



# APPEC'S GUIDE TO HORIZON2020



04/11/13

CONFIDENTIAL

Based on the current information, this is a summary of the opportunities that could be presented to the Astroparticle Physics community in Horizon2020.

The European Astroparticle Physics (APP) community has been greatly successful in getting funded in the context of FP7, the previous EU Framework Programme. This EU funding has greatly contributed in the quality of scientific results obtained in the last decades. It is therefore of the utmost importance for the future of the field, that this good funding track record is continued. In this spirit, APPEC is taking a **proactive role** in supporting the community in their efforts to take advantage of the opportunities in Horizon2020.

Specifically, APPEC produced this document, "**APPEC's guide to Horizon2020**", whose aim is to inform as much as possible *in advance* the community on the details of the funding landscape of Horizon2020.

Based on the information below, the following remarks can be made:

- The APP community stands to profit the most from Pillar 1 – Excellent Science.
  - Focus should be put in applying for **Marie Skłodowska Curie Actions (MSCA)** and **European Research Council (ERC) fellowships**. These account for **25%** of Horizon2020 funding (17,55 B euros).
  - **Research Infrastructures** grants should also be a great focus of the community (3,23% of the Horizon2020 budget, i.e. 2,27 B euros).
- The APP community **should NOT ignore opportunities that can be presented in the other two pillars, since Pillar 1 is less than a third of Horizon2020**.
  - A number of calls have been selected that could be of interest to the community, with the aim of demonstrating that opportunities do exist in the other two pillars.
  - Applying for calls in the other two Pillars will require **enhanced efforts in networking with industry** (in the case of Pillar 2) and with **scientists from other disciplines** (in the case of Pillar 3). In the context of ASPERA a number of workshops were organised in order to help the community in its networking efforts (e.g. three ASPERA Technology Fora for networking with industry and three multidisciplinary workshops for networking with other disciplines). APPEC will continue the legacy of these extremely successful workshops.
  - The following topics of great interest to the APP community could be mapped to the **Future and Emerging Technologies (FET, Pillar 1)** and **Leadership in Enabling and Industrial Technologies (LEIT, Pillar 2)** calls: e.g.
    - Sensor networks in hostile environments
    - Low radioactivity tracing
    - Photonics: Photodetectors (large area, small pixels) // Extreme photonics (lasers/mirrors)
    - Cryogenic detectors (MKIDs, TES)
    - Materials of extreme radiopurity
    - Space
- A large part of the Horizon2020 will be dedicated to **ICT**. In the context of ASPERA the computing APP community worked on clarifying the computing needs of the field. These efforts need to be intensified and support may come from these ICT calls. In addition, there are many calls that collaboration with CERN and eventually astrophysics (e.g. ASTRONET) will lead to joint proposals beneficial for all.

- The APP field is very strong on **global cooperation**, which is a transversal theme of Horizon2020. Taking therefore advantage of this key aspect of the field to apply in calls related to global cooperation is thus extremely important.

In this proactive role, APPEC is also organising a workshop to inform the community in more detail on the Horizon2020 opportunities. The event will take place on the **4<sup>th</sup> and 5<sup>th</sup> of November in DESY-Zeuthen, Berlin** and its structure will be as follows.

- 4<sup>th</sup> of November: short talks by representatives of the funding agencies in Brussels, who will then be available to answer any questions that the participants might have.
- 5<sup>th</sup> of November: in the morning the participants will be divided into interest-themed groups for parallel sessions. In the afternoon, the rapporteurs of these groups will present their plans and needs to the APPEC funding agencies.

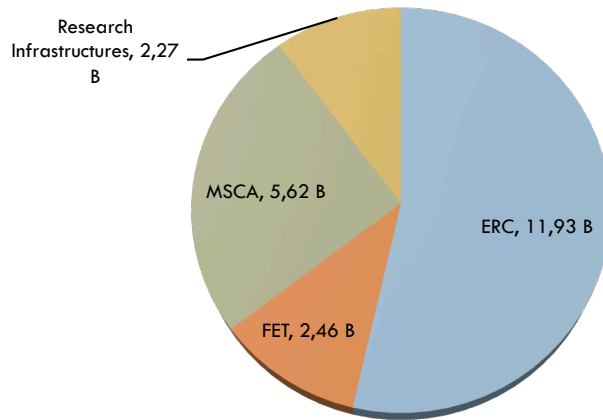
**It is strongly recommended that numerous members of the community will attend this workshop, whose aim is to give the participants a clear idea on the funding landscape for Astroparticle Physicists in the next two years, but also for the funding agencies to understand what will be the plans of the different parts of the community so that they can support them in these efforts.**

To register please visit the workshop's website: <https://indico.desy.de/conferenceDisplay.py?confId=7970>.

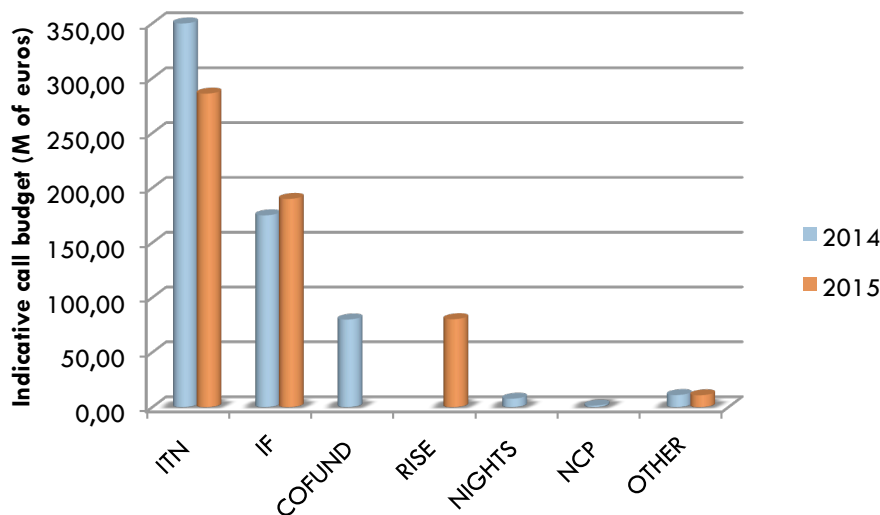
## TABLE OF CONTENTS

<b>PILLAR 1: EXCELLENT SCIENCE (22,27 B)</b>	<b>4</b>
1.1. MARIE SKŁODOWSKA CURIE ACTIONS (MSCA)	4
1.1.1. INNOVATION TRAINING NETWORKS (ITN) – 2014, 2015	4
1.1.2. INDIVIDUAL FELLOWSHIPS (IF) – 2014, 2015	5
1.1.3. CO-FUNDING OF REGIONAL, NATIONAL&INTERNATIONAL PROGRAMMES (COFUND)- 2014	6
1.1.4. RESEARCH AND INNOVATION STAFF EXCHANGE (RISE) 2015	7
1.2. FRONTIER RESEARCH (EUROPEAN RESEARCH COUNCIL)	8
1.3. RESEARCH INFRASTRUCTURES (RI)	9
1.3.1. DEVELOPING NEW WORLD-CLASS RESEARCH INFRASTRUCTURES	9
1.3.2. INTERGRATING AND OPENING RESEARCH INFRASTRUCTURES OF PAN-EUROPEAN INTEREST	16
1.3.3. E-INFRASTRUCTURES	21
1.3.4. SUPPORT TO INNOVATION, HUMAN RESOURCES, POLICY AND INTERNATIONAL COOPERATION	32
1.4. FUTURE AND EMERGING TECHNOLOGIES (FET)	38
1.4.1. FET-OPEN - FOSTERING NOVEL IDEAS	39
1.4.2. FET-PROACTIVE - NURTURING EMERGING THEMES AND COMMUNITIES (FETPROACT)	41
1.4.3. FET-Proactive - towards exascale high performance computing (FETHPC)	45
1.4.4. FET-FLAGSHIPS -TACKLING GRAND INTERDISCIPLINARY SCIENCE&TECHNOLOGY CHALLENGES	48
<b>PILLAR 2: INDUSTRIAL LEADERSHIP (15,51 B)</b>	<b>49</b>
2.1. LEADERSHIP IN ENABLING AND INDUSTRIAL TECHNOLOGIES (LEIT)	49
2.1.1. ICT	49
2.1.2. SPACE	56
2.1.3. NMP	69
2.1.4. BIOTECHNOLOGY	71
2.2. ACCESS TO RISK FINANCE	72
2.3. INNOVATION IN SMALL AND MEDIUM-SIZED ENTERPRISES (SMES)	73
<b>PILLAR 3: SOCIETAL CHALLENGES (27,05 B)</b>	<b>73</b>
3.1. HEALTH	74
3.1.1. CALL FOR PERSONALISING HEALTH AND CARE	74
3.1.2. CALL – CO-ORDINATION ACTIVITIES	76
3.2. FOOD SECURITY, SUSTAINABLE AGRICULTURE, MARINE AND MARITIME RESEARCH AND THE BIO-ECONOMY	77
3.2.1. SUSTAINABLE AND COMPETITIVE AGRI-FOOD SECTOR FOR A SAFE AND HEALTHY DIET (LOW)	77
3.2.2. UNLOCKING THE POTENTIAL OF AQUATIC LIVING RESOURCES (MEDIUM)	77
3.2.3. FOCUS AREA “BLUE GROWTH” (HIGH)	77
3.3. ENERGY	81
3.3.1. FOCUS AREA: COMPETITIVE LOW-CARBON ENERGY (HIGH)	81
3.4. TRANSPORT	81
3.4.1. CALL ‘BLUE GROWTH’ (TRANSPORT CHALLENGE CONTRIBUTION) (HIGH)	82
3.5. CLIMATE ACTION, RESOURCE EFFICIENCY AND RAW MATERIALS	83
3.5.1. A.1 CALL – WASTE: A RESOURCE TO RECYCLE, REUSE AND RECOVER RAW MATERIALS	83
3.5.2. A.2 CALL – WATER INNOVATION: BOOSTING ITS VALUE FOR EUROPE	83
3.5.3. A.3 CALL – CLIMATE ACTION, RESOURCE EFFICIENCY AND RAW MATERIALS	85
3.6. INCLUSIVE, INNOVATIVE AND REFLECTIVE SOCIETIES	87
3.6.1. CALL 8 – ACHIEVING IU AND ERA: 46,5 M - 2014/2015 BUDGET (HIGH)	87
3.6.2. CALL 11 – COOPERATION WITH THIRD COUNTRIES: 60M 2014/2015 BUDGET (HIGH)	89
3.7. SECURE SOCIETIES CHALLENGE	92

## PILLAR 1: EXCELLENT SCIENCE (22,27 B)



### 1.1. MARIE SKŁODOWSKA CURIE ACTIONS (MSCA)



#### 1.1.1. INNOVATION TRAINING NETWORKS (ITN) – 2014, 2015

**What?** Support for joint research training and/or doctoral programmes, implemented by partnerships of universities, research institutions, research infrastructures, businesses, SMEs, and other socio-economic actors from different countries across Europe and beyond. Training will respond to well identified needs in defined scientific or technological areas, with appropriate references to interdisciplinary fields. In order to increase the employability of the researchers, the research training will be complemented by meaningful exposure of each researcher to other sectors and by substantial training modules addressing key transferable skills common to all fields (e.g. entrepreneurship, management and financing of research projects and programmes, management of intellectual property rights, other exploitation methods of research results, ethical aspects, communication, standardisation and societal outreach).

Partnerships may take the form of collaborative European Training Networks (ETN), European Industrial Doctorates (EID) or Joint Doctorates (EJD). Attention will be paid to the quality of supervision and mentoring arrangements as well as career guidance. Joint supervision of the researchers is mandatory for EJD and for EID. In EID, the joint supervision of the researcher shall be done by at least one supervisor from the academic sector and one supervisor from the non-academic sector. Joint supervision is also encouraged in ETN.

Calls: [H2020-2014-MSCA-ITN] publication: 11 December 2013 // deadline: 8 April 2014

[H2020-2015-MSCA-ITN] publication: 02 September 2014 // deadline: 21 January 2015

Indicative budget: 2014: 350 M (300M for ETN, 25M EID and 25M EJD)

2015: 386 M (332M for ETN, 27M EID and 27M EJD)

Instrument: Grants (100%) – Single stage

Duration: 4 years max

Network composition:

- (1) At least 3 beneficiaries (or at least 2 for EID) located in different Member States or Associated Countries.
- (2) Not more than 40% of the project budget shall be dedicated to hosts in the same country (except for two-partner EID).
- (3) In the case of EID, at least one beneficiary must be entitled to award doctoral degrees and at least one beneficiary must come from the non-academic sector. For EJD, at least three beneficiaries must be entitled to award doctoral degrees.
- (4) Support for early-stage researchers in ITN will be for periods of 3 to 36 months.
- (5) The overall European Union contribution is limited to the recruitment of a maximum
  - 500 researcher-months \*\* 42 researcher-years! \*\* for ETN and EJD.
  - 180 researcher-months \*\* 15 researcher-years! \*\* for EID projects with only 2 participants.

**APP interest: e.g.**

- **multidisciplinary science in underground labs**
- **detectors**

### 1.1.2. INDIVIDUAL FELLOWSHIPS (IF) – 2014, 2015

What? Individual, trans-national fellowships to develop or help to restart the careers of researchers that show great potential, considering their experience. It provides opportunities to acquire new knowledge and to work on research projects in a European context (Member States and associated countries) or outside Europe. It also particularly supports the reintegration of researchers currently outside Europe who have previously worked here. Application made jointly by the researcher and host organisation in the academic or non-academic sectors.

There are three different mobility types:

- (1) European Fellowship (EF)

- (2) Reintegration Fellowship (RF): there must be mobility into Europe and the researcher must have previously been a long-term resident in Europe.
- (3) Global Fellowship (GF): include a mandatory 12 month period in Europe upon return from the third country, which is not subject to the mobility rule (thus enabling sabbaticals). The Global Fellowships panel is open to nationals or long-term residents of Member States and associated countries.

European and Reintegration Fellowships are held in Member States or associated countries, whereas Global Fellowships are based on a secondment to a third country. Researchers receiving an individual fellowship may opt to include a secondment phase, notably in the non-academic sector, within the overall duration of their Fellowship.

Calls: [H2020-2014-MSCA-IF] publication: 11 December 2013 // deadline: 10 April 2014

[H2020-2015-MSCA-IF] publication: 12 November 2014 // deadline: 14 April 2015

Indicative budget: 2014: 175 M (130 for EF, 20M RF and 25M GF)

2015: 190 M (141 for EF, 22M RF and 27M GF)

Instrument: Grants (100%) – Single stage

Duration: European or Reintegration Fellowship: 12-24 months

Global Fellowship: 12-24 months plus 12 month return phase in Europe.

**APP interest: given the global character of the field, APPEC greatly encourages APP researchers to apply for IF. These positions should be advertised to scientists in the field that are currently residing outside the EU.**

### 1.1.3. CO-FUNDING OF REGIONAL, NATIONAL&INTERNATIONAL PROGRAMMES (COFUND) 2014

What? Co-funding new or existing regional, national, and international programmes to open-up to, and provide for, international, intersectoral and interdisciplinary research training, as well as transnational and cross-sector mobility of researchers at all stages of their career. Each project funded under this action shall have a sole participant that shall be responsible for the availability of the necessary matching funds to execute the project. Participant will submit multi-annual proposals for new or existing doctoral programmes or fellowship programmes that may be run on regional, national or international level.

The evaluation will be organised in two different panels:

A) Doctoral programme: early-stage researchers. Collaboration with a wider set of partners, including from the non-academic sector, which may provide hosting or secondment opportunities or training in research or transferable skills, as well as innovative elements of the proposed programme, will be positively taken into account during the evaluations.

B) Fellowship programmes: will fund individual research training and career development fellowships for experienced researchers. Fellowships shall not be awarded to researchers who are already permanently employed at the host organisation. The programmes supported should have regular selection rounds.

Mobility types supported by fellowship programmes may be similar as the ones supported under INDIVIDUAL FELLOWSHIPS (IF). On top of transnational mobility, applicants are encouraged to include elements of cross-sectoral mobility into their programmes. Given that the aim of the co-funded fellowship programmes is the support of individual fellows, research teams will not be funded. Proposed fellowship programmes are encouraged to cover all scientific disciplines ("bottom-up"), but can also focus on specific disciplines. Programmes that prioritise specific scientific disciplines based on national or regional Research and Innovation Strategies for Smart Specialisation (RIS3 strategies) will also be supported.

Calls: [H2020-2014-MSCA-COFUND] publication: 8 July 2014 // deadline: 18 November 2014

Indicative budget: 2014: 80 M (25 for DP, 55M FP)

Instrument: Programme co-fund action. Grants (up to 70%) – Single stage

Duration: Selected programmes shall have a duration of 3-5 years, which includes the time that is needed to select or recruit the researchers.

Note: The European Union contribution has maximum overall of EUR XX million to a single applicant legal entity for one call. Participants having benefited from COFUND under previous calls (under FP7 or under Horizon 2020) shall explain in their proposals how the latest proposal relates to and goes beyond the earlier grant and provide evidence for its quality (e.g., if appropriate, by external evaluations).

**APP interest: given the “smaller” emphasis on industrial links, this would be ideal for funding movement of researchers such as that required by theoretical community (PACT).**

#### 1.1.4. RESEARCH AND INNOVATION STAFF EXCHANGE (RISE) 2015

What? Partnerships in the form of a joint research and /or innovation programme between the participants, aimed at knowledge sharing and international as well as inter-sector mobility, based on two-way secondments of research and innovation staff with in-built return mechanism. It is designed to involve institutions from the academic sector and non-academic sectors (in particular SMEs), based in Europe (Member States and Associated Countries) and outside Europe (third countries). The action fosters a culture of innovation that welcomes and rewards creativity and entrepreneurship and helps to turn creative ideas into innovative products, services or processes. Exchanges can be for both early-stage or experienced researchers' levels and can also include administrative, managerial and technical staff.

Note that:

- The exchanges between institutions in Europe will cover only inter-sector secondments.
- The mobility towards countries outside Europe and vice-versa can cover both inter-sector and intra-sector secondments.
- No intra-national secondments and no secondments between institutions located outside Europe (i.e. Member States and associated countries) can be supported.

