructures and design a stakeholder driven governance framework, with the involvement of the research user community, the research infrastructures and the research funding bodies to ensure its sustainability. Links with related national and European (e.g. Helix Nebula) initiatives should be established. Collaboration agreements should also be established with projects selected under topic EINFRA-12-2017, to exploit potential synergies and ensure complementarity. The Commission considers that proposals requesting a contribution from the EU of between EUR 5 and 10 million would allow this topic to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

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

Type of action: Research and Innovation actions

CONDITIONS FOR THIS CALL

Opening date(s)[2]: 10/12/2015 for INFRADEV-2-2016 and INFRADEV-3-2016/2017
22/03/2016 for INFRADEV-4-2016
01/12/2016 for INFRADEV-1-2017

Deadline(s)[3]:

[2] The Director-General responsible may decide to open the call up to one month prior to or after the envisaged date of opening.

[3] The Director-General responsible may delay this deadline by up to two months.

INFRADEV-2-2016 and INFRADEV-3-2016/2017	30/03/2016 at 17.00.00 Brussels time
INFRADEV-4-2016	22/06/2016 at 17.00.00 Brussels time
INFRADEV-1-2017	29/03/2017 at 17.00.00 Brussels time

Overall indicative budget: EUR 80.00 million from the 2016 budget and EUR 60.00 million from the 2017 budget[4]

	2016 EUR million	2017 EUR million	
INFRADEV-1-2017		20.00	Single stage
INFRADEV-2-2016	40.00		Single stage
INFRADEV-3-2016/2017	30.00	40.00	Single stage
INFRADEV-4-2016	10.00		Single stage

Eligibility and admissibility conditions: The conditions are described in parts B and C of the General Annexes to the work programme.

Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in part H of the General Annexes to the work programme with the following exceptions:

INFRADEV-1-2017, INFRADEV-2-2016 implemented as a RIA and INFRADEV-4-2016	For the criterion Impact: • The extent to which the outputs of the project contribute at the European and/or international level to the expected impacts listed in the work programme under the relevant topic; • Where relevant, any other impacts that would strengthen the competitiveness and growth of companies by developing innovations meeting European and/or global needs and markets, enhance or protect the environment, or bring important benefits for society; • Quality of the proposed measures to exploit and disseminate the project results (including, where relevant, management of IPR), and to manage research data where relevant. • Quality of the proposed measures to communicate the project activities and results to different target audiences.

Evaluation procedure: The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes. The full evaluation procedure is described in the relevant guide[5] published on the Participant Portal.

- Indicative timetable for evaluation and grant agreement:

	Information on the outcome of the evaluation (*single stage*)	Indicative date for the signing of grant agreements
All topics	Maximum 5 months from the final date for submission.	Maximum 8 months from the final date for submission.

[4] ----

[5] See: http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/pse/h2020-guide-pse_en.pdf.

Consortium agreements: In line with the Rules for Participation and the Model Grant Agreement, participants in Research and Innovation Actions are required to conclude a consortium agreement. However, for mono-beneficiary actions resulting from this call under topic INFRADEV-3-2017, participants are not required to conclude a consortium agreement.

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Call - Integrating and opening research infrastructures of European interest

H2020-INFRAIA-2016/2017

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.

In addition to serving basic science challenges, Integrating Activities target research infrastructures, ranging across all fields of science and technology, needed to support the EU political priorities and to address the Societal Challenges, including Focus Areas. They also target research infrastructures needed to gain leadership in the industrial and enabling technology.

ESFRI and other world-class research infrastructures are not specifically targeted by this call. Nevertheless, where relevant, they can participate in an integrating activity together with other key national and regional research infrastructures.

Proposals are invited against the following topics:

INFRAIA-1-2016/2017: Integrating Activities for Advanced Communities

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:

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

An Integrating Activity will mobilise a comprehensive consortium of several key research infrastructures[6] 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, in particular when they offer complementary or more advanced services than those available in Europe.

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

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

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

(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;
(ii) Trans-national access or virtual access activities, to support scientific communities in their access to the identified key research infrastructures;
(iii) Joint research activities, to improve, in quality and/or quantity, the integrated services provided at European level by the infrastructures.

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

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

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

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

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

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

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

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

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

The Commission considers that proposals requesting a contribution from the EU of up to EUR 10 million, of which maximum EUR 3.5 million for activities other than access, would allow this topic to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

On the basis of a multiannual plan drafted taking into account the assessment and the timing of previous grants as well as political priorities and needs, in term of research infrastructures services, emerging from other parts of Horizon 2020, this work programme invites proposals addressing the following areas listed under the different domains:

Biological and Medical Sciences

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Energy

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Environmental and Earth Sciences

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Mathematics and ICT

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Engineering, Material Sciences, and Analytical facilities

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Physical Sciences

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Social Sciences and Humanities

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Expected impact:

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

Type of action: Research and innovation actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

INFRAIA-2-2017: Integrating Activities for Starting Communities

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:

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

An Integrating Activity will mobilise a comprehensive consortium of several key research infrastructures[7] 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, in particular when they offer complementary or more advanced services than those available in Europe.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million, of which maximum EUR 3.5 million for activities other than access, would allow this topic to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

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

- When applicable, the socio-economic impact of past investments in research infrastructures from the European Structural and Investment Funds is enhanced.

Type of action: Research and innovation actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

DRAFT

CONDITIONS FOR THIS CALL

Opening date(s)[8]: 10/12/2015 for all topics
01/12/2016 for second stage of INFRAIA-2-2017

Deadline(s) [9]:

INFRAIA-1-2016/2017	30/03/2016 at 17.00.00 Brussels time
INFRAIA-2-2017 INFRAIA-2-2017	30/03/2016 at 17.00.00 Brussels time first stage 29/03/2017 at 17.00.00 Brussels time second stage

Overall indicative budget: EUR 90.00 million from the 2016 budget and EUR 110.00 million from the 2017 budget[10]

	2016 EUR million	2017 EUR million	
INFRAIA-1-2016/2017	90.00	70.00	Single stage
INFRAIA-2-2017		40.00	Two stage

Eligibility and admissibility conditions: The conditions are described in parts B and C of the General Annexes to the work programme, with the following exceptions:

INFRAIA-1-2016/2017 and INFRAIA-2-2017	Given the specific nature of this topic, specific eligibility conditions, in addition to the standard eligibility conditions for Research and Innovation Action, apply: all the three types of activities: networking, access and joint research activities shall be included in the proposal. Please read carefully the provisions under the part D of the section "Specific features for Research Infrastructures" before the preparation of your application. Under these topics, legal entities established in Australia, Brazil, Canada, China, India, Japan, Russia, Mexico and USA, which provide access to their research infrastructures to researchers from Members States and Associated countries, are eligible for funding from the Union.

Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in part H of the General Annexes to the work programme, with the following exceptions:

INFRAIA-1-2016/2017 and INFRAIA-2-2017	For the criterion Excellence, in addition to its standard sub-criteria, the following aspects will also be taken into account; • The extent to which the Networking Activities will foster a culture of co-operation between the participants and other relevant stakeholders. • The extent to which the Access Activities (Trans-national Access and/or Virtual activities) will offer access to state-of-the-art infrastructures, high quality services, and will enable users to conduct excellent research.

[8] The Director-General responsible may decide to open the call up to one month prior to or after the envisaged date of opening.

[9] The Director-General responsible may delay this deadline by up to two months.

[10] ---

	• The extent to which the Joint Research Activities will contribute to quantitative and qualitative improvements of the services provided by the infrastructures. For the criterion Impact: • The extent to which the outputs of the project should contribute at the European and/or international level to the expected impacts listed in the work programme under the relevant topic; • Where relevant, any other impacts that would strengthen the competitiveness and growth of companies by developing innovations meeting European and/or global needs and markets, enhance or protect the environment, or bring important benefits for society; • Quality of the proposed measures to exploit and disseminate the project results (including, where relevant, management of IPR), and to manage research data where relevant. • Quality of the proposed measures to communicate the project activities and results to different target audiences.

Evaluation procedure: The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes. The full evaluation procedure is described in the relevant guide[11] published on the Participant Portal.

- Indicative timetable for evaluation and grant agreement:

For single stage procedure:

- Information on the outcome of the evaluation: Maximum 5 months from the final date for submission; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission.

For two-stage procedure:

- Information on the outcome of the evaluation: Maximum 5 months from the final date for submission for the first stage and maximum 5 months from the final date for submission for the second stage; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission of the second stage proposals.

Consortium agreements: In line with the Rules for Participation and the Model Grant Agreement, participants in Research and Innovation Actions are required to conclude a consortium agreement prior to grant agreement.

[11] See: http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/pse/h2020-guide-pse_en.pdf.

Call – e-Infrastructures

H2020-EINFRA-2016/2017

The e-infrastructures[12] call for 2016/2017[13] will support the European policies on open research data, data and computing intensive science, research and education networking, high-performance computing and big data innovation[14]. It is structured along the following themes:

1 - Integration and consolidation of e-infrastructure platforms supporting European policies and research and education communities

The integration and consolidation of e-infrastructure platforms covers the following aspects: (a) coordination of regional, national and European operations and funding (b) synergies between operational e-infrastructures (c) continuous upgrades of infrastructure without service disruption.

2 - Prototyping innovative e-infrastructure platforms and services for research and education communities, industry and the citizens at large

e-Infrastructure platforms and services need to evolve through innovation actions to respond to the long-term needs of research and education communities, industry and the citizens at large. Innovative developments based on state-of-the-art technologies need to mature to be integrated and offered as dependable e-infrastructures. The support to e-infrastructure innovation is done by means of two types of activities: (a) *Platform-driven e-infrastructure innovation* (technology push, driven by the supply-side) and (b) *User-driven e-infrastructure innovation* (user pull, driven by the demand-side).

Support to policies and international cooperation for e-infrastructures is covered in the INFRASUPP Call (topic INFRASUPP-3-2016/17).

The implementation of the e-infrastructures call for 2016/2017 is informed by the following framework conditions:

Service orientation:

The whole work programme aims at supporting a *service oriented European e-infrastructure landscape* catalysing new knowledge and innovative ICT solutions by global and multidisciplinary research. All projects will contribute to the production of a high quality catalogue of services describing the services that they will provide during the lifetime of the project or that they intend to develop during the project.

Maximizing and assessing the impact of the e-infrastructures:

Proposals shall define, collect and make available key performance indicators (KPIs) in support of operational, technical and socio-economic impact assessment.