Calls: [H2020-2015-MSCA-RISE] publication: 30 September 2014 // deadline: 15 January 2015

Indicative budget: 2015: 80,3 M



**Instrument:** Grants (100%) – Single stage

**Duration:** 4 years max

**Note:** great chances of success

**APP interest: Great interest for APPEC given its tradition in global exchange and coordination.**

## 1.2. FRONTIER RESEARCH (EUROPEAN RESEARCH COUNCIL)

The ERC expects to publish with all rules for participation, budget allocation and scheduling for publication and closure of the scholarships for 2014. The ERC is committed to the following schedule (subject to change):

- Starting Grants: First quarter 2014 call publication, second quarter 2014 call deadline
- Consolidator Grants: Call publication and deadline in second quarter 2014
- Advanced Grants: Call publication and deadline in fourth quarter 2014

**Note:** increase of budget by 77%

**APP interest: APPEC encourages proposals.**

### 1.3. RESEARCH INFRASTRUCTURES (RI)

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-infrastructure, 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'.

Just as public infrastructures form the substrate of civil society, research infrastructures are the backbone of scientific communities. Research infrastructures have been a well-established concept in the Physical Sciences for a long time. More recently, the concept of openly accessible infrastructures has spread into all disciplines of science, including life, environmental and social sciences and the humanities. This spread has happened not least under the influence of interdisciplinary users and the increasing importance of e-Science. Research infrastructures therefore provide research opportunities and services to researchers in many areas also addressed by other Parts of Horizon 2020, in particular the Parts SOCIETAL CHALLENGES (27,05 B), LEADERSHIP IN ENABLING AND INDUSTRIAL TECHNOLOGIES (LEIT), and the other parts of EXCELLENT SCIENCE (22,27 B): 1.4 FUTURE AND EMERGING TECHNOLOGIES (FET), 1.1 MARIE SKŁODOWSKA CURIE ACTIONS (MSCA) and 1.2 FRONTIER RESEARCH (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-infrastructure 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.

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

The Research Infrastructures Work Programme foresees actions to provide support services for the implementation of the Open Research Data Pilot.

The Work Programme 2014-2015 for Research Infrastructures will include 4 calls.

#### 1.3.1. DEVELOPING NEW WORLD-CLASS RESEARCH INFRASTRUCTURES

The aim is to facilitate and support the implementation, long-term sustainability and efficient operation of the research infrastructures identified by the ESFRI as well as other world-class research infrastructures, which will help Europe respond to grand challenges in science, industry and society.

##### 1.3.1.1. INFRADEV-1-2014: DESIGN STUDIES

**Specific Challenge:** The aim of this activity is to support the **conceptual design and preparatory actions** for new research infrastructures, which are of a clear European dimension and interest. Major upgrades of existing infrastructures may also be considered if the end result is intended to be equivalent to, or capable of replacing, an existing infrastructure.

**Scope:** Design studies should address all key questions concerning the technical, legal and financial feasibility of new or upgraded facilities, leading to a 'conceptual design report' showing the maturity of

the concept and forming the basis for identifying and constructing the next generation of Europe's and the world's leading research infrastructures. Conceptual design reports will present major choices for design alternatives and associated cost ranges, both in terms of their strategic relevance for meeting today's and tomorrow's societal challenges, and (where applicable) in terms of the technical work underpinning the development of new or upgraded research infrastructures of European interest. All fields of science are considered.

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

- Scientific and technical work, i.e.

- (1) the drafting of concepts and engineering plans for the construction, as well as the creation of final prototypes for key enabling technologies and implementation plans for transfer of knowledge from existing prototypes to the new research infrastructure;
- (2) scientific and technical work to ensure that the beneficiary scientific communities exploit the new facility from the start with the highest efficiency, including the introduction of new processes or software.

- Strategic work, i.e.

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

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

When the Design study includes scientific and technical work it should be implemented as a Research and Innovation Action (RIA), otherwise as a Coordination and Support Action (CSA).

**Timeline:** publication: 11 December 2013 // deadline: 2 September 2014

**Indicative budget:** 2014: 15 M

**Instrument:** Research & Innovation Action (RIA) or Coordination & Support action (CSA) / Single stage

**Note:** 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.

**APP interest: At most one new design study (multi-ton dark matter?)**

### 1.3.1.2. INFRADEV-2-2015: PREPARATORY PHASES OF ESFRI PROJECTS

**Specific Challenge:** 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 or in the European strategy for particle physics (CERN Council) to the level of legal, financial, and, where applicable, technical maturity required for implementing it.

Proposal consortia should involve all the stakeholders necessary European research infrastructures (including e-Infrastructures) to move the project forward, to take the decisions, and to make the financial commitments necessary before construction can start (e.g. national/regional ministries/governments, research councils, funding agencies). Appropriate contacts with ministries and decision makers should be continuously reinforced, thus further strengthening the consortia. Operators of research facilities, research centres, universities, and industry may also be involved whenever appropriate. During the preparatory phase the Commission may act as a 'facilitator', in particular with respect to the financial engineering needed for the construction phase. The preparation of the legal agreements (including site, governance, financing of the new research infrastructures) is one of the main activities and deliverables and must be finalised before the end of the project (e.g., through the signature of a Memorandum of Understanding).

If the preparatory phase includes technical work it should be implemented as a Research and Innovation Action (RIA), otherwise as a Coordination and Support Action (CSA).

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 European research infrastructures (including e-Infrastructures) EU instruments (such as the European Structural and Investment Funds or the European Investment Bank); (2) studying new mechanisms, e.g. pre-commercial procurement 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.

Under Horizon 2020 support can be provided to two types of preparatory phase proposals:

- (1) Preparatory phase type I: Proposals will address research infrastructures identified in the periodic updates of the ESFRI roadmap or in the European strategy for particle physics, that are willing to set up a pan-European governance and legal structure (e.g. in the form of an ERIC).
- (2) Preparatory phase type II: Proposals will target projects that have been identified by ESFRI as requiring additional support for entering into the implementation phase. In this case a reduced grant for the continuation of the preparatory phase could be given to support a limited set of activities in particular for setting up an adequate governance and management structure, securing financial commitment and broadening the membership.

Timeline: publication: 11 December 2013 // deadline: 14 January 2015

Indicative budget: 2015: 14 M

Instrument: Research & Innovation Action (RIA) or Coordination and Support action (CSA) / single stage

Note: Projects for PP type 1 shall not request more than EUR 5 million and projects for PP type 2 not more than EUR 2 million of EU contribution. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

**APP interest: TBD**

### 1.3.1.3. INFRADEV-3-2015: INDIVIDUAL IMPLEMENTATION AND OPERATION OF ESFRI PROJECTS

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

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

- central management and coordination;
- 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;
- 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 RIs, in particular regarding the quality of services, management and open access policy;
- development of final prototypes for key enabling technologies and implementation plans for transfer of knowledge from prototypes to the new facility;
- development of high performance methodologies and protocols, high performance instrumentation, including the testing of components, subsystems, materials, techniques and dedicated software;
- introduction of new processes or software facilitating the take-up by the research communities of the new facility ;
- R&D and engineering work jointly with industry and users; pre-commercial procurement processes, public procurement of innovation;
- innovative solutions for data or sample collection, management, processing, curation, annotation, and deposition, including relations with publishers for supporting data and sample deposition services;
- innovative software solutions for research activities
- definition of standards, protocols and interoperability; benchmarking;
- access provision to research communities following the rules specified for integrating activities;
- integration of distributed resources into virtual facilities;
- spreading of good practices, consultancy and training courses to new users; outreach;
- exchange of personnel and training of staff;
- 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), dissemination of research outcome and technology transfer.

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).

Timeline: publication: 11 December 2013 // deadline: 14 January 2015

Indicative budget: 2015: 90 M

Instrument: Research & innovation action / single stage

Note: Projects shall not request more than EUR 15 million of EU contribution. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

**APP interest: Continuation of PP phase nearing completion for CTA?**

#### 1.3.1.4. INFRADEV-4-2014/2015 - CLUSTER OF ESFRI RESEARCH INFRASTRUCTURES AND OTHER WORLD CLASS RESEARCH INFRASTRUCTURES IN IDENTIFIED SCIENTIFIC DOMAINS THROUGH A TARGETED APPROACH.

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

Scope: Proposals must be centred and built around ESFRI projects in a specific thematic area, broad enough to gather critical mass (e.g. Biomedical Science, Advanced Light Sources, Astronomy, Environment and Earth Sciences). While the ESFRI projects represents the core component of any cluster, other relevant world class research infrastructures, e-infrastructures and Integrating Activity projects should also be involved in a cluster.

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

Proposals may address the development of skills and the specific training of staff managing and operating the research infrastructures, as well as fostering the innovation potential of research infrastructures, in complementarity with the horizontal activities supported under O (in particular topics 1.3.4.3 and 1.3.4.4). Activities should contribute to a faster adoption of best practices and foster the use of open standards and interoperability in data and computing services. When addressing common or interoperable data services, proposals should encompass the definition of metadata, ontologies and identifiers as well as models (e.g. open web services) to process semantics at machine level. Proof of concept, prototyping and deployment of advanced data services will be supported.

Proposals for the implementation and operation phase of clusters of ESFRI, and other relevant research infrastructures initiatives should cover one or more of the following activities:

- coordination;
- definition and/or harmonisation of common access policies for researchers and management of IPRs and ethical issues;
- foresight studies for new common instrumentation, methods, concepts and/or technologies;
- development of final prototypes for common key enabling technologies and implementation plans for transfer of knowledge from prototypes to the new facilities;
- development of common high performance methodologies and protocols, high performance instrumentation, including the testing of components, subsystems, materials, techniques and dedicated software;

- common R&D and engineering work jointly with industry and users; common pre- commercial procurement processes;
- common innovative solutions for data or sample collection, management, processing, curation, annotation, and deposition, including relations with publishers for supporting data and sample deposition services;
- innovative software solutions for common research activities
- definition of common standards, protocols and interoperability; benchmarking;
- integration of distributed infrastructures into virtual facilities;
- spreading of good practices, consultancy and training courses to new users; outreach;
- activities to improve the efficiency of the research infrastructures' management and of their service provision including pilot provision of trans-national access (following the rules specified for integrating activities) by new research infrastructures to promote exchange of best practise and service provision harmonization;
- exchange of personnel and training of staff;
- 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 European research infrastructures (including e-Infrastructures)
- activities to increase the potential for innovation, including social innovation, of the related infrastructure, such as networking with industries (including SMEs), dissemination of research outcome and technology transfer.

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

This topic is complementary with topics 1.3.3.1 (Big research data), and 1.3.3.9 (Virtual Research Environments – VRE). 1.3.3.1 addresses services that are potentially transversal and generic, 1.3.3.9 addresses integration of data, network and computing resources for interdisciplinary communities whereas this call address interoperability of services and common solutions for cluster of ESFRI and other research infrastructure initiatives in thematic areas.

Timeline: publication: 11 December 2013 // deadline: 15 September 2014

Indicative budget: 2014: 55 M, 2015: 25 M

Instrument: Research & innovation action / single stage

Note: The Commission considers that proposals requesting a contribution from the EU of between EUR 6 and 15 million would allow this topic to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

**APP interest: APP infrastructures are not in the selected domains, closest one is the “Astronomy” Cluster. In previous drafts this was described as:** *“A project under this heading should aim at synergies in the development of data policy and solutions, including processing, storing and curating the huge data flows generated by the next generation astronomy research infrastructures such as the SKA and the E-ELT, as well as of key critical components such as the next generation correlator for the SKA and the necessary software development;”*



### 1.3.2. INTERGRATING AND OPENING RESEARCH INFRASTRUCTURES OF PAN-EUROPEAN INTEREST

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

In addition to serving basic science challenges, Integrating Activities under the different domains target research infrastructures needed to address the Societal Challenges, in particular 3.1 HEALTH, 3.2 FOOD SECURITY, SUSTAINABLE AGRICULTURE, MARINE AND MARITIME RESEARCH AND THE BIO-ECONOMY, 3.3 "Secure, clean and efficient energy", 3.5 CLIMATE ACTION, RESOURCE EFFICIENCY AND RAW MATERIALS 3.4 "Smart, green and integrated transport", and 3.6 "Europe in a changing world – Inclusive, innovative and reflective societies" as well as some of the Focus Areas such as 3.2.3 "Blue Growth" and "Water Innovation". They will also target research infrastructures needed to gain leadership in the industrial and enabling technology such as "Nano and advanced materials, manufacturing and processing".

#### 1.3.2.1. INFRAIA 1-2014/2015: INTEGRATING AND OPENING EXISTING NATIONAL AND REGIONAL RESEARCH INFRASTRUCTURES OF PAN-EUROPEAN INTEREST

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

Scope: An Integrating Activity will mobilise a comprehensive consortium of several research infrastructures in a given field as well as other stakeholders (e.g. public authorities, technological partners, research institutions) from different Member States, Associated Countries and other third countries when appropriate.

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

An Integrating Activity shall combine, in a closely co-ordinated manner:

- a) **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; 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, 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 and sample deposition services;
  - mapping of infrastructures, users, investments, etc, in the specific field for supporting policy developments.
- b) **Trans-national access or virtual access activities**, to support scientific communities in their access to the identified research infrastructures;
1. Trans-national access activities
    - To provide 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 EU financial support will serve to provide access mostly 'free of charge' to external users, including all the infrastructural, logistical, technological and scientific support (including training courses, travel and subsistence for users).
    - 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 dimension 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 come from countries other than where the operator of the infrastructure is established (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. 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 can be foreseen in the Grant Agreement 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<sup>1</sup> incurred by the access provider for the provision of access to the selected researchers as well as the travel and subsistence incurred by these researchers to use the infrastructure.
- 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.

## 2. 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 approved by the Commission. 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 the service. Only eligible costs that can be clearly attributed to the provision of access can be reimbursed.

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

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<sup>1</sup> 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, pending the adoption of a specific Commission decision determining the method to be used, on the basis of unit costs. In the last 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. If this specific Commission decision is adopted a combination of the two methods mentioned above will also be possible.

- innovative solutions for data or sample collection, management, curation annotation, and deposition;
- innovative software solutions for making new user communities benefit from computing services.

All three categories of activities are mandatory as synergistic effects are expected from these different components. However, the focus among these categories will differ for 'Starting' and 'Advanced' Communities.

Integrating Activities should, whenever appropriate,

- give due attention to any related initiatives internationally (i.e. outside the European Union),
- foster the use and deployment of standards,
- carry out research on impacts of the involved research infrastructures (direct and indirect, on social, environmental and economic levels) as well as of the project itself.
- 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, and either work in cooperation with e-infrastructure service providers or include them in the consortium.
- contribute to fostering the potential for innovation, including social innovation, of research infrastructures by reinforcing the partnership with industry, through e.g. transfer of knowledge and other dissemination activities, activities to promote the use of research infrastructures by industrial researchers, involvement of industrial associations in consortia or in advisory bodies. **A specific work package on innovation is therefore recommended in all Integrating Activity proposals.**

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

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

- a) European laboratory astrophysics. Laboratory Astrophysics is a rapidly growing field, not least because the knowledge of fundamental physical properties and processes at nuclear, atomic and molecular levels is crucial for the interpretation of data from ground- and space- based observatories as well as solar-system probes. This activity aims at coordinating and integrating joint efforts of separate laboratories, for all aspects of generation, collection, distribution, curation, and access to data or samples.
- b) Research infrastructures for high-energy astrophysics. This activity aims at opening up existing facilities for developing, calibrating and testing both generic technologies as well as individual instruments developed for space missions in an environment representative of space conditions. Access should be provided in particular to scientists without national access to testing and calibration facilities, at the same time stimulating scientific and technological exchanges among European teams.
- c) Science at deep-underground laboratories. This activity aims at achieving a high level of integration of facilities for deep underground research by simultaneously establishing common access procedures, promoting the common planning of experiments, and by coordinating technological efforts in order to optimise use and access to resources and to avoid duplication.

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

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

- a) Detectors for future accelerators. This activity aims at furthering the integration of, and access to, the key research infrastructures in Europe for the development of advanced detector technologies.
- b) Research infrastructures for nuclear physics. This activity aims at furthering the integration of, and access to, the key research infrastructures in Europe for studying the properties of exotic nuclei or of nuclear matter at extreme conditions.
- c) European planetary science. This activity aims at furthering the integration of the key research infrastructures in Europe for studying planetary science by drawing in new partners and by providing access to the facilities and to a larger number of users, taking into account the multi- and trans-disciplinary nature of the field.

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

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

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

**Timeline:** publication: 11 December 2013 // deadline: 2 September 2014

**Indicative budget:** 2014: 90 M, 2015: 50 M

**Instrument:** Research and Innovation Action / Single stage

**Note:** The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million for Starting Communities and of up to EUR 10 million for Advanced Communities would allow this topic to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

**APP interest: Underground and Gravitational wave labs. Estimated 50% chances of success.**

### 1.3.3. E-INFRASTRUCTURES

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

- a. Integrating e-infrastructure resources and services across all layers (networking, computing, data, software, user interfaces), in order to provide seamless services tailored to user needs. Integration will be facilitated by agreeing and deploying common or interoperable core services and service building blocks, which is the main aim of topic 1.3.3.7, by avoiding rigid boundaries between computing and data (in 1.3.3.1 and 1.3.3.5), and by user-driven integration in Virtual Research Environments (topic 1.3.3.9).
- b. Implementing the e-infrastructure to ride the wave of "big data", on the basis of the policy orientations provided by the High-Level Group on Scientific Data and the "framework for action" published in March 2013, through topics 1.3.3.1, 1.3.3.2 and 1.3.3.3.
- c. Providing support to the e-infrastructure for Open Access as defined in the Communication on Scientific Information through 1.3.3.1 and 1.3.3.2, in particular for the implementation of the Open Access mandate (covering all Horizon 2020 publications output) and the Open Data Pilot, and for federating researcher electronic identities as defined in the ERA Communication through 1.3.3.7. Actions in 1.3.3.1 and 1.3.3.2 will provide services to support project participants in any area of Horizon 2020 for managing the life cycle of data they collect or produce within their projects (e.g. deposition, storing, access to and preservation).
- d. Implementing the e-infrastructure part of the EU strategy on High Performance Computing (HPC), in particular the provision of services, the infrastructure for computing applications (Centres of Excellence) and a network of HPC Competence Centres for SMEs through topics 1.3.3.4, 1.3.3.5 and 1.3.3.6. A Public-Private Partnership (PPP) in HPC (expected by the end of 2013) will provide the framework for the implementation of the HPC strategy, addressing in particular the Centres of Excellence in computing applications and the development of HPC technologies towards exascale (supported in the FET part of the Excellent Science pillar).
- e. Under topic 1.3.3.8, it is intended to establish a partnership with the selected consortium, based on the agreed action plan, through entering into a Framework Partnership Agreement (FPA)<sup>2</sup>. Within this framework, the Commission intends to award Specific Grant with the selected consortium (see also section on "Other actions"), in order to implement the action plan of the FPA..
- f. Software cuts across almost all topics. Strategic software is addressed in EINFRA-1 (e.g. sub-topic 7 on database software for extremely large datasets) and computing application codes are addressed in 1.3.3.5).
- g. Mainstreaming innovation and the development of human capital in all topics that are relevant.