Proposals shall plan for active participation in international *fora* and community-led consensus building initiatives to promote data and computing infrastructure interoperability such as the Research Data Alliance.

[12] a.k.a Information and Communication Technologies infrastructure
[13] Is based on the "Scoping Paper" for Research Infrastructures (including e-infrastructures) and other extensive consultations
[14] COM Data value chain

Co-Design:

In order to successfully achieve the work programme objectives and to increase the scope, depth and economies of scale of e-infrastructures, the Commission encourages that consortia applying to all topics, in particular to those in the *platform-driven* and *user-driven* innovation themes, are composed by a balanced set of partners with complementary competences and roles.

Open Research Data in Horizon 2020:

Producers and users of research data will benefit from more systematically opening it to broad access, depositing and accessing their data with the objective to make research data discoverable, accessible, assessable, intelligible, useable, and wherever possible interoperable – c.f. *G8 principles on research data*[15].

The projects funded under this programme will participate in the Horizon 2020 Pilot on Open Research Data in line with the Commission's policy on Open Access to research data for facilitating access, re-use and preservation of research data. Projects have the possibility to opt out of the Pilot.

A related new element in Horizon 2020 is the use of Data Management Plans (DMPs) detailing what data the project will generate, whether and how it will be exploited or made accessible for verification and re-use, and how it will be curated and preserved. The use of DMPs is required for projects participating in the Open Research Data Pilot. Other projects are invited to submit a DMP if relevant for their planned research. The projects funded under the other calls of this Work Programme may participate in the Open Research Data Pilot in Horizon 2020 on a voluntary basis.

H2020 as a catalyst of the European plan for growth and jobs:

Horizon 2020 encourages synergies with other European Union Funds, with appropriate provisions not to cover the same cost items[16]. The e-infrastructures work programme for 2016-2017 will promote when feasible the combined and/or the cumulative use other funding sources as instrument to support initiatives of European interest to foster growth and jobs[17].

Theme 1 - Integration and consolidation of e-infrastructure platforms supporting European policies and research and education communities

Providing the best services to research and education communities across Europe is the key challenge of all supported e-infrastructures initiatives. Reaching a high level of dependability requires the integration and consolidation of e-infrastructure platforms through stable, secure and sustainable operations. It is not only a question of offering advanced research capacity; reliability and 24/7 availability are essential attributes of e-infrastructure services responding to user communities' short and medium-term requirements. Technology integration, training and interoperation, testing, certification, etc. are essential so that research and education users and the citizen at large can fully benefit. Sound mechanisms to monitor and evaluate the usefulness of services and underlying infrastructures are necessary to support informed decisions on infrastructure upgrades or phasing out obsolete services.

[15] G8 Science Ministers Statement London UK, 12 June 2013 - http://bit.ly/1BtKagu
[16] Article 17a of the Horizon 2020 Regulation and Article 31 of the rules of participation.
[17] Proposed "game-changer" on *European high-performance data networks (weblink)*

The objective is to enable the integration and opening of national research infrastructures by means of remote access to the research resources (research instruments and facilities, global high-speed networks, high-performance computing and research data) offering more than the sum of individual components by sharing resources. It entails the development of efficient and participatory governance structures at European level and to establish a solid foundation to manage investment with the objective of scientific excellence while widening access to the key research and education resources.

Areas covered under this theme are:

Support to the next implementation phase of Pan-European High Performance Computing infrastructure and services (PRACE): to help creating a world-class pan-European High Performance Computing (HPC) infrastructure and to provide state-of-the-art services with access by users, independently of their location.

Data Management and Distributed Computing e-infrastructures for Open Science: covering two areas of e-infrastructures:

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

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

The above topics are complemented by topics described under the section "*Other actions with different types of instruments* ", in particular:

Research and Education Networking – GÉANT; FPA actions: effectively supporting data and computing-intensive collaborative research and education anywhere in Europe and beyond, through reliable networking services and operational excellence.. Connectivity between Europe and Latin America will be supported.

Conditions for theme 1 *(Integration and consolidation of e-infrastructure platforms supporting European policies and research and education communities):*

The operation of e-infrastructure services will be funded by supporting the trans-national and virtual access activities provided to researchers. Those service activities shall comply with the conditions set out in Article 16.1 for trans-national access and Article 16.2 for virtual access to research infrastructures of the model grant agreement.

Under theme 1, only platforms and services based on systems and technologies that have achieved Technology Readiness Level 9 (TRL9)[18] before the start of the project will be supported. The services offered under a project must be adequately documented in an open catalogue of services and shall be periodically assessed by an external board approved by the Commission and common to all EC funded e-infrastructure services.

[18] TRL 9 – Technology Readiness Level 9: actual system proven in operational environment (competitive manufacturing in the case of key enabling technologies; or in space). See Annex G.

The projects in this theme will be implemented through complementary grants. Complementary grants have, inter-alia, the obligation to conclude a written collaboration agreement among the projects[19]. In addition, the projects in this theme will conclude written collaboration agreements with all projects funded under "Other actions with different types of instruments (a) GÉANT Partnership projects (a1) *Research and Education Networking – GÉANT"* and INFRADEV-4-2016, "*Towards a European Research and Science Cloud*". The main purpose of these collaboration agreements is, inter-alia, to work on potential synergies, overlaps and gaps in the overall service offering.

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

Topics under Theme 1:

EINFRA-11-2016 - Support to the next implementation phase of Pan-European High Performance Computing infrastructure and services (PRACE)

Specific Challenge: In order to create a world-class pan-European High Performance Computing (HPC) infrastructure and to provide state-of-the-art services with access by users, independently of their location, the HPC resources need to be further pooled, integrated and rationalised. Horizon 2020 is a key element to support the European strategy on High Performance Computing which sets the way forward, in particular regarding the access to the best supercomputing facilities and services for both industry and academia. This topic complements the activities of the Public-Private Partnership (PPP) in HPC in order to fully implement the European HPC strategy.

Scope

Proposals will address all points below:

(1) Provide a seamless and efficient Europe-wide Tier-0[20] service to users, 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 users, including ESFRI projects, Horizon 2020 projects/programmes, large institutional users or industry.

(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;

[19] Article 2 of the Horizon 2020 Model Grant Agreement

[20] Tier-0 are those services provided at pan-European level with machines devoted to the pan-European infrastructure for a significant fraction of cycles (to be agreed with the Commission) and having a minimum performance level to be periodically defined by the consortium

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 environment of world-class systems with different machine architectures - evolving towards exascale - including the implementation roadmap at EU and national level, taking into account financial aspects, best practices for reduction of operating and energy costs, 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 European Technology Platform for HPC (ETP4HPC) and the Centres of Excellence in HPC applications in support of the European HPC strategy towards the next generation of computing systems, technologies and applications. In particular, the mechanisms to be put in place by PRACE for the provision of technical specifications to guide research activities for future exascale prototypes and systems, for the testing and demonstration of such exascale solutions, for the identification of new user needs in the use of next generation computing systems evolving towards exascale, and for the reaching out to scientific and industrial communities and the transfer of know-how for the use of HPC.

(7) Design and execute training and skills development programmes tailored to the needs of research in academia and industry and relevant public services 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 in the area of HPC aiming at systems interoperation.

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

Expected impact: The successful response to this area will improve services and procedures for user access to HPC infrastructure resources and services. Allocation schemes fostering openness to new user communities and applications will increased the amount of computing cycles available to researchers at European level through user-friendly and efficient procedures. This will help Europe staying at the forefront of scientific breakthroughs and innovation. This initiative will increase the number of industrial organisations (in particular SMEs), EU projects and institutional users benefiting from access to services including training in HPC. Benefits will also translate in increased investment in HPC infrastructure in Europe (national, regional and EU), long term financial sustainability through flexible business models and inclusive governance, better coordination between demand and supply in the European HPC ecosystem, with improved collaboration of the users and procurers with technology developers and suppliers to foster innovation.

Type of action: Research and innovation actions

EINFRA-12-2017 - Data and Distributed Computing e-infrastructures for Open Science

Specific Challenges:

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

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

The European data and computing e-infrastructure landscape remains very fragmented which is an obstacle for research collaboration at European and global levels and introduces additional complexity for achieving sustainable governance. The challenge is to integrate at European level the geographically and disciplinary dispersed resources to achieve economies of scale and efficiency gains in providing the best data and computing capacity and services to the research and education communities. This action is complementary to INFRADEV-4-2016, "*Towards a European Research and Science Cloud*".

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

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

Scope

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

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

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

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

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

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

(5) work closely with user communities (from different disciplines) to foster the use of digital infrastructures, promote the values of open science and support their data management plans.

Engage and train users (researchers, educators and students) to contribute to the dynamic *registry* and *catalogue of services* improving quality of data, software and computing infrastructure that become available for re-use

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

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

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

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

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

(1) Deployment and maintenance of service-driven knowledge e-infrastructure responding to general and specific requirements of researchers and research organisations for open access to research digital objects, their registration and preservation. This e-infrastructure will further develop the research capacity through a coordinated and participatory architecture linking institutional and thematic repositories across Europe. It will support publishing platforms by providing essential services for scientific information that can be used by humans and machines. Such target platforms can be generic, specific for a research field or specialised on quality assurance, discoverability, archiving etc. Essential functions of this service-driven approach will include helpdesks, training and guidance to support producers and users of scientific information, community building to support research data sharing and management, as well as implementation of Open Access policies in Europe. Relevant indicators on the take-up of open access in Europe including publications and data should be elaborated and reported regularly. The project will promote a limited set of biblio- and webometrics that reflect open access policies. It will collect bibliometric data on publications, citations, data citations, etc. on all Horizon 2020 scientific output (including on the Open Research Data Pilot) and produce both standard and on-demand statistics.

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

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

Expected impact:

(a) the operation of a federated European data and distributed computing infrastructure for research and education communities will optimise the access to IT equipment and services and will put all European researchers and educators in equal footing to access essential

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

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

Type of action: Research and innovation actions

Theme 2 - Prototyping innovative e-infrastructure platforms and services for research and education communities, industry and the citizens at large

e-Infrastructure platforms and services need to evolve through innovation actions to respond to the long-term needs of research and education communities, industry and the citizens at large. Innovative developments based on state-of-the-art technologies need to mature to be integrated and offered as dependable e-infrastructures. The support to e-infrastructure innovation is done by means of two topics described below: (a) Platform-driven innovation (technology push, driven by the supply-side) and (b) User-driven innovation (user pull, driven by the demand-side). The topics unfold in the following activities:

Areas covered in platform-driven e-infrastructure innovation

Support to Public Procurement of innovative HPC systems, PPI: Mastering high-performance computing (HPC) technologies and accessing the best HPC infrastructures and services are key factors for competitiveness and social, scientific and industrial innovation[21]. Industry and academia need access to leading-edge supercomputing infrastructures and services in order to stay competitive. The most advanced state-of-the-art systems (evolving from current dozens of peta-scale to future exa-scale performance) require ever-increasing investments hardly affordable by a single EU Member State.