The projects funded under this area will participate in the Pilot on Open Research Data in Horizon 2020 in line with the Commission's policy on open research data.

The following conditions are expected to be met by proposals for research infrastructures:

- Proposals that develop or offer services are expected to draft business plans for financial sustainability beyond the support they receive in Horizon 2020. Such business models may greatly vary depending on the service in question and will rely on funding sources chosen on a case-by-case basis (such as: government funds; income from services offered to other research projects; and income from services to industry). In particular, long-term data preservation is a major challenge

<sup>2</sup> Commission Delegated Regulation (EU) No 1268/2012 of 29 October 2012, Article 178

and difficult to sustain without committed institutional funding. Partnering with the private sector is welcome where appropriate.

- Projects should share basic operations services such as authorisation and accounting systems, service registry, etc. to the greatest extent possible; such services should not be (re)developed when they already exist unless sound justification is provided in the project proposal. 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 to be developed under research infrastructures needs to be open source with a "CC-BY" type of license, 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.

Proposals addressing e-infrastructure services development (all topics in 1.3.3 except 1.3.3.3 and 1.3.3.6) will combine, in a closely co-ordinated manner, Networking, Service and Joint Research Activities. A detailed list of activities is:

(i) Networking activities. To foster a culture of co-operation between the participants in the project, the scientific communities benefiting from the e-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 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. To provide specific e-infrastructure related services to the scientific community. This 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. These activities should be innovative and explore new fundamental technologies or techniques underpinning the efficient and joint use and provision of e-infrastructure services. 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.

#### 1.3.3.1. EINFRA-1-2014 MANAGING, PRESERVING AND COMPUTING WITH BIG RESEARCH DATA (50 M)

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



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

(1) Establishing a federated pan-European data e-infrastructure to provide cost-effective and interoperable solutions for data management and long-term preservation. The needs for data access, replication, annotation, search, compute, analysis and reuse of information across disciplines should be accommodated in different research and education contexts. All these functions should expose standard interfaces for interoperation with other data sources to aggregate them or to be aggregated. Sustainability is of paramount importance, therefore robust business models should be proposed to encourage investment from all stakeholders. Foreseen challenges are technical, legal and organisational, including engaging e-infrastructure operators and other service providers (such as those receiving support under topics 1.3.3.2, 1.3.3.3 and 1.3.3.7);

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

(3) Federating institutional and, if possible, private data management and curation tools and services used across or at some point of the full data lifecycle, including approaches for identification of open data sources and data collected with sensitive or restricted access features. Services and tools should be federated on the basis of an open architecture and should offer or coordinate support to the development of Data Management Plans, in particular for Horizon 2020 project participants;

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

(5) Development and adoption of a standards-based computing platform (with open software stack) that can be deployed on different hardware and e-infrastructures (such as clouds providing infrastructure-as-a-service (IaaS), HPC, grid infrastructures...) to abstract application development and execution from available (possibly remote) computing systems. This platform should be capable of federating multiple commercial and/or public cloud resources or services and deliver Platform-as-a-Service (PaaS) adapted to the scientific community with a short learning curve. Adequate coordination and interoperability with existing e-infrastructures (including GÉANT, EGI, PRACE and others) is recommended

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

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

(8) Enable the creation of a platform and infrastructure for mining text aggregated from different sources/publishers that responds to the needs of users (researchers). This includes the definition of technical requirements (e.g. on interoperability, metadata standards and aggregation of new services) as well as addressing legal and contractual issues to serve the needs of text mining communities. The project should also provide consulting and counselling services to solve problems related with the legal framework and

permissions to text mine collections, and to advise researchers on the benefits and practice of text mining. The development of the proposed platform and services should be informed by the studies on policy and licencing issues associated with Text and Data Mining that will be funded from the Call on "Science with and for Society" (GARRI.5.2014 - Scientific Information in the Digital Age: Text and Data Mining). Therefore, the successful proposals in these two calls are expected to engage in a mutual dialogue and establish synergies in their work.

This topic is complementary with topic 1.3.1.4, as it addresses services that are potentially transversal and generic, whereas 1.3.1.4 addresses interoperability of services and common solutions for cluster of ESFRI and other research infrastructure initiatives in thematic areas.

Timeline: publication: 11 December 2013 // deadline: 2 September 2014

Indicative budget: 2014: 55 M

Instrument: Research & Innovation Action

Note: Maximum 8 M€ for subtopic (6).

**APP interest: A plan in the making. Discussions with CERN.**

### 1.3.3.2. EINFRA-2-2014: E-INFRASTRUCTURE FOR OPEN ACCESS (13 M)

Specific challenge: Europe needs a robust e-infrastructure supporting Open Access policies, also for Horizon 2020. This infrastructure, based on already existing e-infrastructures (institutional and thematic repositories, aggregators, etc.), should support reliable and permanent access to digital scientific records. A key element will be capacity building to link literature and data in order to enable a more transparent evaluation of research and reproducibility of results. Such an action will include an analysis of alternative means of public support to Gold Open Access in order to identify the optimal approach. The Open Access mandate and the Open Data Pilot of Horizon 2020 impose new requirements for the infrastructures to fully support participants to comply with their obligations and objectives. Therefore, a key objective will be to provide service driven infrastructures to enable wide participation in the Open Data Pilot.

Scope: Proposals should address all the following activities:

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

(2) Developing proof of concept and prototyping new services in support of open science (e.g. new forms of publishing, innovative services based on data mining, new forms of peer review etc.), assisting researchers and educators in everyday tasks. This includes the accessory task of piloting a mechanism to stimulate publishing in open access journals by paying authors part or all of the article processing charges they incurred after the end of their grant agreement with the Commission<sup>18</sup>; the proposal should indicate the maximum amount to be paid per publication that occurred within two years after the related EC grant expired, as well as other conditions that are necessary to enable as many authors as possible to participate and to ensure that this service contributes to the development of a sustainable and competitive market for scientific open access publishing; the duration of the pilot should be 12 to 24 months unless the available budget is exhausted before. Proposals should consider barriers (including legal) to data sharing in the context of these new services and assess the possibility of pan-European information sharing agreements considering the authentication and authorization infrastructure described in topic EINFRA-7.

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

**Timeline:** publication: 11 December 2013 // deadline: 15 April 2014

**Indicative budget:** 2014: 13 M

**Instrument:** Research & Innovation Action

**Note:** It is expected that one proposal will be selected. A maximum of EUR 4 million of the total budget for this topic is foreseen for the article processing charges under point (2).

**APP interest: A plan in the making. Discussions with CERN.**

### 1.3.3.3. EINFRA-3-2014 - TOWARDS GLOBAL DATA E-INFRASTRUCTURES – RDA (4 M)

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

**Scope:** Proposals will support all of the following points:

- (1) definition, operation and monitoring of the governance structures of the Research Data Alliance (RDA); secondment and exchange of staff where appropriate;
- (2) active participation of European stakeholders (organisations and individual experts) in RDA and leadership initiatives in strategic working group activities; EU industry involvement and innovation will be promoted in particular;
- (3) engaging scientific communities having underdeveloped data infrastructures in defining the best practices for data exchange and interoperability; and
- (4) establishing coordination mechanisms at European level (national research funders, European education and research associations) and with international organisations dealing with standardisation, research data and education issues (IETF, W3C, CODATA, OECD, UNESCO, ...).

Timeline: publication: 11 December 2013 // deadline: 2 September 2014

Indicative budget: 2014: 4 M

Instrument: Coordinating and Support Action – CSA (100%) – single stage

**APP interest: A plan in the making. Discussions with CERN.**

#### 1.3.3.4. EINFRA-4-2014: PAN-EUROPEAN HPC INFRASTRUCTURE AND SERVICES (15 M)

Specific challenge: In order to create a world-class infrastructure, and to provide state-of-the-art services and access to this infrastructure to users, independently of location, the HPC resources in Europe need to be further pooled, integrated and rationalised. This topic contributes to the implementation of the EU strategy on High Performance Computing (HPC), in particular by providing access to the best supercomputing facilities and services for both industry and academia, and complements the activities of the Public-Private Partnership (PPP) in HPC in order to implement the HPC strategy.

Scope: Proposals should address the following activities:

1. Provide a seamless and efficient Tier-0 service to users Europe-wide based on promoting research excellence and innovation; this includes peer-review procedures for the allocation of computing time; transparent billing; and specific services adapted to the needs of ESFRI projects, Horizon 2020 projects/programmes, large institutional users or industry. Tier-0 are those services provided at pan-European level with machines devoted to the pan-European infrastructure more than 50% and having a minimal performance to be periodically defined by the consortium;
2. Carry out activities (training, service prototyping, software development etc.) that build on national HPC capabilities (Tier-1) and are necessary to support Tier-0 services or a functional European HPC ecosystem;
3. Ensure openness to new user communities and new applications; promote industrial take-up of HPC services in particular by SMEs;
4. Implement inclusive and equitable governance and a flexible business model to ensure long term financial sustainability; the business model should allow financial or in-kind contributions by research projects/programmes, institutions, industry and regions or countries; based on an auditable cost model for the operation of HPC Centres providing European services with different financing sources;
5. Develop and maintain the strategy for the deployment of a rich HPC ecosystem with different machine architectures - evolving towards exascale - including the implementation roadmap at EU and national level and the specifications and technical requirements for a varied set of Tier-0 systems ensuring a broad coverage of user needs;
6. Working in synergy with:
  - a. the Centres of Excellence (see topic 1.3.3.5 – CoEs for computing applications);
  - b. the European Technology Platform for HPC;
  - c. the pan-European HPC infrastructure will provide technical specifications to guide research activities for future exascale prototypes and systems;
7. Design and execute training and skills development programmes tailored to the needs of research in academia and industry in order to stay at the forefront of scientific breakthroughs, as well as introduction of scientific computing and HPC in academic curricula;
8. Develop an international cooperation policy and associated activities.

The infrastructure should provide core and basic services in coordination with other e-infrastructure providers to promote interoperability and a seamless user experience, in accordance with topic 1.3.3.7. Interworking with other computing infrastructures such as clouds and grids should be ensured.

**Timeline:** publication: 11 December 2013 // deadline: 2 September 2014

**Indicative budget:** 2014: 15 M

**Instrument:** Research & Innovation Action

**APP interest: A plan in the making. Discussions with CERN.**

#### 1.3.3.5. EINFRA-5-2015 - CENTRES OF EXCELLENCE FOR COMPUTING APPLICATIONS (40 M)

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

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

**Scope:** The CoE's are expected to be:

- a) User-driven, with the application users and owners playing a decisive role in governance;
- b) integrated: encompassing not only HPC software but also relevant aspects of hardware, e.g. data management/storage, connectivity, security, etc.;
- c) multidisciplinary: with domain expertise co-located alongside HPC system, software and algorithm expertise;
- d) user-driven, with the application users and owners playing a decisive role in governance; and
- e) distributed with a possible central hub, federating capabilities around Europe, exploiting available competences, and ensuring synergies with national/local programmes;

Proposals for CoEs will address:

- Provision of services such as: developing, optimising (including if needed re-design) and scaling HPC application codes towards peta and exascale computing; testing, validating and maintaining codes and managing the associated data; quality assurance; co-design of hardware, software and codes; consultancy to industry and SMEs; research in HPC applications; and addressing the skills gap in computational science.
- Working in synergy with the European Technology Platform for HPC and with the pan-European HPC infrastructure, including by identifying suitable applications for co-design activities relevant to the development of HPC technologies towards exa-scale.

- Sustainability embracing a wide range of service models and funding from a mixture of sources, including through sponsorship by industry or hybrid public-private models. Clear business plans need to be presented in the proposal.
- Creating communities around specific codes that impact the target sectors, involving ISVs (independent software vendors) where appropriate, and exchange of best practices in particular for SMEs.
- A governance structure driven by the needs of the users. Commercial management expertise will be needed along with technical expertise to manage industry clients and supply chains.

Timeline: publication: 11 December 2013 // deadline: 14 January 2015

Indicative budget: 2015: 40 M

Instrument: Research & Innovation Action

Note:

- 8-10 CoEs are expected to be funded in this Topic in order to test the concept. A follow up Call is expected in the future that will build on the results and lessons learnt from the present Call.
- International co-operation is encouraged where there are clear mutual benefits and the partners have the relevant HPC capacity.
- The Commission considers that proposals requesting a contribution from the EU of between EUR 4 and 5 million would allow this topic to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

**APP interest: A plan in the making. Discussions with CERN.**

#### 1.3.3.6. EINFRA-6-2014 - NETWORK OF HPC COMPETENCE CENTRES FOR SMES (2 M)

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

Scope: Proposals should address at least the following activities:

- (1) networking of existing HPC competence centres providing HPC services to exchange best practices and pool technical, expertise or business resources;
- (2) awareness raising and visibility activities of the benefits of HPC for SMEs;
- (3) identification of the pool of SMEs and available expertise in the different business areas at European level, and mechanisms to match SME needs and the available expertise;
- (4) training (in synergy with the activities carried out by other organisations providing specific training for SMEs in HPC);

The aim is to support one network which will address coordination, outreach, training and the exchange of best practice and software components between the participating national and regional competence centres, complementing their current activities and services with actions of a clear European added-value that cannot be performed at local level. Direct support to adoption of HPC by individual SMEs is not expected to be carried out by this network.

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

Timeline: publication: 11 December 2013 // deadline: 2 September 2014

Indicative budget: 2015: 2 M

Instrument: Coordinating and Support Action – CSA (100%) – single stage

**APP interest: TBD**

#### 1.3.3.7. EINFRA-7-2014 – PROVISIONING OF CORE SERVICES ACROSS E-INFRASTRUCTURES (6 M)

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

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

- (1) Development and promotion of the uptake of a Digital Identifier e-infrastructure for digital objects (articles, datasets, collections, software, nomenclature, etc), contributors and authors which cuts across geographical, temporal, disciplinary, cultural, organisational and technological boundaries, without relying on a single centralised system but rather federating locally operated systems to ensure interoperability. The requirements of all relevant stakeholder groups (researchers, libraries, data centres, publishers, etc.) will be addressed;
- (2) Deployment and promotion of a pan-European identity federation for researchers, educators and students, in compliance with existing identity inter-federation efforts. The action will involve (research and education) institutions in EU Member States, existing identity federations, e-infrastructure providers and libraries. It should aim to overcome technical, organisational and legal obstacles for the implementation of an integrated and interoperable authentication and authorisation infrastructure (AAI) and to lower barriers for entry of organisations not already participating in identity federations, e.g. by providing scalable policy negotiation mechanisms, as well as legal guidance notably in data protection. It should also encourage the use of security token translation services to enable interoperability of different AAIs, as well as accounting services for enabling interoperability and aggregation in recording the usage of resources securely and reliably, including for the highly distributed heterogeneous infrastructures envisaged for global research data. Guest identities and alternative methods of identification (e.g. social media identities) are encouraged e.g. in order to allow public access at large. Assessment of penetration of existing identity federations at national level and development of training activities for data professionals on issues related to AAI enabled collaboration and data sharing (data privacy, intellectual property, cultural barriers, etc.) should be foreseen.

Timeline: publication: 11 December 2013 // deadline: 2 September 2014

Indicative budget: 2014: 6 M

Instrument: Research & Innovation Action

Note: one proposal per action will be funded

**APP interest: A plan in the making. Discussions with CERN.**

#### 1.3.3.8. EINFRA-8-2014 - RESEARCH AND EDUCATION NETWORKING – GÉANT

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

The long-term cooperation between the Commission and the selected consortium will be formalised within a Framework Partnership Agreement (FPA) covering the duration of Horizon 2020 to provide a stable environment for the implementation of GÉANT as the European communication commons and with an indicative average yearly EU funding of EUR 25 million per year. This agreement shall specify the common objectives, the nature of actions planned and the general rights and obligations of each party.

**Timeline:** publication: 11 December 2013 // deadline: 2 September 2014

**Indicative budget:** 2014: 0 M

**Instrument:** Framework Partnership Agreement with multiple beneficiaries (no funding) providing a framework for Specific Grants.

**APP interest: No direct interest.**

#### 1.3.3.9. EINFRA-9-2015 – E-INFRASTRUCTURES FOR VIRTUAL RESEARCH ENVIRONMENTS (VRE) (42 M)

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

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

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

Where data are concerned, projects will define the semantics, ontologies, the 'what' metadata, as well as the best computing models and levels of abstraction (e.g. by means of open web services) to process the



rich semantics at machine level (the so called 'how' metadata), as to ensure interoperability. They may also support proof of concept, prototyping and deployment of advanced data services and environments, providing a toolset and desktop with easy to use functionalities and access to top-of-the-range connectivity and computing.

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

This topic is complementary with topic 1.3.1.4, as VREs integrate data, network and computing resources for interdisciplinary research communities, whereas 1.3.1.4 addresses interoperability of services and common solutions for cluster of ESFRI and other research infrastructure initiatives in thematic areas.