[21] Communication "High Performance Computing (HPC): Europe's place in a global race"

A Public Procurement of Innovation (PPI) action addressing HPC can mobilise the national and EU resources needed to help renew the current set of HPC top systems in Europe dedicated to excellent research that is being progressively outdated. The PPI can contribute to a dynamic supply and demand HPC ecosystem in the EU, where the most advanced solutions produced by R&I in Europe can find a way to the HPC infrastructure. This action contributes to the implementation of the EU strategy on High Performance Computing (HPC), in particular regarding the access to the best supercomputing facilities and services for both industry and academia. This topic complements the activities of the Public-Private Partnership (PPP) in HPC in order to implement the European HPC strategy.

Universal discoverability of data objects and provenance: A digital science ecosystem requires that research data, software and computational resources are discoverable, accessible and usable. These are conditions for researchers and educators to collaborate and, through adequate incentives such as data citation, share data and assess its quality. Encouraging openness while respecting constraints such as privacy and community legacy best practices requires managing discoverability and provenance, quality review, citation and certification. There are technological and organisational challenges to offer a sustainable, robust, pan-European e-infrastructure service for universal discoverability of data objects and their provenance (by means of Universal Digital Identifiers). Such a service will open new prospects for data and computing-intensive science and education, encouraging openness and building trust.

Computing e-infrastructure with extreme large datasets: Long-term capacity upgrade of data and computing e-infrastructure is constantly tested by research communities that push the envelope in terms of volume, velocity and variety of research data. Scientific communities are increasingly aware of the rising tide of data which requires new approaches to data discoverability, management, quality assurance and trust, preservation, access and sharing. e-Infrastructures incorporating advanced computing resources and software based on up-to-date mathematical methods are essential in order to increase the capacity to manage and store extremely large, heterogeneous and complex datasets and to enable intelligent and timely analyses, to extract accurate knowledge and information from huge datasets.

The above topics are complemented by topics described under the section "*Other actions with different types of instruments*". These are related with the running Framework Partnership Agreements (FPAs):

Networking infrastructure: platform innovation – FPA action described in detail under "other actions": To enhance future generations of GÉANT platform by prototyping network components, modules, services and applications accessing wired/wireless infrastructures and networked resources.

Interactive Computing e-infrastructure for the Human Brain Project FET Flagship – FPA action described in detail under "other actions": To define and deliver the interactive computing e-infrastructure for brain simulation activities, as indicated in the HBP FPA as well as to address computing and storage e-infrastructure to complement the existing European HPC service offering to satisfy unmet needs from research communities at large such as neuroscience, climate, geophysical and seismic simulations, earth systems, agriculture/meteorological, energy, medical ...) leading to the upgrade of the PRACE infrastructure and services.

Areas covered in user-driven e-infrastructure innovation

Exploitation of e-infrastructures for user-driven innovation and pilots responding to community specific challenges: there is an increasing demand on research e-infrastructures to contribute to the further development of a modern European *data economy*. European initiatives (e.g. on environment and marine sustainability, agriculture and biodiversity, health and human brain etc.) share common requirements for reliable high-speed connectivity, access to data management and computing resources to address the exponential growth of data produced and make them available and create value chains.

EC-funded scientific e-infrastructures have been focusing on serving academic and research communities and institutions. Facilitating access to e-infrastructures tools and services by industry and in particular SMEs that cannot afford building their own infrastructures remains a challenge. Opening up platforms, research equipment and facilities, coupled with development of skills, can improve cost-effectiveness. Establishing a close cooperation between existing e-infrastructures and industry (particularly SMEs), the latter playing a more active role at supply and demand sides, will enable transfer of research results to the market, thus contributing to implementation of EU strategy aiming to boost growth and jobs.

Innovation for Open Science e-infrastructures and services: Open Science is a pre-requisite for building trust in research discovery processes, not only between peers but also to engage citizens to become better informed and more engaged. Europe needs that the e-infrastructure supporting Open Science is enriched with innovative services to exploit open scientific content (literature and data), make use of open e-infrastructures for connectivity and high-performance computing and promote a culture of transparent scientific culture. The key challenge is to promote user-driven innovation services to empower a participatory pan-European e-infrastructure linking institutional and thematic repositories, scientific content aggregators etc. Innovative services will support reliable and permanent access to digital scientific records and link all kinds of research objects in order to enable a more transparent evaluation of research and reproducibility of results.

As part of innovation activity linking the Arts into the innovation practices of H2020, projects are encouraged to dedicate, whenever appropriate, resources to creative and artistic practices for requirements definition, exploration of technological limits via art installations, developing novel and unexpected uses of technology, testing of unexpected technical solutions, and for working on social acceptance.

Conditions for theme 2 *(Prototyping innovative e-infrastructure platforms and services for research and education communities, industry and the citizens at large)*

Only platforms and services based on systems and technologies that have achieved at least TRL 6[22] before the start of the project will be supported and it is expected that they will have achieved TRL 9 by the end of the project. This condition does not apply to point "EINFRA-2.1-2016/17: Platform-Driven e-infrastructure innovation (a) Support to Public Procurement of innovative HPC systems, PPI".

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

[22] TRL 6 – technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies). See Annex G.

Topics under Theme 2:

EINFRA-21-2017: Platform-driven e-infrastructure innovation

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

Scope

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

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

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

(2) ensuring and reinforcing European access to European leading-edge supercomputing Tier-0 infrastructures and services, by making available a substantial percentage of the new systems to European researchers in the frame of the Pan-European High Performance Computing infrastructure and services (see EINFRA-1.1-2016/17)

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

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

(b) e-Infrastructure prototypes:

Proposals will address points (b1) or (b2), but not both.

(b1) Universal discoverability of data objects and provenance *(proposals shall address all points below):*

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

A maximum of EUR 5 million from the topic indicative budget is foreseen for this activity. It is expected that one proposal will be selected.

(b2) Computing e-infrastructure with extreme large datasets *(proposals shall address all points below):*

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

Expected impact

(a) Support to Public Procurement of innovative HPC systems, PPI: This action will contribution to the European HPC strategy through the creation of a European procurement market for the benefit of the HPC actors in Europe (in particular technology suppliers) and catalysing the efforts to vitalise the European HPC ecosystem. It position Europe as a world-class HPC hub with more leading-class HPC computing resources and services available at European level for European academia and industry, independently of the location of users or HPC systems. It will foster adoption and use of innovative world-class HPC solutions featuring the most advanced results of the R&I in Europe, widening the access to more users, in particular for and industry (including SMEs). It will improve effectiveness of public procurement in leading-class HPC systems through joint procurement and pooling of European and national resources, contributing to sustainability. Benefits will also translate in better coordination between demand and supply in the European HPC ecosystem, with improved collaboration of the users and procurers with technology suppliers.

(b): **e-Infrastructure prototypes**

(b1) Universal discoverability of data objects and provenance: the successful set up of such service based on standards and best-practices will support interoperability of e-infrastructure services. The use of Digital Identifiers opens new prospects for advanced services for science and education and for encouraging openness and building trust. Data and other resources become discoverable and easy to use which will facilitate access to resources and collaboration between scientists. It has the potential to be used as a core service across Europe and globally. Duplication of efforts for developing services common to many e-infrastructures is reduced.

(b2) Computing e-infrastructure with extreme large datasets: The successful prototyping of this action services will support the evolution of e-infrastructure services based on *exascale* data resources. It will prepare data and computing infrastructure to absorb needs of communities that push the envelope in terms of data and computing intensive science while softening the learning curve for scientific communities that will be using new services.

Type of action:

a. Public Procurement for Innovative solutions Co-fund actions (PPI)
b. Research and innovation actions

EINFRA-22-2016: User-driven e-infrastructure innovation

Specific Challenge:

(a) Preparing the capacity required to future generations of e-infrastructure is the key challenge. There is a need to support user-driven design and prototyping of innovative e-infrastructure services and applications to meet the needs of those communities that push the envelope in scientific and technological domains requiring top-of-the range capacity in the long term. It is also important to promote multi-domain community-driven approaches to fully exploit core e-infrastructure services with high economic innovation potential. With the support of, inter-alia, independent software vendors, innovation clusters and Research and technology organisations, e-infrastructures should open up to innovative stakeholders, including researchers, citizens and SMEs, to exploit a wide range of technology developments, research results and data.

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

Scope:

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

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

Proposals will address only one of the points below:

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

A maximum of EUR 8 million from the topic indicative budget is foreseen for this point.

(2) Proposals are expected to stimulate the innovation potential of innovative actors, SMEs in particular, either as suppliers of technologies and services for e-infrastructures or as users of e-infrastructures to improve their own product and service offering. The proposals shall involve actions led by innovative actors (notably SMEs) for which financial support will be granted (minimum 80% of the EU funding requested by the proposal, in the order of EUR 100.000 – 150.000 per innovative actor)[23].

[23] In line with the conditions set out in Part K of the General Annexes.

A maximum of EUR 6 million from the topic indicative budget is foreseen for this point. It is expected that one proposal will be selected.

(3) Promotion of a pan-European identity federation services for researchers, educators and students, in compliance with existing identity inter-federation efforts (including *Eduroam* and *Edugain*). Stimulate AAI services supporting communities involved in the emerging data-rich science era to manage and share their resources. It shall respond to requirements of cybersecurity and information assurance towards integrated identity management across-disciplines and interoperable at global level.

A maximum of EUR 3 million from the topic indicative budget is foreseen for point this point. It is expected that one proposal will be selected.

(b) Innovation for Open Science e-infrastructures and services

Proposals will address all points below:

(1) Reuse and improve (performance, quality, reputation, etc) the open access repository and publishing platform infrastructure for prototyping new infrastructure services in support of open science (e.g. new forms of publishing, machine-assisted knowledge extraction services from heterogeneous data resources and strengthening of machine readability and other discovery services). Prototyping of open review and research certification services engaging researchers, educators and students. Also registration and archiving services can be targeted.

(2) Developing further and widening the scope of the European Open Science e-infrastructure. Proposals should address an open scientific knowledge management infrastructure in which scientific and educational information repositories and publishing platforms form a visible part of an inter-connected and global knowledge system. Proposals can target any relevant parts of the scientific information ecosystem to enhance the links between literature, data, software, models and other digital objects. The proposed prototypes should have the potential to become part of an interoperable framework in order to enable more efficient digital science as well as transparent evaluation of research and reproducibility of results. Proposals should consider barriers (including legal) to data sharing in the context of these new services and assess the possibility of using pan-European authentication and authorization infrastructures.

A maximum of EUR 4 million from the topic indicative budget is foreseen for this point.

Expected impact:

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

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

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

Type of action: Research and innovation actions

CONDITIONS FOR THIS CALL

Opening date(s)[24]: xx/xx/xxxx for EINFRA-11-2016 and EINFRA-22-2016
xx/xx/xxxx for EINFRA-12-2017 and EINFRA-21-2017

Deadline(s)[25]:

EINFRA-11-2016 and EINFRA-22-2016	April 2016 at 17.00.00 Brussels time
EINFRA-12-2017	April 2017 at 17.00.00 Brussels time
EINFRA-21-2017 (a)	September 2016 at 17.00.00 Brussels time
EINFRA-21-2017 (b)	April 2017 at 17.00.00 Brussels time

Overall indicative budget: EUR 36.00 million from the 2016 budget and EUR 86.00 million from the 2017 budget[26]

	2016 EUR million	2017 EUR million	
EINFRA-11-2016	15.00		Single stage
EINFRA-12-2017		40.00	Single stage
EINFRA-21-2017 (a)		26.00	Single stage
EINFRA-21-2017 (b)		20.00	Single stage
EINFRA-22-2016	21.00		Single stage

[24] The Director-General responsible may decide to open the call up to one month prior to or after the envisaged date of opening.

[25] The Director-General responsible may delay this deadline by up to two months.

[26] ---

Eligibility and admissibility conditions: The conditions are described in parts B and C of the General Annexes to the work programme.

Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in part H of the General Annexes to the work programme, with the following exceptions:

EINFRA-11-2016 and EINFRA-12-2017	For the criterion Excellence, in addition to its standard sub-criteria, the following aspects will also be taken into account; • Clarity and pertinence of the objectives. • Credibility of the proposed approach, including the extent to which it is demonstrated that the concerned platforms and services are based on systems and technologies that have reached TRL 9 before the start of the project. • The extent to which the Service Activities (Trans-national and/or Virtual Access Activities) will offer access to state-of-the-art infrastructures and high quality services, and will enable users to conduct excellent research as demonstrated, inter-alia, by both the quality of the associated catalogue of services and the baseline and expected future measurements of related KPIs • Extent that the proposed work is ambitious (e.g. ground-breaking objectives, novel concepts and approaches). For the criterion Impact: • The expected impacts listed in the work programme under the relevant topic. • Potential to enhance capacity for innovation and production of new knowledge. • Effectiveness of the proposed measures to exploit and disseminate the project results (including management of IPR), to communicate the project, and to manage research data where relevant. For the criterion Quality and efficiency of the implementation: • Coherence and effectiveness of the work plan, including appropriateness of the allocation of tasks and resources. • Complementarity of the participants within the consortium (when relevant). • Appropriateness of the management structures and procedures, including risk and innovation management.

EINFRA-21-2017	For the criterion Excellence, in addition to its standard sub-criteria, the following aspects will also be taken into account; • Clarity and pertinence of the objectives. • Credibility of the proposed approach, including the extent to which it is demonstrated that the concerned platforms and services are based on systems and technologies that have reached TRL 6 before the start of the project and will be brought to TRL 9 by the end of the project. • The extent to which the proposed activities will improve, in quality and/or quantity, the services provided by state of the art e-

	infrastructures. • Extent that the proposed work is ambitious (e.g. ground-breaking objectives, novel concepts and approaches). For the criterion Impact: • The expected impacts listed in the work programme under the expected impacts listed in the work programme under the relevant topic. • Potential to enhance capacity for innovation and production of new knowledge. • Effectiveness of the proposed measures to exploit and disseminate the project results (including management of IPR), to communicate the project, and to manage research data where relevant. For the criterion Quality and efficiency of the implementation: • Coherence and effectiveness of the work plan, including appropriateness of the allocation of tasks and resources. • Complementarity of the participants within the consortium (when relevant). • Appropriateness of the management structures and procedures, including risk and innovation management. **Scoring**: The score for the criterion Excellence will be weighted by 1.5.

EINFRA-22-2016	For the criterion Excellence, in addition to its standard sub-criteria, the following aspects will also be taken into account; • Clarity and pertinence of the objectives. • Credibility of the proposed approach, including the extent to which it is demonstrated that the concerned platforms and services are based on systems and technologies that have reached TRL 6 before the start of the project and will be brought to TRL 9 by the end of the project. • The extent to which the proposed activities will improve, in quality and/or quantity, the services provided by state of the art e-infrastructures. • Extent to which the proposed work is ambitious (e.g. ground-breaking objectives, novel concepts and approaches). For the criterion Impact: • The expected impacts listed in the work programme under the relevant topic. • Potential to enhance capacity for innovation and production of new knowledge. • Effectiveness of the proposed measures to exploit and disseminate the project results (including management of IPR), to communicate the project, and to manage research data where relevant.

	For the criterion Quality and efficiency of the implementation: • Coherence and effectiveness of the work plan, including appropriateness of the allocation of tasks and resources. • Complementarity of the participants within the consortium (when relevant). • Appropriateness of the management structures and procedures, including risk and innovation management. **Scoring**: The score for the criterion *Excellence* will be weighted by 1.5.

Evaluation procedure: The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes. The full evaluation procedure is described in the relevant guide[27] published on the Participant Portal.

- Indicative timetable for evaluation and grant agreement:

	Information on the outcome of the evaluation (*single stage*)	Indicative date for the signing of grant agreements
All topics	Maximum 5 months from the final date for submission.	Maximum 8 months from the final date for submission.

Consortium agreements: In line with the Rules for Participation and the Model Grant Agreement, participants in an action are required to conclude a consortium agreement prior to grant agreement.

[27] See: http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/pse/h2020-guide-pse_en.pdf.

Call - Fostering the innovation potential of Research Infrastructures

H2020-INFRAINNOV-2016/2017

This call focuses on fostering the innovation potential of research infrastructures.

In addition to this call, innovation is mainstreamed in all relevant parts of the work programme.

Proposals are invited against the following topics:

INFRAINNOV-1-2017 – Fostering co-innovation for future detection and imaging technologies

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. Opportunities provided by the development of components, instruments, services and knowledge for the implementation and upgrade of research infrastructures, could be better exploited to push the limits of existing technologies. There is a clear innovation potential associated with procurement from industry during the construction and upgrade of research infrastructures.
A co-innovation approach to continuously generate, scale and deploy breakthrough technologies with market and social value needs to be adopted by research infrastructures.

Scope: The aim is the establishment of an open initiative oriented towards a novel research and innovation collaborative framework engaging both the research communities in Europe using Research Infrastructures and the industry (including SMEs), for the mutual benefit of these stakeholders and the European society at large.

This initiative should address:

- The identification of a wide spectrum of technology opportunities with breakthrough potential across Europe; the assessment of the feasibility and scalability of the identified opportunities; the selection and clustering of those opportunities with a clear potential for industrial implementation; and the support of those opportunities towards industrial applications having societal value;
- The support of technology and innovation transfer and joint development measures of high-tech components;
- The enabling of the best conditions for full exploitation by industrial partners of the innovation potential of Research Infrastructures (e.g. in the field of instrumentation and detectors);

As a pilot initiative, the proposals should mainly address the development of future detection and imaging technologies, which have applications in the fields of medicine, manufacturing industry, aerospace, ICT, engineering, environmental sciences and beyond, and should constitute a driver enabling the transfer of fundamental research towards industrial application.

This action allows for the provision of financial support to third parties in line with the conditions set out in Part K of the General Annexes. The financial support to third parties is indeed the primary aim of the action. The Commission considers that proposals requesting a contribution from the EU of up to EUR 20 million would allow this topic to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

This activity will:

- establish a co-innovation platform in the field of detection and imaging technologies
- provide financial support and guidance towards industrial applicability to the identified co-innovation opportunities
- increase the capacity to generate, absorb and use new technologies in Europe;
- enhance the innovation capability of European Research Infrastructures;
- increase the involvement of industry (including SMEs) in the development of research infrastructures, raising the technological level and competitiveness of European companies and generating market opportunities for them;
- 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;
- when applicable, the socio-economic impact of past investments in research infrastructures from the European Structural and Investment Funds is enhanced.

Type of action: Research and innovation actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

INFRAINNOV-2-2016 – Support to Technological Infrastructures

Specific challenge: Pan-European Research Infrastructures use more and more sophisticated technologies that can only be hosted in large-scale platforms combining R&D, integration and validation. These platforms can be viewed as Technological Infrastructures: they form a distributed network across Europe and provide Research Infrastructures with advanced key technologies and integration services. They also provide longer-term visibility and involvement of industry in scientific and technological advancements and therefore ensure greater socio-economic impact. The coordination of Technological Infrastructures working in a given technological domain and their networking will contribute to harmonise their operation conditions and increase their operation efficiency. This will permit the creation of a more efficient integrated ecosystem between academic laboratories, focussed on technological R&D needs of Research Infrastructures, large companies as well as SMEs, motivated by the innovative environment and the market opportunities created by the Research Infrastructure needs. Being focussed on innovation and on higher Technology Readiness Level (TRL) than usually targeted by Research Infrastructures, these networks of Technological Infrastructures should contribute to bridging the gap between the academic world and industry, and to the training of high-level engineers and technological scientists in Europe.

Scope: Funding will be provided for the coordination and networking of Technological Infrastructures involving research infrastructures, industry and SMEs.

Proposals should address:

- the definition of key techniques and trends which are crucial for the further development of Research Infrastructures, in close partnership with the industrial partners, especially with innovative SMEs;

- the definition of roadmaps and/or strategic agendas together with industrial sector actors for key technologies for R&D and for the construction and upgrade of Research Infrastructures as well as for key technologies to be explored by industries;
- the identification of the domains of societal applications and potential markets beyond Research Infrastructures;
- the implementation of a strategy addressing the training of young engineers, technicians and scientists in an environment of strong industrial relevance and scientific excellence;
- the exchange of good practices between user communities and managers of research infrastructures as regard benchmarking performance of technology platforms, harmonisation of tests, standards, reference materials, interoperability and data handling.