Timeline: publication: 11 December 2013 // deadline: 14 January 2015

Indicative budget: 2015: 42 M

Instrument: Research & Innovation Action

**APP interest: Discussions with ASTRONET for virtual observatory**

#### 1.3.4. SUPPORT TO INNOVATION, HUMAN RESOURCES, POLICY AND INTERNATIONAL COOPERATION

This call focuses on fostering the innovation potential and developing the human resources of research infrastructures especially in areas that suffer from shortages in supply or where new skills and professions need to emerge, e.g. in 'data science'. It will also aim at reinforcing European research infrastructures policy and international cooperation. In addition to this call, innovation and development of human resources are mainstreamed in all relevant parts of the work programme. Similarly, development of policy and international cooperation are encouraged 'bottom up' in any project where these activities appear relevant. Support to the global Research Data Alliance is envisaged separately in call 3.

##### 1.3.4.1. INFRASUPP-1–2014 - INNOVATION SUPPORT MEASURES

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

Scope: Proposals should address the following areas:

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

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

Timeline: publication: 11 December 2013 // deadline: 2 September 2014

Indicative budget: 2014: 2 M

Instrument: Coordination and Support Action (100%) – single stage

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

**APP interest: TBD**

#### 1.3.4.2. INFRASUPP-2-2015 - INNOVATIVE PROCUREMENT PILOT ACTION IN THE FIELD OF SCIENTIFIC INSTRUMENTATION (7 M)

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

##### a) Feasibility studies

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

##### b) Pre-commercial procurement in the field of scientific instrumentation (PCP)

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

##### c) Joint public procurement of innovative scientific instrumentation (PPI)

Proposals will focus on organizing joint procurement of innovative instrumentation by research infrastructures to enhance their services, better serving their communities.

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

Timeline: publication: 11 December 2013 // deadline: 14 January 2015

Indicative budget: 2015: 14 M

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

Note: The Commission expects to fund at least two proposals under this topic..

**APP interest: PCP could be interesting but only 2 projects will be funded.**

#### 1.3.4.3. INFRASUPP-3 - 2014 – STRENGTHENING THE HUMAN CAPITAL OF RESEARCH INFRASTRUCTURES (2 M)

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

Timeline: publication: 11 December 2013 // deadline: 2 September 2014

Indicative budget: 2014: 2 M

Instrument: Coordination and Support Action (100%) – single stage

**APP interest: TBD**

#### 1.3.4.4. INFRASUPP-4 - 2015 – NEW PROFESSIONS AND SKILLS FOR E-INFRASTRUCTURES (2,5 M)

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

- (1) Defining or updating university curricula for the e-infrastructure competences mentioned above, and promoting their adoption.
- (2) Developing and executing training programmes (including for lifelong learning) for the above mentioned professionals working as part of a team of researchers or supporting research teams.
- (3) Support the establishment of these professions as distinct professions from that of a researcher. Create a reference model which defines their competencies, supported by case studies and best practices relating to e-infrastructure skills, human resources management, support tools and related institutional practices. Develop alternative means for recognising non-research contributions by research technologists and data scientists.

- (4) Support networking and information sharing among already practicing e-infrastructure experts, research technologists, computation experts, data scientists and data librarians working in research institutes and in higher education.
- (5) Awareness raising activities; establish and promote e-infrastructures community champions to advocate on new jobs and skills needs at schools, universities and scientific communities.

Timeline: publication: 11 December 2013 // deadline: 14 January 2015

Indicative budget: 2015: 2,5 M

Instrument: Coordination and Support Action (100%) – single stage

**APP interest: Eventual interest together with CERN and ASTRONET**

#### 1.3.4.5. INFRASUPP-5 - 2014 – POLICY MEASURES FOR RESEARCH INFRASTRUCTURES (3 M)

Specific Challenge: In the context of the recent communication for a reinforced ERA partnership for excellence and growth<sup>3</sup> and the commitments of the Innovation Union flagship initiative<sup>4</sup>, the focus of this action is related to the effective investment and use of research infrastructures.

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

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

Timeline: publication: 11 December 2013 // deadline: 2 September 2014

Indicative budget: 2014: 4 M

Instrument: Coordination and Support Action (100%) – single stage

<sup>3</sup> COM (2012) 392 final

<sup>4</sup> COM(2010) 546 final

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

**APP interest: more interest for APPEC itself.**

#### 1.3.4.6. INFASUPP-6 - 2014 – INTERNATIONAL COOPERATION FOR RESEARCH INFRASTRUCTURES (7 M)

**Specific Challenge:** Following the recent communication of the Commission on International Cooperation in Research and Innovation<sup>5</sup>, the research infrastructures activity will focus on a number of key third countries seen as strategic for the development, exploitation and management of world-class research infrastructures. The G8+O5 countries plus Australia, singularly or in their entirety, for the purposes of the Group of Senior Officials (GSO) on Global Research Infrastructures, are also included, without excluding the possibility of cooperation with other interested third countries or regional bodies such as the African Union.

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

Proposals will address one of the following areas:

- Facilitate the development of global research infrastructures and the cooperation of European RI with their non-European counterparts, ensuring their global interoperability and reach, and to pursue international agreements on the reciprocal use, openness or co-financing of infrastructures, on the basis of the recommendations of the Group of Senior Officials on Global Research Infrastructures;
- Support bilateral cooperation on research infrastructures with Africa. The proposal will build on the past experience and achievements gained in the FP7 project PAERIP (Promoting African – European Research Infrastructure Partnerships).
- Support bilateral cooperation on research infrastructures with Russia. The proposal will in particular help develop cooperation between European research infrastructures and the Russian Megascience facilities<sup>6</sup>, including the underpinning e-infrastructure.
- Support multilateral cooperation with European Neighbourhood Policy countries and Western Balkan Countries. The proposal will aim at developing regional roadmaps of research infrastructures jointly with stakeholders and policymakers and help them develop closer cooperation with research infrastructures of pan-European interest through training, data management and trans-national access.
- Support multilateral cooperation on research infrastructures in one or several of the following areas: Arctic research, marine science, biodiversity, food research and medicine. Particular emphasis will be made on cooperation with USA, Canada (including for implementing the Transatlantic Research

<sup>5</sup> EC communication on 'Enhancing and focusing EU international cooperation in research and innovation: a strategic approach' (COM(2012) 497).

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

Alliance, launched by the Galway Statement on Atlantic Ocean Cooperation) and Russia, without excluding other relevant countries such as Australia and New Zealand.

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

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

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

Timeline: publication: 11 December 2013 // deadline: 2 September 2014

Indicative budget: 2014: 7 M

Instrument: Coordination and Support Action (100%) – single stage

**APP interest: more interest for APPEC itself given its tradition.**

#### 1.3.4.7. INFRASUPP-7 - 2014 – E-INFRASTRUCTURES POLICY DEVELOPMENT AND INTERNATIONAL COOPERATION (5 M)

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

- (1) Dissemination of information on the e-infrastructure programme and of project results, including coordination among projects;
- (2) Stakeholder initiatives, including a user forum to provide orientations for e-infrastructure service interoperability and integration;
- (3) Policy coordination with the major national and European policy makers, including the collection of information needed for policy making e.g. through consultation actions and surveys as well as the wider use of e-infrastructures for public services and society;
- (4) Support to monitoring results and assessing impact of the Horizon 2020 e-infrastructure activities, including through metrics and indicators;
- (5) Monitor and analyse the take-up of digital science and e-infrastructures by researchers and possible other users, such as citizens and the education sector, per country, region and research domain or community;
- (6) Support to technology transfer from the e-infrastructures projects to the market;
- (7) Support to cooperation with developing countries and regions to promote connectivity, global e-infrastructure services, identification of use cases and promising applications of particular interest for developing regions.

Timeline: publication: 11 December 2013 // deadline: 2 September 2014

Indicative budget: 2014: 5 M

Instrument: Coordination and Support Action (100%) – single stage

**APP interest: Discussions with CERN for common actions**

#### 1.3.4.8. INFRASUPP-8 - 2014 – NETWORK OF NATIONAL CONTACT POINTS

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

Timeline: publication: 11 December 2013 // deadline: 2 September 2014

Indicative budget: 2014: 2 M

Type of action: Coordination and Support Action

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

### 1.4. FUTURE AND EMERGING TECHNOLOGIES (FET)

The mission of Future and Emerging Technologies (FET) is to turn Europe's excellent science base into a competitive advantage by uncovering radically new technological possibilities. It will help Europe to grasp leadership early on in new and emerging technology areas that promise to renew the basis for European competitiveness and growth and that will make a difference for society in the decades to come.

In order to succeed in this mission FET focusses on research beyond what is known, accepted or widely adopted and supports novel and visionary thinking to open promising paths towards powerful new technologies. In particular, it funds interdisciplinary collaborations that seek genuine cross-fertilisation and deep synergies between the broadest range of advanced sciences (physical sciences, information sciences, life sciences, environmental sciences, social sciences, humanities,...) and cutting-edge engineering disciplines (chemical, physical, biological, computational, geospatial, ...) in order to turn new knowledge and high-risk ideas into a viable basis for radically new technologies. Thus, research in FET is complementary to incremental research as well as to the European Research Council, which itself is aiming at excellent individual researchers while FET supports collaborative research projects to open up new and promising fields of research, technology and innovation.

The combination of a game-changing long-term vision and technological concreteness positions FET research between blue-sky science on the one hand, and research driven by societal challenges or by industrial competitiveness on the other. It will bring closer science, engineering and society and accelerate the

transition from upstream research to technology development and transformational impact. FET actions will help to create in Europe a fertile ground for responsible and dynamic multi-disciplinary collaborations on future and emerging technologies and for kick-starting new European research and innovation eco-systems around them. These will be the seeds for future industrial leadership and for tackling society's grand challenges in new ways.

FET aims at shaping the future technology landscape and European thought-leadership on new and emerging technologies. The combination of a bottom-up spirit and a broadly based participatory agenda-setting assures that FET explores radically new avenues while remaining sensitive to future needs from industry and society. By promoting interdisciplinary collaboration that go well beyond the strictly technological and 'hard' scientific disciplines, FET promotes dialogue and cooperation between science, industry, citizens and policy makers on how to turn new technological possibilities into an opportunity for industry and a benefit for society. This will boost long-term innovation potential in Europe both from the abundance of novel ideas and the diversity of actors ready to take them forward. Along the same line, FET will pay attention to issues such as gender, age and culture, in the research topics and teams it promotes as well as in its public engagement, aware that this can offer new perspectives, posing new questions, and opening new areas of investigations in, for instance, life sciences, engineering and technological development, environment, food and nutrition, health and medicine, or transport.

The silo-breaking research collaborations in FET will also improve readiness across Europe to take up new research and innovation practices for making leading-edge science and technology research more open, creative and closer to society, especially through 'digital science', promoting for instance open scientific data, advanced simulation, and the use of platforms for open collaboration or for better involvement of the general public in research. These are essential tools for building operational links between science, technology, innovation and society, as well as across disciplines, so that even the most advanced results can find their way to stimulate industrial leadership and for addressing societal challenges.

FET research is well placed for global collaborations that can raise the level of excellence and accelerate the impact from global alliances. Thus, participation of excellent non EU partners in FET activities, whenever necessary and essential, is welcome.

The projects funded under this area will participate in the Pilot on Open Research Data in Horizon 2020 in line with the Commission's policy on open research data.

#### 1.4.1. FET-OPEN - FOSTERING NOVEL IDEAS

FET Open supports early-stage joint science and technology research around new ideas for radically new future technologies. It will build up a diverse portfolio of targeted projects to explore a wide range of new technological possibilities, inspired by cutting-edge science, unconventional collaborations or new research and innovation practices. Early detection of promising new areas, developments and trends, along with attracting new bold-visioned and high-potential research and innovation players will be key. FET-Open represents 40% of the overall FET budget in Horizon 2020. The call is entirely non-prescriptive with regards to the nature or purpose of the technologies that are envisaged and thus targets mainly the unexpected. A bottom-up selection process will build up a diverse portfolio of projects. In order to identify and seize opportunities of long-term benefit for citizens, the economy and society, the early detection of promising new areas, developments and trends, wherever they come from, will be essential. The call also seeks for coordination and support activities to turn Europe into the best place in the world for responsible collaborative research on future and emerging technologies that will make a difference for society in the decades to come.



#### 1.4.1.1. FETOPEN 1 – 2014/2015: FET-OPEN RESEARCH PROJECTS

Proposals are sought for collaborative research projects with all of the following characteristics:

- Long-term vision: the research proposed must address a new, original or radical long-term vision of technology-enabled possibilities that are far beyond the state of the art and currently not anticipated by technology roadmaps.
- Breakthrough S&T target: research targets concrete and ambitious breakthroughs that are arguably crucial steps towards achieving the long-term vision and that are plausibly attainable within the life-time of the proposed project.
- Foundational: the breakthroughs that are envisaged are foundational in the sense that they can establish a basis for a new line of technology not currently anticipated.
- High-risk: the potential of a new technological direction depends on a whole range of factors that cannot be apprehended from a single disciplinary viewpoint. Thus, this high-risk has to be countered by novel concepts and ideas, and by a strongly interdisciplinary research approach, where needed expanding well beyond the strictly technological realm
- Novelty: the research proposed finds its plausibility in new ideas and concepts, rather than in the application or incremental refinement of existing ones.
- Interdisciplinary: the proposed collaborations are interdisciplinary in the sense that they go beyond current mainstream collaboration configurations in advanced science and technology research, and that they aim to advance different scientific and technological disciplines together and in synergy towards a breakthrough.

Timeline: publication: 11 December 2013 // deadlines: 30/09/2014, 31/03/2015, 29/09/2015

Indicative budget: 2014: 77 M, 2015: 37 M, 40 M

Instrument: Research and Innovation Actions (100% funding)

Note: This call is open to early-stage research on any new technological possibility. The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

**APP interest: TBD**

#### 1.4.1.2. FETOPEN 2 – 2014/2015: COORDINATION AND SUPPORT ACTIVITIES

Proposals shall address one of the following topics:

- a) [2014] FET Observatory: identifying new opportunities and directions for interdisciplinary research towards new and visionary technology of any kind, combining evidence from FET (e.g., portfolio analysis) and other sources, as well as by broad and open stakeholder engagement, in particular through on line tools.
- b) [2014] FET Communication: collecting, aggregating and disseminating information from the entire range of FET projects and activities, and using an appropriate mix of channels and formats, including activities to reach stakeholders well beyond the research communities (including the public at large), and visibility at well-selected events.

c) [2015] FET Exchange: structuring an emerging FET-relevant topic and the interdisciplinary communities around it. This shall include research roadmapping, stimulating learning and exchange (possibly with related initiatives worldwide) involving the appropriate range of disciplines and actors such as young researchers and high-tech SMEs, and broader stakeholder engagement.

d) [2014] FET Conference: supporting the organisation of the third European Future Technologies Conference and Exhibition (see <http://www.fet11.eu/>). The conference shall foster a dialogue between science, policy and society on future and emerging technologies, showcase progress, seed new ideas across disciplines and involve high-potential actors that can reshape the future. Proposals will address pre-conference communication, the local organisation, participant assistance and post-conference follow-up. The event shall take place late 2015 or early 2016.

e) [2015] FET Take-Up: actions for stimulating take-up of FET research results towards impact and innovation, in ways that are complementary to and beyond the capacity of single research projects. Examples include outreach to investors and entrepreneurs, use of unconventional channels (like NGOs or artists), or targeting of new audiences and purposes (e.g. for social innovation, global development or peace).

f) [2014] FET Prizes: Identifying suitable areas in which prizes and competitions can boost FET research and increase its impact. Actions shall aim to identify a diversity of such areas, investigating for each of them the rationale, competition objectives, target communities (possibly including youngsters) and organisational aspects of running the competitions.

g) [2014] FET Impact: Assessing the direct and indirect impacts of the FET programme on the science and technology landscape and its perception by individuals and society. Proposals must indicate a framework of key performance indicators, a systematic assessment methodology and perform the required data collection and analysis, in line with the overall mission of FET.

For each of the scope items a), b), d), f) and g) at most one proposal will be funded.

Timeline: publication: 11 December 2013 // deadline: a, b, d, f, g: 30 September 2014 / e: 31/3/2015 / c: 30/09/2014, 31/03/2015, 29/09/2015

Indicative budget: 2014: 3 M, 2015: 1,5 M and 1,5 M

Instrument: Coordination and Support Actions (100% funding)

Note: The Commission considers that proposals requesting a contribution from the EU of between EUR 0,3 and 0,5 million, and up to EUR 1 million for scope item d), would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

**APP interest: TBD**

#### 1.4.2. FET-PROACTIVE - NURTURING EMERGING THEMES AND COMMUNITIES (FETPROACT)

FET Proactive nurtures emerging themes and communities by addressing a number of promising exploratory research themes with the potential to generate a critical mass of inter-related projects that, together, make

up a broad and multifaceted exploration of the themes and build a European pool of knowledge and excellence. Through this line of activity FET engages in the coordinated exploration of a new theme, as well as in the consolidation of promising future technologies to be taken up by industry and society. Under its proactive calls the present work programme supports two themes (H2020-FETPROACT) selected from a wide bottom-up consultation (see 'FET Observatory') and a third one (H2020-FETHPC) implementing part of the HPC strategy elaborated in the context of the HPC Public-Private Partnership by ETP4HPC<sup>7</sup>.

- d) **Global Systems Science (GSS)** aims to radically improve the way in which scientific knowledge can stimulate, guide, and help evaluate policy and societal responses to global challenges like climate change, global financial crisis, global pandemics, and growth of cities – urbanisation and migration. This is a highly interdisciplinary theme with strong impacts across different sectors of policy and society.
- e) **'Knowing, doing and being: cognition beyond problem solving'** aims at renewing ties between the different disciplines studying knowledge, cognition and related issues (e.g., embodiment, , development, insight, identity, responsibility, culture...) from various perspectives (e.g., neural, physical, social, ecological), to artificial cognitive systems beyond the level of dull task execution or repetitive problem solving. This topic has been selected to stimulate new interdisciplinary configurations and for its potential to boost future innovation potential in robotics, materials and cyber-physical systems.
- f) **'Towards exascale high-performance computing'** is the science and technology building block of Europe's trailblazing and timely initiative to achieve world-class extreme scale computing capabilities in terms of platforms, technologies and applications. The increasing demand for computing power from all areas of modern science and industrial engineering cannot be met without radically new architectures, new algorithmic approaches and the interdisciplinary co-design of software and applications.