Proposals should cover a broad technological domain of interest for pan European Research Infrastructures such as but not restricted to components for accelerator based facilities, laser, high-field magnets, vacuum and cryogenic systems, or components for oceanic investigation (e.g. underwater vehicles and associated robotics, autonomous instrumented mobile floats, deep sea stations).

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

Expected impact:

The implementation of a coordinated ecosystem of Technological Infrastructures as key components of the European Research Infrastructure landscape will help ensure both the scientific competitiveness of European Research Infrastructures in the long-term and the further development of innovative companies.

In particular this activity will:

- Establish technology roadmaps and identify market opportunities shared between Research Infrastructures and Technology Infrastructures and socio-economic partners for a better positioning of Europe in the global Research Infrastructure sector;
- Facilitate the creation of both large and viable markets and structuring industrial partners in a critical mass to enable European industry to respond to demands from international Research Infrastructures;
- Established links between universities and industrial companies of such a technology cluster to ensure the dissemination of the acquired knowledge and the training of top-level engineers and technicians;
- Support the integration of research infrastructures into local, regional and global innovation systems; the competitive nature of such a technology cluster-based approach will facilitate the development of synergies and complementarities across Europe and avoid duplication of work.

Type of action: Coordination and support actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

CONDITIONS FOR THIS CALL

Opening date(s)[28]: 10/12/2015 for INFRAINNOV-2-2016
01/12/2016 for INFRAINNOV-1-2017

Deadline(s) [29]:

INFRAINNOV-2-2016	30/03/2016 at 17.00.00 Brussels time
INFRAINNOV-1-2017 and	29/03/2017 at 17.00.00 Brussels time

Overall indicative budget: EUR10.00 million from the 2016 budget and EUR 20.00 million from the 2017 budget[30]

	2016 EUR million	2017 EUR million	
INFRAINNOV-1-2017		20.00	Single stage
INFRAINNOV-2-2017	10.00		Single stage

Eligibility and admissibility conditions: The conditions are described in parts B and C of the General Annexes to the work programme.

Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in part H of the General Annexes to the work programme.

Evaluation procedure: The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes. The full evaluation procedure is described in the relevant guide[31] published on the Participant Portal.

- Indicative timetable for evaluation and grant agreement:

	Information on the outcome of the evaluation (*single stage*)	Indicative date for the signing of grant agreements
All topics	Maximum 5 months from the final date for submission.	Maximum 8 months from the final date for submission.

Consortium agreements: In line with the Rules for Participation and the Model Grant Agreement, participants in an action are required to conclude a consortium agreement prior to grant agreement.

[28] The Director-General responsible may decide to open the call up to one month prior to or after the envisaged date of opening.

[29] The Director-General responsible may delay this deadline by up to two months.

[30] ---

[31] See: http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/pse/h2020-guide-pse_en.pdf.

Call - Support to policy and international cooperation

H2020-INFRASUPP-2016/2017

This call focuses on reinforcing European research infrastructures policy and international cooperation.

In addition to this call, development of policy and international cooperation are encouraged in any proposal where these activities appear relevant.

The e-infrastructures topic for 2016/2017 foresees support to the implementation of the Open Research Data Pilot[32]. It will provide support for coordination of European, national and/or regional policies and programmes. International co-operation will promote the European leadership in the development of new e-infrastructure capacity on research data, high performance computing and networking, ensuring interoperation at global level. It will enable European communities to be linked with third countries, have access to unique research infrastructures and contribute to standardisation activities in international *fora*, aligning strategic developments and sharing best practices.

Proposals are invited against the following topics:

INFRASUPP-1-2016 – Policy measures for research infrastructures

Specific challenge: In the context of the communication for a reinforced ERA partnership for excellence and growth[33], the focus of this action is related to the effective investment and use of research infrastructures.

Scope: Proposals will address one of the following areas:

- Support Research Infrastructure policy development in terms of exchange of best practices for national Roadmap drafting and evaluation procedures for research infrastructures in order to promote comparability and synchronisation of national procedures and a possible harmonisation of ex-ante and ex-post evaluation mechanism. The full lifecycle of research infrastructure funding should be duly taken into account. The proposals shall foresee the conduction of an analysis of existing national roadmaps so to extrapolate common trends that could be then proposed as best practices in terms of criteria for inclusion, and for addressing societal needs with cross-cutting/multi-disciplinary approaches. The activity should foresee, amongst other, the organisation of dedicated workshops with the relevant key players both at national and European level (with specific reference to ESFRI and the e-IRG) for validation of the findings and recommendations.
- Support the development of a comprehensive database on research infrastructures of pan-European relevance in Europe, targeted at policy-makers. A sustainable funding model should be presented in the proposal for ensuring the availability and accessibility of this database beyond the EU grant. 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

[32] Further information on the Open Research Data Pilot is made available on the Participant Portal.

[33] COM (2012) 392 final

proposers should develop and update a portal where detailed information on the research infrastructures will be made available. The proposal should build on the experience gained in the Seventh Framework Programme MERIL (Mapping of European Research Infrastructure Landscape) project.

- Develop a model describing the socio-economic leverage of Research Infrastructures in terms of impact of the financial investment for the different types of Infrastructures. The model should be applicable in a broad range of scientific domains. Major key international players should be involved. The model should support national budget planning exercises for research.
- Support the active participation of ESFRI projects and relevant Integrating Activities in the Research Data Alliance (RDA) initiatives and strategic working group activities.

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 practices between the national and/or regional policies and programmes;
- Enhance partnerships between policy makers, funding bodies, academia and industry and promote the development of appropriate monitoring tools for decision making;
- Contribute to the emergence of sustainable approaches for the provision of cross-disciplinary research services;
- 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.
- Engage research infrastructures in defining the best practices and standards for the exchange and interoperability of the data they produce or collect.

A balanced coverage of the various areas is expected as outcome of this topic. The Commission considers that proposals requesting a contribution from the EU of up to EUR 1.5 million for the first three areas and up to EUR 1 million for the latter one would allow this topic to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Type of action: Coordination and support actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

INFRASUPP-2-2017 – International cooperation for research infrastructures

Specific challenge:

Following the communication of the Commission on International Cooperation in Research and Innovation (COM(2012)497), international cooperation for research infrastructures is needed with a number of key third countries/regions seen as strategic for the development, exploitation and management of world-class research infrastructures necessary to address research challenges with a global dimension.

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.

Proposals will address one of the following areas:

- Conduct an International landscaping exercise for Research Infrastructures to support the EU strategy of International cooperation in this field. Such exercise should build on the ESFRI landscaping exercise. The proposals should demonstrate the added value of the pan European investments in terms of establishing, as appropriate, complementarities to non-European initiatives and should link, as appropriate, to the relevant European and International bodies (i.e. ESFRI, GSO, OECD/GSF).
- Support to trans-disciplinary 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), taking also into account the recommendations deriving from the structured dialogues that have been set up between the EU and Africa such as the High Level Policy Dialogue (HLPD) that has initially focused on food and nutrition security and sustainable agriculture. Proposals should allow to further landscape the research infrastructure dimension in Africa and identify domains in which cooperation between research infrastructures would be beneficial to consequently developing roadmaps for cooperation. The proposals 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 pursuing international agreements on the reciprocal use, openness or co-financing of infrastructures;

  Appropriate involvement of African participants is encouraged and will be taken into account during evaluation.
- Support the cooperation between the EU and international strategic partners for the development of global research infrastructures and, or an enhancement of the current interaction among Research Infrastructures in the global arena. The proposals should build on the requirements deriving from existing policy dialogues such as the Group of Senior Officials (GSO), involve the appropriate high-level policy makers and improve the global outreach of European Research Infrastructures.
- Support the training needs of the Synchrotron light for Experimental Science and Applications (SESAME) facility located in Jordan and the staff exchange with other European light source infrastructures to ensure its optimal use by the research community for world-class research.

A balanced coverage of the various areas is expected as outcome of this topic. The Commission considers that proposals requesting a contribution from the EU of up to EUR 1.5 million for the first three areas and up to EUR 2 million for the latter one would allow this topic to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

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 capacity building and research infrastructures human capital development in targeted/relevant regions.

Type of action: Coordination and support actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

INFRASUPP-3-2016/17: Support to policies and international cooperation for e-infrastructures

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

Scope:

Support will be provided to the following activities:

International Co-operation on e-infrastructure[34] which includes two actions: (a) international co-operation on high-end e-infrastructure requirements in the context of the European participation in the construction of the forthcoming Square Kilometre Array (SKA) radio telescope and (b) international co-operation on e-infrastructure supporting major societal challenges.

Policy support to e-infrastructure programme: The success of the actions supported by the work programme depend on the identification and exploitation of synergies between the funded initiatives in order to ensure common aims are being pursued and supported by sustainable investments. It is important to monitor the impacts to optimise efforts and resources and it is necessary to progress towards common transparent monitoring of the e-infrastructure services and associated costs. The definition of a high quality catalogue of services and of qualitative and quantitative performance indicators (Key Performance Indicators, KPI) remains a challenge for operators, users and funders of e-infrastructures. Future e-infrastructure needs and requirements need to be analysed supported by a reliable time series of KPI.

European support to the Research Data Alliance, RDA: Research/Science funders have a common problem when tackling the area of research data infrastructures. The landscape is geographically fragmented and different disciplines have very different practices. It is very

[34] According to the conditions set in H2020 for International cooperation.

difficult to build critical mass and provide common services to different scientific disciplines and take advantage from economies of scale. Some scientific communities are pushing the envelope and adopting new technologies and others are lagging behind. Scientists are, at the end of the day, the generators and users of research data in their experiments, simulations, visualization of complex data arrays, etc. The Research Data Alliance is a useful initiative bringing together competences from different scientific fields and also the competences of technology and services providers in order to make use of the opportunities offered by new information and communication technologies. Interoperable data infrastructures will allow researchers and practitioners from different disciplines to find access and process the data they need in a timely manner. They can collaborate across different domains of science and engineering. The innovative power of industry and enterprise will be leveraged by clear and efficient arrangements for exchange of data between private and public sectors.