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

FET Proactive initiatives have one of the following strategic objectives:

- An **exploratory** initiative explores a variety of directions and builds up a pool of knowledge and new research alliances around promising emerging themes. This will encourage new inter-disciplinary collaborations around a new area or theme, sifting through a wide range of options in order to get a better understanding of which ones may be the more promising directions towards future technologies.
- A **delivery** initiative aims at translating science into concrete technological directions by projects that build on proofs-of-concept and that want to take them to a next level of development. This will consolidate a technological direction within an emerging ecosystem of science and innovation actors.

Proposals are invited against the following topics:

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<sup>7</sup> <http://www.etp4hpc.eu>

#### 1.4.2.1. FETPROACT 1 - 2014: GLOBAL SYSTEMS SCIENCE (GSS)

Specific challenge: The ambition is to improve the way scientific knowledge can help inform and evaluate policy and societal responses to global challenges like climate change, global financial crises, global pandemics, and growth of cities – urbanisation and migration patterns. These challenges entangle actions across different sectors of policy and society and must be addressed by radically novel ideas and thinking for producing, delivering, and embedding scientific evidence into the policy and societal processes.

GSS will put to full use the abundance of data on social, economic, financial, technological, and ecological systems available today. GSS emphasises systems thinking and the need to integrate/link data, models, and policies across all policy sectors with all societal actors. GSS will build on results from, among others, Complex Systems Science, Network Science, Mathematics of Big Data, the life sciences, social sciences and humanities, behavioural sciences, statistics, econophysics, etc.

Scope: Projects must address all of the below steps, necessary to successfully embed scientific evidence in the policy processes tackling global challenges:

- Research grounded in theoretical foundations of, among others, systemic risk, decision making under uncertainty or conflicting evidence, mathematics and computer science for Big Data (including their characteristics), algorithmic game theory, cascading/escalating effects in networks, integration and visualisation of Big Data...
- Contributions to solving real world problems in one selected problem area - for instance tackling systemic risk in finance/economics, managing growth of cities and migration, or global pandemics – and in particular to tackle cross-cutting policy dependencies and interactions affecting the area of choice.
- Novel ideas and technologies to generate and better communicate the scientific evidence-base: advanced simulation of highly interconnected systems; mathematical and tools for analysing (often unstructured) Big Data; integration of the whole spectrum of structure and unstructured data; methods to deal with conflicting data and modeling results; novel data visualisation tools.
- Society/human-centred technologies, for instance, new approaches to allow citizens to actively participate in the policy process, to collectively gather and integrate data, analyse evidence, and novel methods to better judge and use scientific evidence: methods, e.g. games, gamification, and narratives to clearly and consistently convey data and modeling results and thereby to stimulate societal responses.

Timeline: publication: 11 December 2013 // deadline: 01 April 2014

Indicative budget: 2014: 10 M

Instrument: Research and Innovation Actions (100% funding)

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

**APP interest: TBD**

#### 1.4.2.2. FETPROACT 2 - 2014: KNOWING, DOING, BEING: COGNITION BEYOND PROBLEM SOLVING

**Specific challenge:** This initiative addresses the interdisciplinary fundamentals of knowing, thinking, doing and being, in close synergy with foundational research on future artificial cognitive systems, robots, smart artefacts and large scale cyber-physical systems. It aims at renewing ties between the different disciplines studying knowledge (especially beyond the 'declarative' and static action oriented kind of knowledge), cognition (e.g., perception, understanding, learning, action) and related issues (e.g., embodiment, thinking, development, insight, knowledge as a social construct, identity, responsibility, culture...) from various perspectives (e.g., physical, biological, neuronal, behavioural, social, epistemological, ecological). The aim is to enable new synergies with engineering disciplines on smart and self-organising materials, embedded systems, robotics, hybrid systems or smart infrastructures and cities to take artificial cognitive systems beyond the level of dull task execution or repetitive problem solving.

**Scope:** Proposals must address at least one of the following topics:

- New concepts and paradigms in cognitive systems such as new approaches to embodiment, learning, motivation, autonomy, knowledge and mind, not limited to prior anthropocentric or bio-mimetic models. Proposals will aim to demonstrate these paradigms in robust performance of future robotic systems (possibly nano-, micro-, multi-, hybrid- or unconventional ones) in challenging changing environments, possibly co-habited with or linked to biological systems, and over long periods of time.
- Integrative studies of knowing, thinking, doing and being that bridge between low-level (e.g., neuronal, physiological) and high-level (e.g., belief, intention, identity) descriptions. These multidisciplinary studies are expected to go well beyond addressing the perception-action loop, and to tackle issues such as development, experience, understanding, empathy, memory, attention, the emergence and development of self, social belonging and culture. They are to be researched in close synergy with technological experiments, for instance in computational neuroscience, intelligent materials, robotics, cyber physical settings or large scale simulations that incorporate, test and refine insights gained.
- Approaches for understanding the long-term development of individual and social knowledge and identities, especially in highly heterogeneous and dynamic settings (reflecting aspects of e.g., diversity, urban change, migration, social and gender divides, multiculturalism, inter-disciplinarity, etc.). Proposals are expected to take into account the role of technologies and infrastructures in this, as well as how these facilitate or hamper societal changes.

**Timeline:** publication: 11 December 2013 // deadline: 01 April 2014

**Indicative budget:** 2014: 20 M

**Instrument:** Research and Innovation Actions (100% funding)

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

**APP interest: TBD**

### 1.4.3. FET-PROACTIVE - TOWARDS EXASCALE HIGH PERFORMANCE COMPUTING (FETHPC)

High Performance Computing (HPC) is a crucial asset for Europe's innovation capacity and is of strategic importance to its scientific and industrial capabilities, as well as to its citizens. The European strategy in HPC aims at ensuring European leadership in the development and use of HPC systems, software, applications and services by 2020. The implementation of this HPC strategy in Horizon 2020 combines three elements: (a) developing the next generation of HPC towards exascale; (b) providing access to the best supercomputing facilities and services; and (c) achieving excellence in HPC applications. A Public Private Partnership (PPP) with the European Technology Platform in HPC (ETP4HPC) (establishment expected by the end of 2013) will provide, throughout Horizon 2020, the framework for the implementation of elements (a) and (c) of the evolving HPC strategy, based on the Strategy Research Agenda (SRA) of the ETP4HPC.

The focus of this proactive call is on element (a) of the HPC strategy and the research and development for advanced applications and co-design of element (c). The support for elements (b) and the infrastructure aspects of HPC applications in element (c) of the strategy will be provided by the e-Infrastructure part of the Excellent Science pillar.

This call aims at leveraging the existing European strengths for building the next generation of extreme performance computing by 2020 and taking advantage of the new opportunities created from the transition from peta to exascale computing.

The goal is to achieve world-class extreme scale computing capabilities in platforms, technologies and applications, while ensuring that a broad spectrum of mid-range and entry-level HPC systems can be built using the targeted technologies in order to maximize the exploitation potential and develop a sustainable European HPC Ecosystem to boost research and innovation in scientific areas such as physics, chemistry, biology, life sciences, materials, climate, geosciences, etc..

This activity will be coordinated with complementary work in LEIT/Advanced Computing, LEIT/Photonics, and ECSEL (Electronic Components and Systems for European ) that will develop basic system technology that is relevant to the needs of exascale computing (e.g. microprocessors, photonics components, interconnects or system software, programming environments for critical/real time systems, etc.).

Proposals are invited against the following topics:

#### 1.4.3.1. FETHPC 1 - 2014: HPC CORE TECHNOLOGIES, PROGRAMMING ENVIRONMENTS AND ALGORITHMS FOR EXTREME PARALLELISM AND EXTREME DATA APPLICATIONS

**Specific challenge:** The challenge is to achieve, by 2020, the full range of technological capabilities needed for delivering a broad spectrum of HPC systems, from extreme-scale HPC systems, to extremely efficient, innovative and competitive mid-range and entry-level systems for the broader and/or emerging HPC markets. The designs of these systems need to respond to critical demands of energy efficiency, new delivery models, as well as to the requirements of new types of applications, including extreme-data applications. New methodologies, environments and tools for extremely-parallel and data-intensive programming are needed to achieve code quality and portability, reduce software development and maintenance costs while maximally exploiting underlying system capabilities (e.g., exploiting millions of cores in an energy-aware way). New mathematics and new algorithms are needed for ultra-scalable algorithms with predictable performance for existing or visionary applications, including data-intensive and extreme data applications in scientific areas such as physics, chemistry, biology, life sciences, materials, climate, geosciences, etc.

**Scope:** Proposals must target at least one of the following topics:

- a. HPC core technologies and architectures, addressing one or more of the HPC core technologies (processors, memory, interconnect and storage) and their optimal integration into HPC systems, platforms and prototypes. Proposals should have a co-design approach driven by ambitious applications and in close cooperation with the scientific disciplines and stakeholders concerned, aiming at radical overall system performance improvement while at the same time addressing issues such as: a holistic understanding of energy efficiency across the full HPC system architecture; I/O, storage and data-throughput capabilities especially for big-data applications; radical scalability, concurrency, locality and resilience in the presence of millions of cores.
- b. Programming methodologies, environments, languages and tools: development of new programming models, domain-specific languages, programming paradigms, visualisation and data-analysis tools to facilitate the effective exploitation of the full system capabilities (including energy management) of the emerging large- and extreme scale systems, in particular for extreme parallelism and extreme data applications.
- c. APIs for Future Extreme Scale Systems and exascale stack: New APIs and the corresponding efficient, flexible and scalable exascale system software for managing extreme scale systems, taking into account extreme parallelism, extreme data, energy consumption and resilience. Proposals are expected to include communication and dissemination activities towards relevant standards bodies and research programmes. It is expected that proposals on this point have the critical mass, if necessary beyond Europe, to strategically coordinate the API work in the exascale stack.
- d. New mathematical and algorithmic approaches for existing or emerging applications on extreme scale systems. Work proposed should include energy-aware algorithms and maximally exploit the projected characteristics of exascale-class systems. Specific issues are quantification of uncertainty and noise, multiscale and extreme data. Software engineering for extreme parallelism should be addressed. Open source development is privileged.

**Timeline:** publication: 11 December 2013 // deadline: 25 November 2014

**Indicative budget:** 2014: 94 M

**Instrument:** Research and Innovation Actions (100% funding). A minimum of 60% of the available budget will be allocated to research under part a) of the scope.

**Note:** The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 4 million would allow this specific challenge to be addressed appropriately. Under part a) of the scope also larger proposals requesting a contribution from the EU of up to EUR 8 million can be envisaged. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

**APP interest: TBD**

#### 1.4.3.2. FETHPC 2 - 2014: HPC ECOSYSTEM DEVELOPMENT

**Specific challenge:** to develop a sustainable European HPC Ecosystem

**Scope:** proposals shall address a single of the two following topics:

a) Coordination of the HPC strategy: The aim is to support the implementation of a common European HPC strategy through coordination of the activities of stakeholders such as the European Technology Platform for HPC (ETP4HPC), PRACE, application owners and users (including emerging HPC applications), the European exascale computing research community, the open source HPC community, related activities in other parts of H2020, etc. Proposals must include activities for promoting a joint community structuring and synchronisation as well as other non-research activities such as the development of Strategic Research Agenda for High Performance Computing (including the roadmap for exascale in Europe), the link to the H2020 Societal Challenges, the mapping and analysis of related national and international R&I programmes/activities/research agendas in HPC towards exascale, coordination with and participation in relevant international activities, etc. Specific actions for attracting young talent into HPC must be included.

b) Excellence in High Performance Computer Architecture: The aim is to boost European research excellence in high-performance computer architecture, to ensure a durable integration of the relevant European research teams, to identify and promote best practices in computer architecture curricula and training, to build and strengthen links to venture capital, and to promote entrepreneurship. Activities towards self-sustainability of the research integration on the longer-term must be included.

Timeline: publication: 11 December 2013 // deadline: 25 November 2014

Indicative budget: 2014: 4 M

Instrument: Coordination and Support Actions (100% funding).

**APP interest: TBD**

#### 1.4.3.3. FETHPC 3 - 2014: TARGETED OPENING WITH RUSSIA

Specific challenge: Collaboration with Russia on mathematics and algorithmic as well as on common HPC programming interfaces and interoperability of tools.

Scope: Research work must cover one or more of the following areas:

- New mathematical and algorithmic approaches for existing or emerging applications for extreme scale systems
- Programming models and APIs for extreme scale systems
- Development of common tools for extreme scale systems

Timeline: publication: 11 December 2013 // deadline: 25 November 2014

Indicative budget: 2014: 2 M

Instrument: Research and Innovation Actions ((100% funding).

**APP interest: TBD**



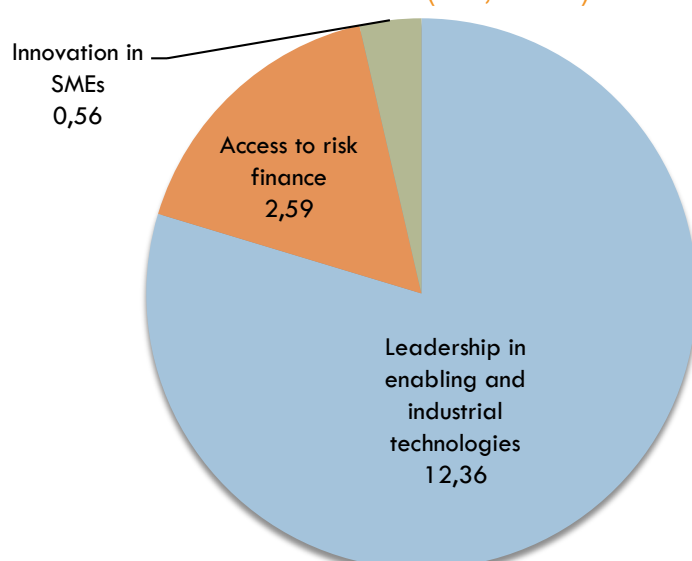
#### 1.4.4. FET-FLAGSHIPS -TACKLING GRAND INTERDISCIPLINARY SCIENCE&TECHNOLOGY CHALLENGES

FET Flagships support ambitious large-scale, science-driven research aimed at grand interdisciplinary S&T challenges. Such activities require and will benefit from the alignment of European and national agendas, and provide a strong and broad basis for future technological innovation and economic application in a variety of areas, as well as novel benefits for society. The present workprogramme continues to support and to further develop two FET flagships (call H2020-FETFLAG):

- The Graphene flagship pushes the science and technologies for a new class of material beyond the era of silicon, bringing graphene and related 2D-materials, from academic labs to industry, manufacturing and society.
- Human Brain Project (HBP) aims to simulate and better understand the Human Brain in order to develop new diagnostic tools and treatments for brain diseases, as well as new classes of low-energy technologies with brain-like intelligence, such as neuromorphic computing.

**APP interest: Since these are preselected – Graphene and Human Brain Project – there is no interest here for the APP community**

## PILLAR 2: INDUSTRIAL LEADERSHIP (15,51 B)



### 2.1. LEADERSHIP IN ENABLING AND INDUSTRIAL TECHNOLOGIES (LEIT)

A note on Technology Readiness Levels (TRLs):

- TRL 1 – basic principles observed
- TRL 2 – technology concept formulated
- TRL 3 – experimental proof of concept
- TRL 4 – technology validated in lab
- TRL 5 – technology validated in relevant environment (industrial environment in the case of KETs)
- TRL 6 – technology demonstrated in relevant environment (industrial environment in the case of KETs)
- TRL 7 – system prototype demonstration in operational environment
- TRL 8 – system complete and qualified
- TRL 9 – Actual system proven in operational environment (competitive manufacturing in the case of KETs; or in space)

For areas relevant to TRL scale, this Work Programme addresses TRLs from 3-4 up to 7-8. For Space this Work Programme focuses on low TRLs (1-4), with bottom-up calls, and on preparing the ground for high TRL activities (6-7), with Strategic Research Clusters and in-orbit demonstration.

#### 2.1.1. ICT

ICT in LEIT is structured around focused implementation of roadmap based R&I developed closely with industrial partners in several contractual Public Private Partnerships (cPPP). Furthermore, a strong support to innovation is found throughout the Programme. New mechanisms such as the SME instrument, Prizes and Open Schemes will help attract new constituencies and move towards a more agile, risk-taking and reactive support to innovation. Innovation-oriented activities will be a key element in all areas.

Activities will not be carried out in isolation. Synergies will be developed within LEIT and between the other two pillars of H2020 as well as between the ICT activities and other parts of Horizon 2020. In particular

ICT in LEIT provides ICT generic technologies to support a large part of the Focus Areas defined in the Strategic Programme.

#### 2.1.1.1. 1.A.1 ICT CHALLENGE 1 – A NEW GENERATION OF COMPONENTS AND SYSTEMS

Electronics, microsystems and embedded systems underpin innovation and value creation across the economy. The objective is to reinforce Europe's stronghold positions in electronics, microsystems and embedded systems and to capture opportunities in new growth ICT markets driven by advances in these technologies. When connected to the evolving Internet, this includes the components and systems that will equip our everyday environments from our own clothes and body to homes, offices, cars, factories, public spaces and cities. Challenge 1 addresses the broad range of systemic integration from smart integrated components to cyber-physical systems. It covers technology-driven R&D which is mostly application-independent and which is complemented by more application-driven R&I, where components and systems are demonstrated, instantiated, integrated and validated. Work is complementary to the activities addressed by the ECSEL Joint Undertaking, which has a centre of gravity on large scale federating projects and integrated demonstrations and pilots. To a large degree Challenge 1 implements parts of the Strategic Research Agendas of Artemis-IA ([www.artemis-ia.eu](http://www.artemis-ia.eu)), EPoSS ([www.smart-systems-integration.org](http://www.smart-systems-integration.org)), and Photonics21 ([www.photonics21.org](http://www.photonics21.org)).