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

(a) International Co-operation on high-end e-infrastructure requirements

Proposals will address all points below:

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

Proposals bringing together key international partners shall address the following aspects:

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

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

A maximum of EUR 3 million from the topic indicative budget is foreseen for this activity. It is expected that one proposal will be selected.

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

Proposals will address part (b1) or (b2) or (b3):

(b1) International Co-operation on e-infrastructure supporting major societal challenges

International cooperation involving different third countries, to facilitate the development of globally interoperable e-infrastructures ensuring their global reach, innovation, skill development and sharing of lessons learned. Co-operation with third countries on interoperability of e-infrastructures for networking, computing and data in order to support

joint-efforts on one or more major societal challenges (e.g.: health, agriculture, education/skills, etc.). Innovation and spin-off of technology for developing and developed countries and emerging economies to establish a platform for sharing information and best practices on e-infrastructure development, deployment and operation.

Proposals should address all the following aspects:

- Define one or more key societal challenge that has significant potential of maximising benefit of e-infrastructure across developing, developed and emerging economies,
- Organise a platform for sharing information and best practices,
- Identify and explore spin-off and innovation, in particular with the co-operation of developing and developed countries.

A maximum of EUR 1 million from the topic indicative budget is foreseen for this activity. It is expected that one proposal will be selected.

(b2) Policy support to e-infrastructure programme

Proposals will address only one of the points below:

(1) Support the e-IRG[35] secretariat. The activities shall include the collection and aggregation of relevant policy information with impact on the development of EC-funded e-infrastructures, including KPIs and cost-related information, in coordination with the funded e-infrastructure initiatives and made available in open formats for reuse. The collected information shall enable the e-IRG with the support of independent expert panels to provide strategic advice on the evolution of the European e-infrastructures landscape and associated costs.

A maximum of EUR 1 million from the topic indicative budget is foreseen for this activity. It is expected that one proposal will be selected.

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

A maximum of EUR 1.5 million from the topic indicative budget is foreseen for this activity.

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

A maximum of EUR 1 million from the topic indicative budget is foreseen for this activity. The Commission considers that proposals requesting an EC contribution of between EUR 300 and 400 thousand would allow this activity to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

[35] e-Infrastructure Reflection Group

(b3) European support to the Research Data Alliance, RDA *(proposals will address all points below):*

Proposals are expected to support the development of global interoperable research data infrastructures that will greatly benefit the coordination at European level. The objective is (a) support to the RDA secretariat for logistics, open access to RDA reference documents and dissemination activities (b) support the emergence of building blocks of an open, interoperable data infrastructure fostering interoperability across regions, organisations and scientific disciplines (c) support new communities to engage in Open Science and data sharing principles. In particular, the proposal activities should provide financial support of the organisation and coordination of European stakeholders' active participation and contribution to the Research Data Alliance[36].

A maximum of EUR 2.5 million from the topic indicative budget is foreseen for this activity. It is expected that one proposal will be selected.

Expected impact

(a) International Co-operation on high-end e-infrastructure requirements: The impact of successful proposals will lead to the improvement of co-operation on e-infrastructures with European partners that are joining efforts in major research infrastructure undertakings. It will help the identification of benefits of joint technology development, standardisation and sharing risks.

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

(b1) International Co-operation on e-infrastructure supporting major societal challenges: will exploit the potential for further economic and educational co-operation between Europe and third countries. It will also improve the identification of areas for further co-operation on scientific development and innovation. The actions will provide mechanisms to assess measurable benefits of co-operation on major societal challenges in the developing countries.

(b2) Policy support to e-infrastructure programme: Support actions provide solid ground for future choices for a comprehensive European Research Infrastructure and especially e-infrastructure policy and enable decision making and deployment of e-infrastructures. Successful collaboration between all projects under the H2020 e-infrastructure funding brings together all key stakeholders, and enables finding further synergies towards a harmonised European e-infrastructure approach.

(b3) European support to the Research Data Alliance, RDA: 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.

[36] In line with the conditions set out in Part K of the General Annexes.

Type of action:

a. Research and innovation actions

b. Coordination and Support Action (CSA)

CONDITIONS FOR THIS CALL

Opening date(s)[37]: 10/12/2015 for INFRASUPP-1-2016 and INFRASUPP-3-2016/17 (b)
01/12/2016 for INFRASUPP-2-2017 and INFRASUPP-3-2016/17 (a)

Deadline(s)[38]:

INFRASUPP-1-2016	30/03/2016 at 17.00.00 Brussels time
INFRASUPP-2-2017	29/03/2017 at 17.00.00 Brussels time
INFRASUPP-3-2016/17 (a)	29/03/2017 at 17.00.00 Brussels time
INFRASUPP-3-2016/17 (b)	30/03/2016 at 17.00.00 Brussels time

Overall indicative budget: EUR 12.50 million from the 2016 budget and EUR9.50 million from the 2017 budget[39]

	2016 EUR million	2017 EUR million	
INFRASUPP-1-2016	5.50		Single stage
INFRASUPP-2-2017		6.50	Single stage
INFRASUPP-3-2016/17 (a)		3.00	Single stage
INFRASUPP-3-2016/17 (b)	7.00		Single stage

Eligibility and admissibility conditions: The conditions are described in parts B and C of the General Annexes to the work programme.

Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in part H of the General Annexes to the work programme.

Evaluation procedure: The procedure for setting a priority order for proposals with the same score is given in part H of the General Annexes. The full evaluation procedure is described in the relevant guide[40] published on the Participant Portal.

- Indicative timetable for evaluation and grant agreement:

	Information on the outcome of	Indicative date for the signing of

[37] The Director-General responsible may decide to open the call up to one month prior to or after the envisaged date of opening.

[38] The Director-General responsible may delay this deadline by up to two months.

[39] --

[40] See: http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/pse/h2020-guide-pse_en.pdf.

	the evaluation (*single stage*)	grant agreements
All topics	Maximum 5 months from the final date for submission.	Maximum 8 months from the final date for submission.

Consortium agreements: In line with the Rules for Participation and the Model Grant Agreement, participants in an action are required to conclude a consortium agreement prior to grant agreement.

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Other actions[41]

Presidency event: Launch of the 2016 ESFRI Roadmap

The Research Infrastructure action would support in the first semester of 2016 the ESFRI Roadmap launch event organised under the Dutch Presidency.

The beneficiary of the grant will be the Koninklijke Nederlandse Akademie van Wetenschappen – KNAW, Kloveniersburgwal, 29 Het Trippenhuis, Amsterdam, Netherlands.

Type of action: Grant to identified beneficiaries - Coordination and support action

Evaluation and rate of co-financing: The standard evaluation criteria, thresholds and weighting for award criteria for this type of action are provided in parts D and H of the General Annexes. The maximum possible rate of co-financing is 75% of the total eligible costs.

Indicative time to grant: First quarter of 2016

Indicative budget: **EUR 0.10 million from the 2016 budget**

External expertise

This action will support:

- The use of appointed independent experts for the monitoring of running projects.
- The use of appointed independent experts for the interim evaluation of the Research Infrastructures Part of Horizon 2020.
- The use of independent experts to advise on the design and implementation of EU research policy and for the assessment of ERIC applications, as required under the ERIC Regulation[42]. A special allowance of EUR 450/day will be paid to the experts appointed in their personal capacity who act independently and in the public interest.

Type of action: Expert contracts

Indicative budget: **EUR 0.6 million from the 2016 budget and EUR 0.6 million from the 2017 budget**

GÉANT Partnership projects[43]

Within the GÉANT Framework Partnership Agreement (FPA) awarded under topic EINFRA-8-2014 of the call e-Infrastructures, the selected consortium will be invited to submit proposals for three Specific Grant Agreements (SGA) addressing objectives defined in the Framework Partnership Agreement (FPA) and action plan. The proposals will be evaluated according to the criteria established in the invitation from the Commission, complying with the Horizon 2020 general requirements of evaluation and selection procedures.

Proposals will address actions (a) or (b) or (c):

41 ---.

42 Council Regulation (EC) No 723/2009 of 25 June 2009 on the Community Legal Framework for a European Research Infrastructure Consortium.

43 Awarding of specific grants in a FPA will follow the rules and procedures established in the Financial Regulation

(a) Research and Education Networking – GÉANT

Effectively support data and computing-intensive collaborative research and education anywhere in Europe and beyond, through reliable networking services and operational excellence. Supply dependable, secure around the clock, high-speed internet access to research and education communities, enhancing the quality of service improving geographical coverage and support cooperation of emergency response teams at European level. Deploy short and medium-term investments to extend geographic network coverage and prepare capacity to integrate new services to be included in the mainstream service bouquet of future generations of the infrastructure. Deploying the 100 Gbits/s technology across Europe and improving peering; decisions for investing in new networking services should be based on a clear business case and commitment by National Research and Education Networks.

Specific Conditions

The operation of e-infrastructure services will be funded by supporting virtual access activities provided to researchers. Those service activities shall comply with the conditions set out in Article 16.2 for virtual access to research infrastructures of the model grant agreement. Capital investments (i.e. costs of renting, leasing, purchasing depreciable equipment, infrastructure or other assets) will be eligible costs for this specific partnership project.

Only platforms and services based on systems and technologies that have achieved TRL 9 before the start of the project will be supported.

The services offered under a project must be adequately documented in an open catalogue of services and shall be periodically assessed by an external board approved by the Commission and common to all EC funded e-infrastructure services.

The project funded under this point will conclude written collaboration agreements with all projects funded under theme 1 "*Integration and consolidation of e-infrastructure platforms supporting European policies and research and education communities*". The main purpose of these collaboration agreements is, inter-alia, to work on potential synergies, overlaps and gaps in the overall service offering.

(b) Networking infrastructure: platform innovation

Enhance future generations of GÉANT platform by prototyping network components, modules, services and applications accessing wired/wireless infrastructures and networked resources. In particular these should to respond to the needs of extreme-scale systems (e.g. requiring massive data transfer capacity). They should develop further and test network resilience, trust and security in scenarios pushing network performance to the limits. Prototype and customise network services to manage the movement of large data files (i.e., PetaByte, ExaByte) between data sources and computing sites. Develop operator and user interfaces for easy deployment, customisation and test of new networking services. Analyse legal, economic, policy evolution scenarios related with use of open network architectures.

Specific Conditions

Only platforms and services based on systems and technologies that have achieved at least TRL 6 before the start of the project will be supported and it is expected that they will have achieved TRL 9 by the end of the project.