Challenge 1 consists of three related topics: The objective of topic 1 is to reinforce and expand Europe's leading industrial position in embedded systems and their further development into cyber-physical systems. Mastering complex cyber-physical systems with massive amounts of interconnected ICT devices embedded in physical objects at different locations is essential for European industry to be able to shape, and create value from future development of the Internet towards an Internet of things supported by a Cloud Infrastructure and delivering a wide range of guaranteed high quality services. Topics 2 and 3 are driven by the vision that the heterogeneous integration of micro and nanotechnologies and materials into smart microsystems will deliver affordable high performance functionalities for a broad spectrum of use, for the benefit of European ICT industrial competitiveness and the well-being of the citizen. The main goal is to establish European leadership and new ecosystems for the design, research, development, manufacturing and use of Smart Miniaturised Electronic Systems and of Thin, Organic and Large Area Electronics (TOLAE).

1.A.1.1 Smart Cyber-Physical Systems

1.A.1.2 Smart System Integration

1.A.1.3 Advanced Thin, Organic and Large Area Electronics (TOLAE) technologies

**APP interest: 1.A.1.3 Advanced Thin, Organic and Large Area Electronics (TOLAE) technologies**

#### 2.1.1.2. 1.A.2 ICT CHALLENGE 2 - ADVANCED COMPUTING

This Challenge is driven by the vision that customised heterogeneous low-power computing systems delivering high-performance functionality under real-time constraints will power our cyber-physical systems (CPS) and smart environments of the future. The strategic focus of Challenge 2 is to reinforce and expand the European low-power ICT industrial and technology strengths in order to address different market segments through an integrated cross-layer (hardware, system, programming, algorithms) and cross-application/cross-market approach.

Work under this challenge is complementary to, and will be coordinated with work undertaken by LEIT-ICT-Challenge 3 under Cloud Computing and by the SCIENCE pillar under Research infrastructures and FET. While this Challenge focuses on the integration of advanced components on all levels in computing systems, the development of next generation CPUs is addressed under the JTI on electronic components and systems in Challenge 6. This topic is also complementary to the work on cyber-physical systems under LEIT-ICT-Challenge 1 and under the ECSEL Joint Technology Initiative.

#### 1.A.2.1 Customised and low power computing

**APP interest: 1.A.2.1 Customised and low power computing**

#### 2.1.1.3. 1.A.3 ICT CHALLENGE 3 – FUTURE INTERNET

Over the last 30 years, the Internet has become a major infrastructure for growth, job creation, and social progress. The challenge is now to enable the Internet to continue to foster and support development and to accommodate all the diverse usages for which it was not initially foreseen. Hence this Challenge aim is to address the most critical technical and use aspects for the Internet to be apt to support the huge future expectations.

The Future Internet challenge will therefore i) address the limitations of an Internet not designed to support the very large set of requirements imposed by an ever more diversified usage; ii) support the advent of more efficient computational and data management models responding to the challenges posed by increased device / object connectivity and data-intensive applications; iii) leverage the Internet to foster innovative usages of social and economic value. The challenge strategy is thus based on a complementary set of technology push – usage pull actions. The technology perspective primarily addresses the limitations of communication networks and cloud computing infrastructures and services when moving towards a hyper connected world with hundreds of billions of devices fuelled by ambient and pervasive services. The usage perspective is supported by the early availability of testbeds for experiments and research validation (FIRE+) and by innovative social and business collaborative usages with users in control and taking advantage of advanced technologies. This is complemented with actions towards web entrepreneurs to leverage downstream business opportunities.

##### 1.A.3.1 Smart Networks and novel Internet Architectures

##### 1.A.3.2 Smart optical and wireless network technologies

##### 1.A.3.3 Advanced Cloud Infrastructures and Services

##### 1.A.3.4 Boosting public sector productivity and innovation through cloud computing services

##### 1.A.3.5 Tools and Methods for Software Development

##### 1.A.3.6 Collective Awareness Platforms for Sustainability and Social Innovation

##### 1.A.3.7 FIRE+ (Future Internet Research & Experimentation)

##### 1.A.3.8 Building upon FIRE+

##### 1.A.3.9 Web Entrepreneurship

##### 1.A.3.10G PPP

**APP interest:****1.A.3.1 Smart Networks and novel Internet Architectures****1.A.3.2 Smart optical and wireless network technologies****1.A.3.3 Advanced Cloud Infrastructures and Services****1.A.3.5 Tools and Methods for Software Development****1.A.3.7 FIRE+ (Future Internet Research & Experimentation)****2.1.1.4. 1.A.4 ICT CHALLENGE 4 – CONTENT TECHNOLOGIES AND INFORMATION MANAGEMENT**

The cultural and creative sectors account for 3.3% of GDP and employ 6.7 million people (3 % of total employment) in the EU. Moreover, worldwide Big Data technology and services are expected to grow from USD 3.2 billion in 2010 to USD 16.9 billion in 2015. The challenge is therefore to strengthen Europe's position as provider of products and services based on digital content and data in order to gain and maintain a significant share of the global market. Research and Innovation activities in this challenge will provide professionals and citizens with new tools to model, analyse, and visualise vast amounts of data from which to extract more value to make an intelligent use of data coming from different sources and to create, access, exploit, and re-use all forms of digital content in any language and with any device.

This challenge addresses in particular four key areas of digital content and information management:

- Big Data, with technologies for extracting value from data as well as innovation around data services and products;
- Machine translation, to overcome barriers to multilingual online communication which is still hampering a wider penetration of cross-border commerce, social communication and exchange of cultural content;
- Tools for creative, media, knowledge and learning industries, mobilizing the innovation potential of the tens of SMEs active in the area, so to;
- Multimodal and natural computer interaction based upon multimodal verbal and non-verbal communication.

This challenge identifies and supports key components for the EU to become a leading supplier - and a strong contender internationally.

1.A.4.1 Big Data Innovation and take-up

1.A.4.2 Big Data - research

1.A.4.3 Cracking the language barrier

1.A.4.4 Support the growth of ICT innovative Creative Industries SMEs

1.A.4.5 Technologies for creative industries, social media and convergence.

1.A.4.6 Adaptive and cognitive systems for human learning

1.A.4.7 Advanced digital gaming/gamification technologies

1.A.4.8 Multimodal and Natural computer interaction

**APPEC interest:****1.A.4.1 Big Data Innovation and take-up****1.A.4.2 Big Data - research****2.1.1.5. 1.A.5 ICT CHALLENGE 5 – ROBOTICS**

The importance of robotics lies in its wide-ranging impact not only on Europe's capacity to maintain and grow a competitive manufacturing sector with millions of related jobs but also on its capacity to address key societal challenges from ageing to health, security, energy and environment.

Smart automation and robotics are simply vital for maintaining manufacturing and associated services in higher-wage regions of the world. Today, large and core business sectors including automotive, aerospace, agro-food or microelectronics, representing more than 20 % of our GDP would quite simply disappear from Europe without intensive use of advanced robotics. By freeing workers from hard, repetitive jobs, robots help us meet the expectations of an increasingly skilled labour force and offer jobs in line with the aspirations for higher quality work conditions.

The potential of robotics expands far beyond the factory though. Service robots for professional or domestic use represent an emerging market with strong growth perspectives as robots become mainstream appliances and systems in many walks of life (work, home appliances, leisure, medical equipment, security, etc). Robots are increasingly endowed with learning and adaptive capabilities that will have a broad impact on all future ICT systems in a wide range of products and services.

The potential economic and societal impact brought by robotics technology is therefore immense. Building on its strengths in industrial and professional service robotics and on the academic knowhow, Europe can play a leading role in future development of the sector.

To conquer new markets and enable large scale deployment of robots, it is essential to advance the current robot capabilities in terms of robustness, flexibility and autonomy to make them achieving useful tasks in an efficient manner while operating in real-world environments. This also requires substantial innovation activities.

1.A.5.1 Roadmap-based R&D&I in Robotics

1.A.5.2 Roadmap-based R&D&I in Robotics

**APP interest: 1.A.5.1 Roadmap-based R&D&I in Robotics****2.1.1.6. 1.A.6 ICT CHALLENGE 6 – MICRO- AND NANO-ELECTRONIC TECHNOLOGIES, PHOTONICS**

This challenge addresses research and innovation in the two ICT Key Enabling Technologies (KETs), micro- and nanoelectronics and photonics. The objective is to take advantage of the S&T excellence that Europe has in these two ICT KETs to support technology development and innovation and strengthen the competitiveness and market leadership of the related industries. This will be essential for growth and jobs in Europe and at the same time it will enable innovative solutions to societal challenges. The challenge also includes activities enabling the cross-fertilisation of the ICT KETs. The challenge is structured as follows:

Micro- and nanoelectronics will be implemented by the JTI on 'Electronic Components and Systems'<sup>8</sup> and within the EC.

Implementation through the JTI on 'Electronic Components and Systems': The JTI will facilitate multi-disciplinary industry-driven research technology development and innovation along the full innovation and value chain, covering Technology Readiness Levels (TRLs) 2 to 8. Focus is on large federating projects including manufacturing pilot lines, technology platforms and application experiments. These are areas in which resources must be pulled from Member States and regions. The Annual Work Programme will be developed within the JTI. It will be based on the multi-annual Strategic Research Agenda elaborated by industry.

Implementation through the EC: Generic Technology Development on micro- and nanoelectronics focused on advanced research/technology development and lower TRLs. Activities should be of direct industrial relevance and have a medium time to market.

The photonics part covers research and innovation activities under the photonics public private partnership (PPP). The activities will address the whole research and innovation value chain – from materials through equipment and devices, to manufacturing and to products and services, and from advanced RTD to pilot lines and to the market.

1.A.6.1 Generic micro- and nano-electronic technologies

1.A.6.2 Photonics KET 2014

1.A.6.3 Photonics KET 2015

1.A.6.4 Cross-cutting ICT KETs 2015

**APPEC interest:**

**1.A.6.2 Photonics KET 2014**

**1.A.6.3 Photonics KET 2015**

#### 2.1.1.7. 1.A.7 SPECIFIC CALL FOR MANUFACTURING, FOF

The Public Private Partnership "Factories of the Future" (PPP FoF) builds on Europe's strengths in engineering and manufacturing technologies and supports the pan-European effort for re-industrialisation through higher innovation in the manufacturing sector ensuring higher growth and jobs creation in the related sectors. Europe is today a world-leader in many areas such as industrial robotics and factory automation, embedded digital systems, enterprise and design software, and 3D- and laser-based manufacturing. Europe's industrial competitiveness depends on its capacity to deliver highly innovative products that are produced economically and at high quality. Innovation in these products often originates from advances in ICT. ICT not only brings radical improvements to engineering, design and manufacturing processes but it also adds significant value to these products and services with embedded electronics and systems. Both, in combination allow for a more personalized, diversified and mass-produced product portfolio and flexible reaction to market changes.

In Horizon 2020 the PPP FoF is implemented in a complementary way under two pillars of the LEIT Programme: "Information and Communications Technologies" (ICT) and "Advanced Manufacturing and

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<sup>8</sup> The scope of the JTI covers micro- and nanoelectronics, embedded and smart systems

Processing". Both are driven by the 2013 Multi-Annual Roadmap for the PPP FoF, which was developed by the European Factories of the Future Research Association (EFFRA). The ICT part in Work Programme 2014/15 is implemented in three complementary topics described underneath. Several of the research activities addressed here are also in line with the Strategic Research Agenda of the proposed PPP SPIRE (Sustainable Process Industry through Resource and energy Efficiency).

- 1.A.7.1 Process optimisation of manufacturing assets
- 1.A.7.2 ICT-enabled modelling, simulation, analytics and forecasting technologies
- 1.A.7.3 ICT Innovation for Manufacturing SMEs (I4MS)
- 1.A.7.4 Development of novel materials and systems for OLED lighting or displays

#### 2.1.1.8. 1.A.8 ICT CROSS-CUTTING AND HORIZONTAL ACTIVITIES

- 1.A.8.1 Internet of Things and Platforms for Connected Smart Objects
- 1.A.8.2 Human-centric Digital Age
- 1.A.8.3 Cybersecurity, Trustworthy ICT
- 1.A.8.4 Trans-national co-operation among National Contact Points
- 1.A.8.5 Support for access to finance
- 1.A.8.6 Innovation and Entrepreneurship Support

**APP interest:**

**1.A.8.1 Internet of Things and Platforms for Connected Smart Objects**

#### 2.1.1.9. 1.A.9 SPECIFIC CALL FOR ODI

- 1.A.9.1 Open Disruptive Innovation Scheme

#### 2.1.1.10. 1.A.10 INTERNATIONAL COOPERATION

- 1.A.10.1 International partnership building and support to dialogues with high income countries
- 1.A.10.2 International partnership building in low and middle income countries
- 1.A.10.3 International Cooperation on Future Internet Research & Experimentation
- 1.A.10.4 EU-Brazil Research and Development Cooperation in Advanced Cyber Infrastructure
- 1.A.10.5 EU-Japan Research and Development Cooperation in Net Futures

**APP interest:**

**1.A.10.1 International partnership building and support to dialogues with high income countries**



- 1.A.10.2 International partnership building in low and middle income countries
- 1.A.10.3 International Cooperation on Future Internet Research & Experimentation
- 1.A.10.4 EU-Brazil Research and Development Cooperation in Advanced Cyber Infrastructure
- 1.A.10.5 EU-Japan Research and Development Cooperation in Net Futures

## 2.1.2. SPACE

Space research is supported in Horizon 2020 under the heading "Industrial Leadership", in line with the main objective and challenge to **foster a cost-effective competitive and innovative space industry (including SMEs) and research community to develop and exploit space infrastructure to meet future Union policy and societal needs**. Building on the successes of FP7, Horizon 2020 will enable the European space research community to develop innovative space technologies and operational concepts "from idea to demonstration in space", and to use space data for scientific, public, or commercial purposes. This will anchor and structure space research and innovation at the European level.

Actions will be carried out in conjunction with research activities of the Member States and ESA, aiming at building up complementarity among different actors.

The Commission proposal for Horizon 2020 sets the following motto for EU Space R&D for 2014 to 2020 'Prepare for the increasing role of space in the future and reap the benefits of space now'.

The work programme has been structured to address these roles by

- Prioritising the three EU Space flagships of **European Global Navigation Satellite System (EGNSS)**, **Earth Observation** and **Securing Europe's investment in Space against threats**, ensuring their state-of-the-art also in the future;
- Ensuring support for the third programmatic priority of the EU space policy: the protection of space infrastructure and in particular the setting up of a **Space Surveillance and Tracking system (SST)** at European level;
- Ensuring support to EU industry to meet the objectives defined in the Commission communication on Space Industrial Policy, notably **to maintain and enhance industry's competitiveness and its value-chain in the global market**;
- Ensuring that Europe's investments made in space infrastructure are exploited to the benefit of citizens, as well as **space science; and**
- Enhancing Europe's standing as attractive partner for **international partnerships in space science and exploration**.

### 2.1.2.1. "APPLICATIONS IN SATELLITE NAVIGATION - GALILEO" – 2014 & 2015

- GALILEO 1 – 2014-2015: EGNSS applications // Proposals should aim at developing new innovative applications, with future commercial impact. The topic addresses application development in all market segments, such as: transport (road, rail, maritime, aviation), high precision surveying, location based services (LBS), agriculture, emergency services etc responding to user requirements. Application development should be seen in a broad context - it includes the development, adaptation and/or integration of new software, hardware, services, datasets, etc. The use of EGNOS and Galileo Early

Services is a key priority for this topic. // Innovation Actions. The indicative funding earmarked for this topic is EUR 15-20 million in 2014 and EUR 10-15 million in 2015.

- GALILEO 2 – 2014-2015: Small and Medium Enterprise (SME) based EGNSS applications // This topic will explore new applications in niche market sectors and business models in any application domain. Proposals should aim at developing sophisticated, innovative applications, such as mass market location based services (LBS) products, feasibility studies, market tests etc. Application development should be seen in a broad context - it includes the development, adaptation and/or integration of new software, hardware, services, datasets etc. Proposals should address emerging user needs and taking specifically advantage of the Galileo and EGNOS capabilities and their distinguishing features A specific emphasis will be given to support development of technological breakthrough into viable products with real commercial potential, where SMEs, which are considered as the key players for innovation in this domain, play a pivotal role, given their flexibility and adaptability. The Commission considers that proposals requesting a contribution from the EU of around € 500.000 would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. // Innovation Actions. The indicative funding earmarked for this topic is EUR 5-10 million 2014 and EUR 5-10 million in 2015
- GALILEO 3 – 2014-2015: Releasing the potential of EGNSS applications through international cooperation // Activities under this topic will enable the development of innovative applications within international context and related standards with high international impact, ensuring that the EGNSS services are well known and can be used throughout the world. The objective is to support new projects consisting of demonstrators of applications, adaptations of applications to a specific and local context outside of the European Union and the implementation of applications benefiting from multiple constellations, including Galileo. GNSS should be used as the primary positioning technology in the application and positioning should be a key enabler of the application. Third countries will be guided and supported in adapting services and developing applications corresponding to local needs and ensure that no unnecessary restriction to the use of the EGNSS is applied. Focus will be on regions of the world, which represent an attractive market for the European industry. // Innovations Actions. The indicative funding earmarked for this topic EUR 5-8 million in 2014 and EUR 0-5 million in 2015.
- GALILEO 4 – 2014-2015: EGNSS awareness raising, capacity building and/or promotion activities, inside or outside of the European Union // The proposals should aim at capacity building, increasing awareness of EGNSS solutions, providing networking opportunities of centres of excellence and other relevant actors and achieving a critical mass of EGNSS applications success stories, making it an attractive option for private investors in Europe and also globally. Activities under this topic may also contribute to the cooperation schemes, which have been established with partner countries worldwide. Technology promotion activities can include support to prizes for innovative applications developed by companies and entrepreneurs and based on the EGNSS that will promote the uptake of satellite navigation downstream applications across Europe and beyond. Proposal for support for prizes shall include details about the intended conditions for participation, award criteria, amount of prizes and arrangements for the payment of prizes to the winners. // Coordination and Support Action (100% rate), Indicative funding for this topic EUR 5-10 million

Timeline: publication: 11 December 2013 // deadline: 3 April 2014 / 4 February 2015

Indicative budget: 2014: 38 M, 2015: 25 M

**APP interest: TBD**

### 2.1.2.2. "EARTH OBSERVATION" – 2014/2015

#### 1) Objective 1 – Space enabled Applications

Over the last decade, Europe has established the autonomous capacity for space-borne observations and operational services in the field of environment and the management thereof, climate change, civil protection and security. Operational satellites are providing data on a free and open data policy basis as well as commercially, and are complemented by first-of-a-kind research satellites. During its lifetime, Horizon 2020 will be supporting the operational Copernicus activities by addressing the continuity of pre-operational services until end of 2014, fostering the development of uptake of EO data (and specifically Copernicus) in applications and commercial exploitation, and performing RD&I to answer specific service evolution needs expressed by the operational Copernicus services. In the years 2014 and 2015, scientific, operational and commercial exploitation of the existing and emergent European space infrastructure needs to be enhanced, by stimulating the emergence of novel ideas on what can be observed from space, and what information might still be hidden in existing Earth Observation (EO) data of various kinds. Research to promote such new ideas will ensure Europe's leadership in space-enabled applications in the future, and enable Europe to effectively address its research challenges, as well as the focus areas of the Commission's strategic programme for Horizon 2020, in innovative ways within the societal challenge pillar.