(c) Trans-Atlantic submarine cable

Improve the global footprint of the European research and education high-speed network through co-funding of bandwidth in a submarine cable to enrich GEANT backbone infrastructure. It will connect Europe with South America offering collaboration opportunities to European research and innovation communities.

A budget of EUR 5 million from the total indicative budget is foreseen for point (c).

Further conditions and requirements that applicants should fulfil when drafting a proposal under (a), (b) or (c), are given in part D of the section "Specific features for Research Infrastructures". Compliance with these provisions will be taken into account during evaluation.

Expected impact:

(a) Research and Education Networking – GÉANT: The investment at the European level in GÉANT is expected to: maximise the value of innovation in a cooperative, open and multi-domain eco-system; the cooperation at European and global levels will minimise the risk of divergent, redundant, overlapping and incompatible investments on the whole REN chain; it will stimulate advancement of the combined REN infrastructures to tackle cross-border links. The GÉANT network is an essential resource to address the digital divide in Europe through a common cost sharing model effectively enabling equal access to IT resources in Europe. It will create economies of scale in procuring/brokering access to cross-border resources at European level and to optimise costs of cross-border links. GÉANT will continue to contribute to the effective European research enterprise making Europe the best connected region in the world.

(b) Networking infrastructure: platform innovation: The above objectives ensure GÉANT's excellent barer infrastructure in support of coherent, scalable, integrated, secure and reliable networking service; keeping it based on open and flexible architecture that made the Internet such a powerful societal game changer. It is the basis of an open eco-system of innovative usages of e-infrastructures services ensuring a smooth collaboration among e-infrastructures as well as with global scientific communities.

(c) Trans-Atlantic submarine cable: This action will directly support inter-continental research and education collaborations with long term low cost view, and will have extended socio-economic impacts for Europe notably in improving the connectivity of the major European internet exchanges and European data-based services, helping addressing emerging markets in Latin America, Africa and East Asia.

Type of action: Research and innovation actions funded through a specific grant agreements under the GÉANT Framework Partnership Agreement.

Indicative timetable: First quarter of 2016

Indicative budget: 64M€

Interactive Computing e-infrastructure for the Human Brain Project FET Flagship (FPA)[44] [45]

Within the Human Brain Project (HBP) Framework Partnership Agreement (FPA) awarded under topic FETFLAG 1 - 2014 of the Call FET Flagships, the selected consortium will be invited to submit a proposal for a Specific Grant Agreement (SGA) that will define and deliver the interactive computing e-infrastructure for brain simulation activities, as indicated in the HBP FPA[46].

Specific challenges: Availability of the interactive computing capacity that the HBP Flagship needs in the context of its large brain simulations.

Scope: The proposal will support the Action Plan of the FPA by making available a computing and memory system with an expected peak performance of at least 50 PetaFlop/s and 20 PetaByte of memory footprint as required for HBP simulations and for an indicative period of five years. The components of the targeted system addressing interactive visualization and steering of large-scale brain simulations and their scalable integration are expected to comply with the capabilities and features defined during the Pre-Commercial Procurement (PCP) of technology readiness demonstration that was launched in the ramp-up phase of the HBP Flagship.

The specifications of the targeted system should also take into account progress in technology and the needs from other scientific communities having similar requirements for data integration (e.g. climate change, geophysics, earth systems, agriculture/meteorology, energy, medicine, etc.) or for close visual monitoring and steering of simulations (e.g. large-scale numerical flow, turbulence, car crash, complete aircraft, evacuation and mass event security, etc.).

The proposal should detail the acquisition process from elicitation of system requirements to system validation and acceptance. It should also explain how potential system suppliers will be consulted, how capacity will be made available to users as well as the financial plan to cover the total cost of ownership.

The proposal should also describe the coordination with the other HBP computing and data storage facilities and the transition from the ramp-up phase main simulations system.

In order to fulfil the HBP mission a programmatic access to 25% of this e-infrastructure capacity must be reserved for the HBP research activities. In addition the related resource allocation model should be explained and include a peer-review process.

The proposal should explain how the novel features and capabilities of this infrastructure will also be made available to the Pan-European High Performance Computing (HPC) Tier-0 infrastructure and services (see EINFRA-1.1-2016/17), by guaranteeing at least another 15% of this new capacity to European researchers at large.

Expected impact: This action will contribute to the targeted impacts defined in the action plan of the HBP FPA. It will also contribute to diversify the available leading-class HPC

[44] This action is related with the objective to address e-Infrastructure pilots responding to community specific challenges, bringing a user-driven e-infrastructure innovation perspective.

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

[46] This action allows for the provision of financial support to third parties in line with the conditions set out in the part K of the General Annex

capabilities in the Tier-0 Pan-European HPC infrastructure, and to the adoption and use in Europe of the most advanced HPC technology.

Type of action: Research and innovation action funded through a specific grant agreement under the Human Brain Project (HBP) Framework Partnership Agreement.

Indicative timetable: First quarter of 2017

Indicative budget: 25M€

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Budget

	2016 Budget EUR million[47]	2017[48] Budget EUR million
Calls		
Other Actions		
Estimated total budget		
Contribution to horizontal activities (08.020500)		
Estimated total budget for the horizontal activities		

Estimated total budget including horizontal activities		

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[47] The budget figures given in this table are rounded to two decimal places.

[48] ----

Specific features for Research Infrastructures

This section provides, for different types of projects supported under the Research Infrastructures calls for proposals, further conditions and requirements that applicants should fulfil when drafting a proposal. The compliance to these provisions will be taken into account during evaluation. Information on synergies with the European Structural and Investment Funds (ESIF) is also provided below.

The European Structural and Investment Funds will invest up to EUR 90 billion in innovation and research in the period 2014-2020, including into the development of research and innovation capacities and infrastructures. Therefore, Article 20 of the Horizon 2020 Regulation and Article 37 of the Rules for Participation encourage synergies between Horizon 2020 and other European Union funds, such as European Structural and Investment Funds.

Synergies do not mean to replace national or private funding by ESIF or to combine them for the same cost item in a project. Synergies mean to expand the scope and impact of both funds in terms of scientific excellence and place-based socio-economic development respectively. Examples could be the development and equipment of innovation infrastructures or the fostering of innovation skills through ESIF that enable the participation in a Horizon 2020 project. ESIF can also be used to expand the support and advisory services for potential Horizon 2020 participants. ESIF can also help deploying innovative solutions stemming from Horizon 2020, e.g. through public procurement in the fields of environment, transport, health and energy.

Applicants are therefore invited to identify the smart specialisation fields of their EU Member State or region[49] and explore potential for synergies with the relevant Managing Authorities in charge of the ESI Funds in their territory[50].

A. Preparatory phase proposals

Preparatory phase proposals should cover one or more of the following activities:

- Legal work, i.e. (1) for the setting-up, construction and operation of the research infrastructure; and (2) for drafting an agreement between committed countries, in the form of a 'signature-ready' document for the setting-up and the actual implementation.
- Management and logistical work, i.e. (1) plans, in terms of construction (or major upgrade) and operation of the new research infrastructure; (2) planning (timing, resources) of staff recruitment to operate the new facility; (3) organisation of the logistic support for researchers, including informatics, etc.;
- Governance work, i.e. plans, in terms of decision-making, management structure, advisory body, IPRs, ethical issues, access rules for researchers, etc.;
- Financial work, i.e. (1) the financial arrangements for the construction, operation and decommission of the facility, using notably the complementarities between national and EU instruments (such as the European Structural and Investment Funds or the European Investment Bank); (2) studying new mechanisms, e.g. pre-commercial procurement

[49] see: http://s3platform.jrc.ec.europa.eu/eye-ris3

[50] see: http://ec.europa.eu/regional_policy/indexes/in_your_country_en.cfm). For more details on ESIF investments in research and innovation see: http://ec.europa.eu/regional_policy/activity/index_en.cfm

processes, by which public authorities may develop new approaches for financing innovative solutions;

- Strategic work, i.e. (1) analysis of the socio-economic impact of the new infrastructure; (2) plan to integrate harmoniously the new entity in the European fabric of related facilities in accordance with the objective of balanced territorial development; (3) to create or consolidate centres of excellence and/or 'regional partner facilities'; (4) the identification of the best possible site(s) to set up the new facility(-ies) and its next generations;
- Technical work, i.e. (1) final prototypes for key enabling technologies and implementation plans for transfer of knowledge from prototypes to the new facility; (2) technical work to ensure that the beneficiary research communities exploit the new facility from the start with the highest efficiency, including the introduction of new processes or software.

B. Individual support to ESFRI projects and other world class research infrastructures

Individual support to ESFRI projects and other world class research infrastructures should cover one or more of the activities listed below. If combined support with the European Structural and Investment Funds (ESIF) is foreseen for such infrastructure, the proposal should specify which activities will not be funded by Horizon 2020, but by ESIF (and by which Operational Programme of ESIF).

- organisation of the logistic support for researchers, definition of access policies for researchers and management of IPRs and ethical issues;
- integration of the new entity in the European landscape of related facilities, and in the local context;
- promotion of long-term sustainability, including e.g. the involvement of funders, enlargement of the membership, the preparation of business plans beyond the end of the grant, clear assessment of the costs for serving a user and for dealing with and making available the produced data;
- development of regional partner facilities (RPF) aiming at a more balanced development of the European Research Area. The supported activities should help the RPF to meet the same standards required for pan-European Research Infrastructures, in particular regarding the quality of services, management and open access policy;
- limited pilots of access provision to research communities following the rules specified for *integrating activities*, in order to test reliability and increase user trust;
- outreach;
- coordination with national or international related initiatives and support to the deployment of global and sustainable approaches in the field;
- mapping of infrastructures, users, investments, etc, in the specific field for supporting policy developments;
- activities to increase the potential for innovation, including social innovation, of the related infrastructure, such as networking with industries (including SMEs), facilitating their involvement as partners of the research infrastructures for technological developments, developing customised services for industry and SMEs, dissemination of research outcome and technology transfer.

C. Integrating Activities

An Integrating Activity shall cover three types of activities: Networking activities, Trans-national and/or virtual access activities, and Joint Research activities.