- EO 1 - 2014: New ideas for Earth-relevant space applications // New and hitherto immature uses of Earth-relevant space-based data (also taking into account specific satellite sensor acquisition modes) should be investigated to enable integration or assimilation into scientific investigations related to Earth system sciences, or forecasting models at regional or wider geographical extent. Attention should be given to space based data covering geographic areas sensitively affecting the earth system, as is the case for instance for the Arctic. When considering inclusion of space based data, consideration should also be given to the near real-time access opportunities offered by state of the art and next generation space/satellite communications capabilities. It is expected that proposals address also how the insights proposed to be obtained from space based data can be validated, e.g. in combination with ground based observations, or in-flight collected data, with appropriate attention also being given to calibration of space data. Research into specification of the uncertainties associated with the derived results should also be included. To enhance the use of intermediate and final products, due attention is also to be given to standardisation of data, best practices, dissemination mechanisms and reference frames. Furthermore, to enable integration into operational services such as Copernicus requires highly automated processes with minimum manual intervention to be developed. // Type of Action: Research and Innovation Actions. A total of 10 million Euro has been set aside for this topic. The Commission considers that projects requesting a contribution from the EU of between EUR 2 and 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.
- EO 1 – 2015: Bringing EO applications to the market // The outcome of this innovation project should be a commercial service platform, sustained by a production process capable to deliver to the user a product which is validated and accepted as a marketable product. Transnational collaboration has a key role to play in this context, as it enhances access to markets beyond the national borders, notably by enabling space application providers to absorb market-related tacit knowledge and know-how of their partners. Corresponding validations and customisations are to be undertaken, and the business case for the application is to be demonstrated. Service level models are to be developed, with appropriate quality of service definitions for the application. Application products are expected to adopt open standards for data documentation, data models and services. // Innovation actions. A total of 10 million Euro has been set aside for this topic. The Commission considers that proposals requesting a contribution from the EU of between EUR 1 and 2 million would allow this specific

challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

## 2) Objective 2 – Tools for access to space data

Efficient and widespread exploitation of the existing and planned operational European space infrastructure (especially Copernicus with its sentinel satellites) is only possible if further efforts are made for the processing, archiving, standardised access and dissemination of satellite data. Sustainable availability has also to be coupled with generic search, data-mining and visualisation techniques inviting wide data use, also allowing for standardised and automated approaches. Wide use has to be achieved at European and global levels, and coordination with mechanisms promoted in the context of the Global Earth Observation System of Systems (GEOSS) and the Committee on Earth Observing Satellites (CEOS) is to be achieved.

For successful exploitation of space borne sensors to take place, it is furthermore necessary to provide access to easy-to-use, calibrated and validated data products, taking into account the latest and emerging remote sensing capabilities. Validation efforts have to provide researchers and users with well-defined uncertainty ranges of space data to make the subsequent usage verifiable and to allow for cross-sensor or cross-satellite use of data.

Proposals are invited against the following topics:

- EO 2 – 2014: Climate Change relevant space-based Data reprocessing and calibration // The remote sensing data maintained in archives of the relevant data holding agencies will require to be reprocessed to ensure the generation of consistent time series of data and products with the most up to date operational algorithms. These time series shall benefit from the panoply of available source data to ensure suitability for producing the most reliable, accurate, stable and complete Climate Data Records. Manipulation of historical data at the relevant sources will be required to enable quick analyses, bulk reprocessing and wide access to different science and application communities. Interoperability of diverse observation collections, including all parts of the atmosphere and its boundary (such as ice, fresh water, sea surface and land surface), tropospheric and stratospheric data, sensor calibration and sensor-to-sensor cross calibration will have to be included, as well as estimates of the associated uncertainties, limits and biases. The proposed activities will need to be closely coordinated with the ESA Climate Change Initiative (CCI). Proposers are advised to consult further information on availability of Copernicus Sentinel Data, access to Copernicus Contributing Mission data, as well as issues recommended to be detailed in the proposals at the Commission's web // Research and Innovation Actions. A total of 5.5 million Euro has been set aside for this topic. The Commission considers that proposals requesting a contribution from the EU of 5.5 million Euro would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.
- EO 3 – 2014: Observation capacity mapping in the context of Atmospheric and Climate change monitoring // Research is needed to assess gaps in remote observation availability and suitable approaches for defining virtual observation constellations. It should include mapping of ground based networks, airborne, balloons and sub-orbital platforms as well as space based sensors. Appropriate calibration and validation of data is to be assessed, charting the campaigns that will be needed to cover the climate change monitoring needs in years to come from remote sensing data gathered over land, water and icy surfaces. A mapping of available/deployed sensor technologies and measurements should be performed as a first step, to identify gaps in available systems and current

knowledge to characterise the atmosphere for different ground level conditions and ensure the provision of reliable and accurate Climate Data Records for the atmosphere, land surfaces and oceans. This information should also lay the basis for drawing up the need for dedicated calibration and validation campaigns combining instruments and measurements deployed in ground based networks, airborne, UAV, balloons, sub-orbital and in-orbit platforms, as relevant for climate change monitoring. Since this activity is highly reliant on consensus of the users in form of the scientific community involved in subsequent climate change and atmospheric measurements/modelling, the project will have to mobilise such key players across Europe and globally, and will have to include mechanisms regarding best practices to reach a consensus on the strategies proposed. // Type of Action: Research and Innovation Actions. A total of 6 million Euro has been set aside for this topic. The Commission considers that projects requesting a contribution from the EU of EUR 6 million Euro would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

- EO 2 - 2015: Stimulating wider research use of Copernicus Sentinel Data // To fully benefit from the high scientific potential of the Sentinel data, development tools, as well as stable and predictable access methods need to be developed, such as: Development of simulators of space based earth observation data, to facilitate the uptake of EO data, and to prepare data processing chains; research into efficient information retrieval from satellite data repositories and dissemination; developing software to read and transform data for access by scientific, institutional and commercial users, including data mining techniques; developing data co-registration and fusion methods (data from several sentinels and /or other contributing satellite missions); advanced visualisation techniques (allowing also for sensory exploration of data beyond visual experience); efficient and validated sentinel data integration methods for operational service use. // Research and Innovation Actions. A total of 11 million Euro has been set aside for this call topic. The Commission considers that projects requesting a contribution from the EU of between EUR 2 and 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.
- EO 3 – 2015: Technology developments for competitive imaging from space // Research should be undertaken to review the emerging fractionated observation system concepts. The required technology challenges as regards interfacing, synchronisation, formation flying, precision thrusting and pointing, communication within the constellation or with ground stations are to be identified. Potential benefits to be obtained (e.g. monitoring performance, risk mitigation, cost effectiveness, responsiveness) are to be examined in light of observation needs in different earth observation domains. Observation needs should be validated with the respective user communities to be fit for purpose in terms of scientific and commercial applications. Constellations of instruments might be of the same instrument type, or include a variety of different instruments and related data fusion approaches. Demands for data transfers and communication should be examined in light of current developments of high-speed in-space communication methodologies. The results obtained should enable mission designers and implementers to decide what missions should be initiated for which application areas, and the requirements for communications support. // Research and Innovation Actions. A total of 5 million Euro has been set aside for call topic. The Commission considers that proposals requesting a contribution from the EU of EUR 2.5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Timeline: publication: 11 December 2013 // deadline: 26 March 2014 / XX XX 201X

Indicative budget: 2014: 21,5 M , 2015: 26 M

### APP interest: Objective 1: New ideas for Earth-relevant space applications?

#### 2.1.2.3. "PROTECTION OF EUROPEAN ASSETS IN AND FROM SPACE" – 2014

The present call concerns space weather and Near Earth Objects (NEOs), while action to support the emergence of a Space Surveillance and Tracking capacity at European level will be dealt with under the heading "Other actions (not subject to calls for proposals)" With increasing dependence on space-based services, the ability to protect our space infrastructures has become essential to our society. Any shutdown of even a part of space infrastructures could have significant consequences for the well-functioning of economic activities and our citizens' safety, and would impair the provision of emergency services. Space harsh radiation and particle can damage spacecraft and ground infrastructure such as power grids and telecom networks. Space Weather activity aims at monitoring understanding and forecasting such phenomena to prevent it. Research is needed to improve our understanding and convert our scientific knowledge into an operational service. NEOs such as Asteroid and Comets when impacting the earth can cause damages to an extent that it could threaten mankind. To meet this global concern, Research will promote a coordinated international effort to predict and mitigate the threats of NEO

Proposals are invited against the following topics:

- PROTEC 1 - 2014: Space Weather // Exploratory work studying new ideas for data analysis and modelling of space weather with a view to enhancing the performance of space weather prediction. Projects can cover the full range of space weather phenomena from the solar cycle, flares and coronal mass ejections to the effects of the solar wind in the near-earth environment and the evolution in between. Research into further improvement of existing models, their validation and the associated simulation tools in the context of international cooperation with leading space weather service providers and/or related to emerging European space weather services. There is scope for cooperation with international partners with relevant expertise (also third States' entities with or without EU funding).
- PROTEC 2 - 2014: Access technologies and characterisation for Near Earth Objects (NEOs) // In the first type of action, research is to be conducted on technologies and instruments relevant to orbiting, hovering, and manoeuvring close to small asteroids with very weak gravity fields. Accurate guidance, navigation and control (GNC) of a high-velocity ( $> 10 \text{ km s}^{-1}$ ) kinetic impactor spacecraft into a small NEO, as well as orbit determination and monitoring (types of observation and precision) before, during, and after a mitigation attempt, require further technology development. The same applies to means for material sampling and collection, in-situ analysis and sample return to Earth, which are of relevance to physical characterisation. In actions covering the second specific challenge, scientific research is needed to identify suitable objects for possible missions for detailed characterisation of properties and for developing demonstration and testing of deflection techniques. A characterisation of the NEO population, in particular the small NEOs (50 – 300 m) is to be undertaken. Typical mitigation-relevant physical properties of NEOs include sizes, albedos, mineralogy, shapes, densities, structures, porosities, frequency of binaries, frequency of rubble piles, etc.
- PROTEC 1 -2015: Passive means to reduce the impact of Space Debris // To develop and test concepts and technologies needed for safe de-orbiting and disposal of space objects, including up to in-orbit demonstration as an option. Planned end-of-life de-orbiting or safe disposal of new satellites and launch vehicle's upper stages as well as non-technical issues including legal issues should be considered.

**Timeline:** publication: 11 December 2013 // deadline: 26 March 2014 , XX XX 201X

**Indicative budget:** 2014: 8 M, 2015: 6,5 M

**Instrument:** Research and Innovation Actions

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

**APP interest: TBD**

#### 2.1.2.4. "COMPETITIVENESS OF THE EUROPEAN SPACE SECTOR"– 2014

##### 1) Competitiveness of European Space Technology

Competitiveness, non-dependence and innovation of the European space sector (including SMEs) must be ensured by fostering the development of space technologies. The overarching objective is to contribute at European level, in conjunction with Member States and ESA, to the safeguarding and further development of a competitive and entrepreneurial space industry and the strengthening of European non-dependence in space systems. This implies enabling advances in space technologies and operational concepts from idea to demonstration in representative terrestrial environments and/or in space.

Competitiveness of European space industry is strongly dependent on performance in a global market, which has a high variability when compared to the institutional market. The ability to react to contract opportunities world-wide with recurring technologies for satellites is a critical success factor, and depends on ready access for integrators to subsystem and equipment capacities in Europe.

To ensure the competitive advantage, subsystems and/or equipment have to be technologically mature (i.e. at adequate technology readiness level –TRL– level, possibly flight proven) and be accompanied by adequate production rates. European focus in future space technologies, beyond the current state of the art, needs to be strengthened along the entire TRL chain: from low TRL Key technologies to in-orbit demonstration and validation.

Technologies enabling recurrence of use contribute to enhancing industrial competitiveness. Research on modular, reusable elements is therefore encouraged. Standardisation of such modular components by existing initiatives such as the European Space Components Coordination (ESCC) and the European Cooperation for Space Standardization (ECSS), and their interfaces across Europe will optimise the investments and will facilitate access to emerging commercial markets. Synergies with ongoing work with ESA in the area of technology standardisation will be sought.

- **COMPET 1 - 2014: Technologies for European non-dependence and competitiveness //** Research in technologies for European non-dependence and competitiveness has been undertaken within the frame of the EC-ESA-EDA joint initiative on Critical Technologies for European non-Dependence, launched in 2008. Activities to be proposed in this call will address technologies identified on the list of Urgent Actions as part of the Joint EC-ESA-EDA task force on Critical Technologies (see Excerpt from Critical Space Technologies for European Strategic Non-Dependence – List of Urgent Actions for 2012/2013" – June 2012, and the update for the 2014 call in [www.xxx.eu](http://www.xxx.eu)), focusing on those areas that have not so far benefitted from prior Framework Programme funding and representing the highest potential for

being addressed through the co-funding instruments available in Horizon 2020. A number of priority technologies have been identified for H2020 support from which proposers can choose: U1 - Space qualification of low shock non-explosive actuators, U2 - Advanced thermal control systems, U5 - Alternative to Hydrazine in Europe, U11 - Application Specific Integrated Circuits (ASICs) for Mixed Signal Processing, U17 - High density (up to 1000 pins and beyond) assemblies on PCB. In this context, technological spin in and/or bilateral collaborations should be enhanced between European non-space and space industries and proposals are expected to provide advanced critical technologies that are of common interest to different space application domains (e.g. telecom, Earth-observation, science, etc.), or even with applicability to terrestrial domains. // Research and Innovation Actions. A total of 10 million Euro has been set aside for this call topic. The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 4 million would allow this specific topic to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. A maximum of one proposal per identified Urgent Action line will be selected for funding. Proposals that include development activities up to space qualification will be favoured in terms of their potential impact.

- **COMPET 2 – 2014: Independent access to space** // All possible technologies, including partly reusable systems and subsystems, will be considered provided that they can demonstrate complementarity no overlapping with on-going launcher developments and credible realization options. Due consideration will be given to the potential of these technologies to strengthen competitiveness and cost-efficiency as well to their commercial potential. Areas of potential improvements for conventional launching systems could be: high energy density green propellants, high performance engineered materials for advanced lightweight structures, innovative avionics solutions for safer and more reliable launch operations, adaptation and use of the launcher upper stages for providing extra functionality regarding multiple access to space of small payloads and platforms. Regarding innovative systems to access space, proposals should have a consistent approach to prove fulfilment of market demands and superiority over classical systems. It is welcomed to explore new solutions for affordable and reliable launcher capabilities in benefit of the wide spectrum of European space RTD community needs (from sub-orbital to orbital injection). // Type of Action: Research and innovation actions. A total of 8 million Euro has been set aside for this call topic. The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.
- **COMPET 3 – 2014: In-Space electrical propulsion and station keeping** // In-Space transportation begins where the launch vehicle upper stage separates. It comprises the functions of primary propulsion, reaction control, station keeping, precision pointing, and orbital manoeuvring necessary for all satellites. Some of these technologies will be used in commercial and governmental communications satellites for orbit positioning and station-keeping. Further development is needed to maintain European leadership in this domain which is threatened by a very strong competition of non-European actors aiming at proposing all-electric platforms. Research and development of promising electric propulsion technologies, far beyond the current state of the art, is encouraged. The Power Processing Units (PPU) for the electrical thrusters will be considered as well. A first objective for the SRC is to foster incremental advances in the development of thrusters by extending their specifications and operative ranges by a factor of at least 3, including advanced studies in the areas of new power concepts, architectures and associated advanced technologies. A second objective is to set up activities for promoting possible disruptive RTD in the field of in-space electrical propulsion, including the increase of electric power for propulsion. // One Coordination and Support Action. A total of 4 million Euro has been set aside for this call topic.