(i) **Networking activities**. To foster a culture of co-operation between the participants in the project, the scientific communities benefiting from the research infrastructures, industries and other stakeholders, and to help developing a more efficient and attractive European Research Area. Networking activities could include (non-exhaustive list):

- joint management of access provision and pooling of distributed resources;
- dissemination and /or exploitation of project results and knowledge, contribution to socio-economic impacts, promotion of innovation;
- reinforcing partnership with industry: outreach and dissemination activities, transfer of knowledge, activities to foster the use of research infrastructures by industrial researchers, involvement of industrial associations in consortia or in advisory bodies;
- strengthening of virtual research communities;
- definition of common standards, protocols and interoperability; benchmarking;
- development and maintenance of common databases for the purpose of networking and management of the users and infrastructures;
- activities to improve the efficiency of the research infrastructures' management and of their service provision;
- spreading of good practices, exchange of personnel and training of staff, consultancy;
- outreach and training courses to new users, with specific attention to increase participation of women to science;
- activities to attract young people to science careers;
- foresight studies for new instrumentation, methods, concepts and/or technologies;
- promotion of clustering and coordinated actions amongst related projects;
- coordination with national or international related initiatives and support to the deployment of global and sustainable approaches in the field;
- promotion of long-term sustainability, including the involvement of funders and the preparation of a business plan beyond the end of the project;
- definition of data management plans to organise the efficient curation, preservation and provision of access to data collected or produced under the project;
- relations with publishers for supporting data and sample deposition services;
- mapping of infrastructures, users, investments, etc, in the specific field for supporting policy developments.

(ii) **Trans-national and/or virtual access activities**.

Trans-national access activities

To provide 'free of charge' trans-national access to researchers or research teams including from industry to one or more infrastructures among those operated by participants. These access activities should be implemented in a coordinated way such as to improve the overall services available to the research community. Access may be made available to external users, either in person ('hands-on') or through the provision of remote scientific services, such as the provision of reference materials or samples, the performance of sample analysis or sample deposition.

The research infrastructures shall publicise widely the access offered under the grant agreement to ensure that researchers who might wish to have access to the infrastructure are made aware of the possibilities open to them. The research infrastructures shall promote equal opportunities in advertising the access and take into account the gender issues when defining

the support provided to visitors. They shall maintain appropriate documentation to support and justify the amount of access reported. This documentation shall include records of the names, nationalities, and home institutions of the users within the research teams, as well as the nature and quantity of access provided to them. To this extent a unit of access to the infrastructure shall be identified and precisely defined in the Grant Agreement.

The selection of researchers or research teams shall be carried out through an independent peer-review evaluation of their research projects. The research team, or its majority, must work in countries other than the country(ies) where the infrastructure is located (when the infrastructure is composed of several research facilities, operated by different legal entities, this condition shall apply to each facility) except in the case of a distributed set of resources or facilities offering remote access to the same services or when access is provided by an International organisation, the Joint Research Centre (JRC), an ERIC or similar legal entities. User teams where all or the majority of users works in third countries can be supported as far as the cumulative access provided to them is below 20% of the total amount of units of access provided under the grant. In exceptional and well justified cases a higher percentage of access to third-country user teams can be foreseen in the Grant Agreement. Only research teams, including industrial users, that are entitled to disseminate the knowledge they have generated under the project are eligible to benefit from research services to the infrastructure under the grant agreement. Exception to this condition is foreseen when users work for SMEs. The duration of stay at a research infrastructure shall normally be limited to three months, unless otherwise provided for in the Grant Agreement.

EU financial support to trans-national access will cover the *access costs*[51] incurred by the access provider for the provision of access to the selected researchers as well as the travel and subsistence incurred to support the visits to the infrastructure of these researchers.

The *access costs* charged to the grant will never include capital investments while they may cover the running costs of the infrastructure as well as the cost for the logistical, technological and scientific support to users' access, including costs for ad-hoc training needed by users to use the infrastructure and for preparatory and closing activities that may be necessary to carry out users' work on the infrastructure.

Virtual access activities

To provide virtual access to resources needed for research through communication networks without selecting or even identifying the researchers to whom access to resources is provided. Examples of virtual access activities are databases available via Internet, or data deposition services. Only virtual services widely used by the community of European researchers will be supported, therefore the services offered under a project shall be periodically assessed by an external board. In addition statistics on the access provided shall be given to the Commission. Virtual access activities will be supported through the reimbursement of the operating costs incurred by the infrastructure or installation for providing virtual access to resources over the duration of the project. EU financial support will never include capital investments while it may cover all the technological and scientific support needed by researchers to effectively use

[51] Access costs can be supported through the reimbursement of the eligible costs specifically incurred for providing access to the research teams selected for support under the project, or on the basis of unit costs calculated according to the methodology indicated in the Commission Decision C(2013)8199. In the latter case the access costs will be calculated multiplying the unit cost by the quantity of access provided under the grant. The cost of the unit of access to the infrastructure, the unit cost, shall then be indicated in the proposal. A combination of the two methods mentioned above will also be possible.

the service. Only eligible costs that can be clearly attributed to the provision of access can be reimbursed.

(iii) **Joint Research activities**. These activities should be innovative and explore new fundamental technologies or techniques underpinning the efficient and joint use of the participating research infrastructures. They should involve, whenever appropriate, industries and SMEs to promote innovation and knowledge sharing through co-creation of needed technical solutions. In order to improve, in quality and/or quantity, the services provided by the infrastructures, the joint research activities could address (non-exhaustive list):

- higher performance methodologies and protocols, higher performance instrumentation, including the testing of components, subsystems, materials, techniques and dedicated software;
- integration of installations and infrastructures into virtual facilities;
- innovative solutions for data or sample collection, management, curation annotation, and deposition;
- innovative software solutions for making new user communities benefit from computing services.

D. Guidance on submission of proposals to e-infrastructures topics

The following conditions shall be met by proposals for research e-infrastructures:

Proposals should consider existing operational services to the greatest extent possible (such as authorisation and authentication systems, service registry, etc.) to use or extend them with new applications and functionalities. Furthermore, all services developed by projects should be made discoverable on-line, e.g. by including them in searchable catalogues or registries of (digital) research services with the metadata for describing and accessing the service.

All software developed under e-infrastructures should be open source with appropriate licenses, unless it can be well justified that it should be otherwise.

All proposals are requested to suggest clear metrics (key performance indicators) for monitoring their results and impact.

A detailed list of activities, structured as *networking activities*, *service activities and Joint Research activities* may be supported in proposals in the e-infrastructure part of the work programme.

While proposals in theme 1 "*Integration and consolidation of e-infrastructure platforms supporting European policies and research and education communities*" shall put their main focus on *service activities* and *networking activities*, proposals in theme 2 "*Prototyping innovative e-infrastructure platforms and services for research and education communities, industry and the citizens at large*" can combine any of the three activity types as appropriate to an effective work plan.

(**i) Networking activities (NA);** foster a culture of co-operation between the participants in the project (service providers, users and other relevant stakeholders) and with complementary and other related projects. Through NA, scientific communities and e-infrastructure operators are empowered to benefit from e-infrastructure services, industrial partnerships and

cooperation with relevant stakeholders. NAs help developing a more efficient and attractive European Research Area.

Networking activities could include (non-exhaustive list):

- joint management of service provision and pooling of distributed resources;
- dissemination and/or exploitation of project results and knowledge, contribution to socio-economic impacts, promotion of innovation;
- reinforcing partnership with industry: outreach and dissemination activities, transfer of knowledge, activities to foster the use of e-infrastructures by industrial researchers, involvement of industrial associations in consortia or in advisory bodies;
- strengthening of virtual research communities;
- definition of common standards, protocols and interoperability; benchmarking;
- development and maintenance of common databases for the purpose of networking and management of the users and e-infrastructures;
- activities to improve the efficiency of the e-infrastructures' management and of their service provision;
- spreading of good practices, consultancy and training courses to new users;
- exchange of personnel and training of staff;
- foresight studies for new instrumentation, methods, concepts and/or technologies;
- promotion of clustering and coordinated actions amongst related projects;
- coordination with national or international related initiatives and support to the deployment of global and sustainable approaches in the field;
- promotion of long term sustainability, including the involvement of funders and the preparation of a business plan beyond the end of the project;
- definition of data management plans to organise the efficient curation, preservation and provision of access to data collected or produced under the project;
- relations with publishers for supporting data deposition services;
- mapping of e-infrastructures, users, investments, etc, in the specific field for supporting policy developments.

(**ii) Service activities (SA):** are at the core of the e-infrastructure development and operation. They provide e-infrastructure related services based on TRL 9 systems and technologies to the scientific community. Proposals addressing theme 1 "*Integration and consolidation of e-infrastructure platforms supporting European policies and research and education communities*" need to comply with the conditions set out in the model grant agreement on trans-national and/or virtual access activities and must provide an adequate description of the services provided in the form of a catalogue of services.

Activities may include (non-exhaustive list):

- procurement and upgrading communication infrastructure, network operation and end-to-end services;
- computer infrastructure support, operation and management; integration, test and certification; services deployed on top of generic communication and computing

infrastructures to build and serve virtual communities in the various scientific domains;

- deployment, quality assurance and support of middleware component repositories;
- data and resources management (including secure shared access, global scheduling, user and application support services) to foster the effective use of distributed supercomputing facilities; federated and interoperable services to facilitate the deployment and wide use of digital repositories of scientific information;
- vertical integration of the different services in support of specific virtual research communities, including virtual laboratories for simulation and specific workspaces.

(iii) Joint Research Activities (JRA): are innovative activities to explore new fundamental technologies or techniques, which have already reached at least TRL 6 and have the potential to underpin the efficient and joint use, co-design and provision of e-infrastructure services. JRA activities shall aim to develop platforms and services based on TRL 9 systems and technologies. They should involve, whenever appropriate, industries and SMEs to promote innovation. In order to improve, in quality and/or quantity, the services provided by the e-infrastructures, the joint research activities could address (non-exhaustive list):

- higher performance methodologies and protocols, higher performance instrumentation, including the testing of components, subsystems, materials, techniques and dedicated software;
- integration of installations and infrastructures into virtual facilities;
- innovative solutions for data collection, management, curation and annotation;
- innovative solutions for communication network (increasing performance, improving management, exploiting new transmissions and digital technologies, deploying higher degrees of security and trust) and introduction of new end-to-end services (including dynamic allocation of resources and innovative accounting management);
- novel computer architecture frameworks and policies, innovative computer technologies, or new middleware solutions driving the emergence of high level interoperable services;
- advanced Service Level Agreements and innovative licensing schemes, fostering the adoption of e-infrastructures and the use of other types of research infrastructures by industry;
- innovative software solutions for making new user communities benefit from computing services.

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