- **COMPET 4 – 2014: Space Robotics Technologies //** Driven by the objective of exploring different strategic directions in the European Space Robotics landscape, and having the chance to present different proposals for different scopes for a Robotics SRCs, with different budgetary conditions, the final target of this topic is to increase the competitiveness of the European Space Industry in sectors demanding robotics solutions. This will be done for the benefit of European robotics and clearly defining the spinning-off and spill over effects to other areas of robotic activity on Earth (such as automobile or underwater). In particular, the topic is centred on-orbit satellite servicing (robotics and rendezvous) and planetary surface exploration. The benefit of investing in space robotics technologies for future on-orbit satellite servicing and planetary surface exploration should also be of benefit in sectors as human-robotic partnership, orbital debris removal but would also spin-off in all terrestrial activities where human intervention is impossible or too hazardous (Submarine, Nuclear Biological and Chemical Industries Crisis Management etc.). Therefore, synergies with the current industrial robotics shall be fostered. Spinning-in, i.e., bringing into space innovations originated in other domains, will be also considered. // One Coordination and Support Action. A total of 4 million Euro has been set aside for this call topic.
- **COMPET 5 – 2014: In-Orbit demonstration/Validation (IOD/IOV) //** Many of the technologies developed for space will need to be demonstrated in orbit in order to be accepted as new space products. In many cases, in order to be considered for future missions, flight heritage is a requirement, in particular when a high risk is associated with the use of totally new technologies and innovations. It is the intention of the Commission to ensure that at least two opportunities for IOD/IOV are co-funded during H2020 as a final step in the process of supporting space RTD. IOD refers to the spaceflight of a scaled version of a particular technology or critical technology subsystem, which would still need further steps to be ready for mission adoption. IOV would already serve as a qualification flight for future missions implementation. Such a successful validation flight of a particular technology would not require any additional space testing before it can be adopted for a specific mission. The studies should define possible scenarios for one or several future flight opportunities for IOD/IOV of European technology developments (components, payloads, spacecraft subsystems, re-entry vehicles, etc.) and/or innovative system architectures. European technologies are those originated from EU R&D programmes as well as projects financed by ESA, National Space Programmes or European private initiatives (e.g. satellite communications). The studies will cover proposals for the IOD/IOV platforms in connection with affordable launch systems, with special focus on European launch solutions. A description of the missions to be accomplished, with the resources available to host a/some technological package/s for demonstration are also required together with the first design and implementation of all the elements needed for the mission. The studies will consider different approaches for the platform for the IOD/IOV activities, or adaptation of existing ones such as: dedicated spacecraft, autonomous multiple payload dispenser systems, platforms of standardised parts, segments/rings and upper stages of launchers, among others. Proposed solutions should be suitable to recurrently place new space products into orbit to perform relevant missions, and to demonstrate their viability by proving maturity of technology payloads. // Coordination and Support Actions. A total of 2 million Euro has been set aside for this call topic. The Commission considers that proposals requesting a contribution from the EU of between EUR 300.000 and 500.000 would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.
- **COMPET 6 – 2014: Bottom-up space technologies at low TRL //** New ideas must be incorporated into the current state of the art. As many advances could come from non-space sectors, such sectors must be actively researched for potential ideas. This should mobilise both traditional space actors and non-space actors, to look for space technologies of the future. The aim of this topic is to attract new actors to space activities and demonstrate technologies that are potentially disruptive, and not only

incremental. Such highly innovative technologies should lead to radical improvements in performance, and will enable emerging missions. Drastic improvements in miniaturisation, efficiency, versatility and functionality are expected. Proposals based on low TRL (1-3) ideas and technologies which could have a final application in future space systems are solicited. The target is to demonstrate these up to TRL 4-5. In this first call, proposals on the fundamental areas of knowledge are foreseen, in which, among others, some of the Key Enabling Technologies (KETs) play a major role. In particular, proposals are sought with relevance for the fields of: "high-resolution optical observation related technologies (including hyperspectral systems)", "radiation-hardened instrument components", "in-situ sensors/instruments of physical parameters", "technologies for flexible/new generation SatCom payloads" and "advanced inter-satellite and/or downlink communications and tracking techniques (RF or Optical)". // Research and innovation action. A total of 5 million Euro has been set aside for this call topic. The Commission considers that proposals implemented in less than 24 months and requesting a contribution from the EU of EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Only up to two proposals will be financed on each of the five lines foreseen: "high-resolution optical observation related technologies (including hyperspectral systems)", "radiation-hardened instrument components", "in-situ sensors/instruments of physical parameters", "technologies for flexible/new generation SatCom payloads" and "advanced inter-satellite and/or downlink communications and tracking techniques RF or Optical".

- **COMPET 1 – 2015: Technologies for European non-dependence and competitiveness** // Research in technologies for European non-dependence and competitiveness has been undertaken within the frame of the EC-ESA-EDA joint initiative on Critical Technologies for European non-Dependence, launched in 2008. Activities to be proposed in this call will address technologies identified on the list of Urgent Actions as part of the Joint EC-ESA-EDA task force on Critical Technologies ("Excerpt from Critical Space Technologies for European Strategic Non-Dependence – List of Urgent Actions for 2012/2013" – June 2012 and the update for the 2015 call in [www.xxx.eu](http://www.xxx.eu)), focusing on those areas that have not so far benefitted from prior Framework Programme funding and representing the highest potential for being addressed through the co-funding instruments available in Horizon 2020. In this context, technological spin in and/or bilateral collaborations should be enhanced between European non-space and space industries and projects are expected to provide advanced critical technologies that are of common interest to different space application domains (e.g. telecom, Earth-observation, science, etc.), or even with applicability to terrestrial domains. // Research and Innovation Actions. A total of 10 million Euro has been set aside for this call topic. The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.
- **COMPET 2 – 2015: Independent access to space** // All possible technologies, including partly reusable systems and subsystems, will be considered provided that they can demonstrate complementarity and no overlapping with on-going launcher developments and credible realization options. Due consideration will be given to the potential of these technologies to strengthen competitiveness and cost-efficiency as well to their commercial potential. Areas of potential improvements for conventional launching systems could be: high energy density green propellants, high performance engineered materials for advanced lightweight structures, innovative avionics solutions for safer and more reliable launch operations, adaptation and use of the launcher upper stages for providing extra functionality regarding multiple access to space of small payloads and platforms. Regarding innovative systems to access space, proposals should have a consistent approach to prove fulfilment of market demands and superiority over classical systems. It is welcomed to explore new solutions for affordable and reliable launcher capabilities in benefit of the wide spectrum of European space RTD community needs (from

sub-orbital to orbital injection). // Research and innovation actions. A total of 6 million Euro has been set aside for this call topic. The Commission considers that proposals requesting a contribution from the EU of between EUR 2 and 4 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

- **COMPET 3 – 2015: Bottom-up space technologies at low TRL** // New ideas must be incorporated into the current state of the art. As many of the advances come traditionally also from non-space sectors, an active search must be done in non-Space areas of knowledge in addition to the identification of breakthrough technologies from the space sector. This should mobilise the traditional space actors, and non-space actors, to look for space technologies of the future. The aim of this topic is to attract new actors to space and demonstrate technologies that are potentially disruptive and not only incremental. As “push” technologies, these will promise radical improved performances, and will enable emerging missions. Drastical increments in miniaturisation, power reduction, efficiency, versatility, and increased functionality are as well expected. // Research and Innovation Actions. A total of 7 million Euro has been set aside for this call topic. The Commission considers that proposals implemented in less than 24 months and requesting a contribution from the EU of EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Only up to two proposals will be financed on each of the eight lines foreseen ("energy storage", "energy production", "materials and structures", "mechanisms", "additive layer manufacturing techniques", "high performance and reliable electronics to boost on-board power", "wireless power transmission" and "thermal control management systems").

## 2) Space exploration and science

Space exploration is a catalyst for the emergence of new technologies, scientific results and innovation that have significantly improved the safety and quality of life on Earth delivering value across all economic areas. Technological priorities for Europe covering the whole spectrum of space exploration activities have been identified and endorsed by EU Council (automation and robotics; novel energy production and storage; advanced propulsion; life support systems). The International Space Station (ISS) plays a key role as a platform for the preparation of next human exploration missions. Life support is one of the key technologies for human exploration and a domain that can bring together a wide array of participants from the space sector and beyond.

Europe has also, over the years, established a leading position in space science, with missions to various destinations in our Solar System. The proposed approach is to enable the European space science community to make a concerted effort to capitalise on current European space science infrastructure, and to achieve the highest possible science return from operational and future space missions. To this end coordinated activities which further science in the context of space missions, i.e. preparing for space missions and deploying scientific activities in support of future or operational missions, will be supported.

The 2014 call topic on space science focuses on Mars data and on the definition of a European sample curation facility. Proposers should note that helio/plasma physics and Earth observation data are dealt with in call sections on space weather and Earth observation respectively.

Exploitation of space science data will be addressed across H2020 on a recurring basis, ensuring a more extensive utilisation of scientific data originated from European missions and missions with European participation.

Proposals are invited against the following topics:

- **COMPET 7 - 2014: Space exploration – Life support** // Prepare for demonstrating technologies, and operations techniques and process, critical for future human missions as well as advancing knowledge related to human spaceflight and terrestrial applications for the benefits of citizens. Proposals demonstrating closed loop regenerative life support system technologies (including for instance modelling of complex microbial and plant-based ecosystem, trace elements, circular dynamic system) for safe production of healthy consumables and in particular food for future manned exploration missions should be proposed to be implemented by leveraging synergies between space and non-space actors (e.g. biotechnology, nutrition, food, controlled agriculture, industrial ecology, health sectors). These on-ground preparatory activities are a prerequisite to potential flight hardware development, such as a greenhouse system, and activities to be conducted on-board the European Columbus module of the ISS. // Research and innovation actions. A total of 8 million Euro has been set aside for this call topic. The Commission considers that proposals requesting a contribution from the EU of between EUR 4 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.
- **COMPET 8 - 2014: Science in context: sample curation facility and scientific exploitation of data from Mars missions** // An action on sample curation facility should analyse what facilities, analytical methods and instruments, portable receiving facilities for sample transfers, and analogue samples are required in what timeframe taking into account specificities of receiving potential Moon, Mars and Asteroid samples in order to adequately serve future sample return mission that will take place with European involvement. For the exploitation and development of tools for the exploitation of data of Mars for scientific research, and analysis in preparation of the two ExoMars missions the scope is to rely on the data available through the ESA Planetary Science Archive or other means (e.g. instrument teams). Combination and correlation of this data with data from NASA missions is encouraged to further increase the scientific return and to enable new investigations with existing data sets.. This includes data from the atmosphere, surface and sub-surface of Mars, as well as data from the Martian moons Phobos and Deimos. Enhanced data products would be fed back to the ESA archives. // Research and innovation action. A total of 4 million Euro has been set aside for this topic. The Commission considers that proposals requesting a contribution from the EU of between EUR 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.
- **COMPET 4 – 2015: Space exploration – Habitat management** // Prepare for demonstrating technologies, and operations techniques and process, critical for future human missions as well as advancing knowledge related to human spaceflight and terrestrial applications for the benefits of citizens. Proposals demonstrating safe and reliable quality control of indoor environment in space including microbial control (e.g. development of early detection and warning systems for environmental contamination and pollution) should be implemented by leveraging synergies between space and non-space actors (e.g. industrial ecology, health sectors). These on-ground preparatory activities are a prerequisite to potential flight hardware development and activities to be conducted on-board the European Columbus module of the ISS. // Research and innovation actions. A total of 6 million Euro has been set aside for this topic. The Commission considers that proposals requesting a contribution from the EU of between EUR 3 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.
- **COMPET 5 – 2015: Scientific exploitation of astrophysics, comets, and planetary data** // Astrophysics proposals shall make use of, or prepare for the use of ESA astrophysics missions, possible in combination with ground-based observations, and/or data from non-ESA missions (e.g. NASA, JAXA, or other national missions). Comets proposals shall prepare for and make use of the Rosetta mission,

possibly in combination with ground-based observations, and/or data from non-ESA missions (e.g. NASA, JAXA, or other national missions). Planetary proposals shall make use of European missions and European instruments on-board international planetary missions and/or data from non-ESA missions (e.g. NASA, JAXA, or other national missions). These activities shall add scientific value through advanced analysis of the data, leading to scientific publications and higher level data products which can be used by other scientists in their studies. This could be done in combination with the development of open source tools for processing and visualisation of astrophysics, comets or planetary data. Enhanced data products should be suitable for feeding back into the ESA archives. // Research and Innovation Actions. A total of 6 million Euro has been set aside for this topic. The Commission considers that proposals requesting a contribution from the EU of EUR 1.5 million would allow this specific challenge dedicated to astrophysics, comets or planetary data to be addressed appropriately, including through proposals from small teams. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

### 3) International Cooperation in Space matters

- **COMPET 9 - 2014: Technology “demonstrator projects” for exploration** // The EU, together with ESA, initiated the high-level platform for space exploration with three dedicated international high level conferences at ministerial level (i.e. Prague in 2009, Brussels in 2010, and Lucca in 2011). The next conference will be hosted by the United States in January 2014. One of the potential outcomes of the International Space Exploration Forum (ISEF) as proposed by Europe is to advance towards the identification of possible future collaboration domains building on technology “demonstrator projects,” to be proposed by one or more actors and linked to exploration missions. This topic will allow implementing the technology “demonstrator projects” to be initiated after the ISEF meeting. These demonstrator projects would target underpinning enabling technologies for space exploration, notably robotics, novel energy production and storage, propulsion or life support, as well as atmosphere entry, return/re-entry vehicles, communication systems. Actors, including international partners, interested to participate to such demonstrator projects could form clusters around several technology “demonstrator projects”. Technology demonstrator projects open to international partnerships would allow developing cutting edge space technology making an important success factor for European researchers and industry. // Coordination and Support Actions. A total of 3 million Euro has been set aside for topic. The Commission considers that proposals requesting a contribution from the EU of EUR 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.
- **COMPET 6 – 2015: International Cooperation in space science** // In line with the objectives of the Union's strategy for international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged, in particular with space powers active in planetary science. The diverse range of competences spread among universities, research institutes, and space agencies in different countries in the world, should be harnessed in this proposal in view of establishing a coordinated authoritative position in the planetary protection research field. Networking, experts meetings and workshops resulting in recommendations for further action and guidelines for future missions are part of the effort. // Research and innovation actions. A total of 1.5 million Euro has been set aside for this call objective 3. The Commission considers that proposals requesting a contribution from the EU of EUR 750 000 would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

**Timeline:** publication: 11 December 2013 // deadline: 26 March 2014 / XX XX 201X

**Indicative budget:** 2014: 52 M 2015: 36,5 M

APP interest: TBD

### 2.1.3. NMP

#### 2.1.3.1. CHALLENGE 1: BRIDGING THE GAP BETWEEN NANOTECHNOLOGY RESEARCH AND MARKETS

- Y2.1-1: Open access pilot lines for cost effective nanocomposites
- Y2.1-3: Integration of novel nano materials into existing production and assembly lines
- Y2.1-4: Manufacturing and control of nanoporous materials
- Y2.1-5: High definition and high throughput 2D & 3D printing of multifunctional materials
- Y2.1-6: Synthesis and functionalisation of nanomaterials for printing applications
- Y2.1-7: Novel nanomatrices and nanocapsules
- Y2.1-8: Additive manufacturing for tabletop nanofactories

#### 2.1.3.2. CHALLENGE 2: NANOTECHNOLOGY AND ADVANCED MATERIALS AS ENABLERS OF APPLICATIONS IN HEALTH

- Y1.2-1: Multi-KETs pilot plant for the scale-up of innovative nanomedicine production
- Y1.2-2: Networking of SMEs in the nano-biomedical sector for improving innovative potential (understanding translation, regulation, IPR, finance and reimbursement)
- Y2.2-3: Nanomedicine therapy for cancer: from pre-clinical lab stage to early clinical testing
- Y1.2-4: Development of smart biomaterials to facilitate the introduction of Advanced Therapies for the treatment of Diabetes Mellitus
- Y2.2-5: Biomaterials for treatment and prevention of Alzheimer's disease

#### 2.1.3.3. CHALLENGE 3: NANOTECHNOLOGY AND ADVANCED MATERIALS FOR LOW CARBON ENERGY TECHNOLOGIES AND ENERGY EFFICIENCY

- Y1.3-1: Innovative materials solutions for storage of energy produced by decentralised sources
- Y1.3-2: ERA-NET on Materials for Energy
- Y2.3-3: Materials innovations for the optimisation of cooling in power plants
- Y2.3-4: Extended in-service life of advanced functional materials in energy technologies (capture, conversion, storage and/or transmission of energy)

#### 2.1.3.4. CHALLENGE 4: TAPPING INTO THE CROSS-SECTOR POTENTIAL OF NANOTECHNOLOGIES AND ADVANCED MATERIALS TO DRIVE COMPETITIVENESS AND SUSTAINABILITY

- Y1.4-1: Development of novel materials and systems for OLED lighting or displays
- Y2.4-2: Accelerating industrial uptake of advanced materials by SMEs

Y2.4-3: Development of improved materials for severe operating conditions, including added-value functionalities e.g. self-diagnosis, self-healing

Y1.4-4: Widening model applications in materials models

Y1.4-5: Fibre materials for high-value, high-performance non-clothing applications, e.g. mechanical parts, industrial components

Y2.4-10: Low-energy solutions for drinking water production – pilot plants

Y1.5-1: Development of new materials and materials-based creative solutions by partnerships of designers and materials scientists – PRIZE

Y1.5-2: Development of materials and materials-based solutions for the protection or preservation of European cultural heritage

Y2.5-3: Innovative sustainable material solutions for use in the creative industry sector, including prototyping and pilot lines

#### 2.1.3.5. CHALLENGE 5: SAFETY OF NANOTECHNOLOGY-BASED APPLICATIONS AND SUPPORT FOR THE DEVELOPMENT OF REGULATION

Y1.6-1: Joint EU & MS activity on the next phase of research in support of regulation "NANOREG II"

Y1.6-2: Coordination of EU and international efforts in support of regulation

Y2.6-3: High Throughput and Toxicity Pathway approaches as a basis for nanosafety assessment, (nanomaterial grouping and read-across strategies)

Y1.6-4: Building a framework for the prediction of environmental concentration and speciation of nanomaterials

Y2.6-5: Next generation tools for risk governance of Nanomaterials

#### 2.1.3.6. CHALLENGE 6: ADDRESSING GENERIC NEEDS IN SUPPORT OF GOVERNANCE, STANDARDS, MODELS AND STRUCTURING IN NANOTECHNOLOGY, ADVANCED MATERIALS AND PRODUCTION

Y1.7-1: Novel visualization tools for enhanced communication, outreach and balanced information on nanotechnology

Y2.7-2: Societal engagement on responsible nanotechnology

Y1.8-2 The Materials "Common House"

Y1.8-3 Facilitating knowledge management, networking and coordination in NMP

Y1.8-4: Networking and sharing of best practises in LCA and eco-design of new advanced materials and related products

Y1.8-5: Study of the potential for use of public procurement to encourage circular economy of products

Y1.8-6: Study on frugal engineering and re-engineering of traditional techniques

Y1.8-7: Business models with new supply chains for sustainable customer-driven small series production

Y2.8-8: Transformation of the innovation process in industrial value chains by the introduction of open innovation networks

Y1-2.8-9: Clusters of projects

Y1-2.8-10: Presidency events

Y1.8-11: Support for NCPs

#### 2.1.4. BIOTECHNOLOGY

##### 2.1.4.1. CHALLENGE FOF - FACTORIES OF THE FUTURE

FoF.2014-1: Manufacturing processes for complex structures and geometries with efficient use of material

FoF.2014-2: Global energy and other resources efficiency in manufacturing enterprises

FoF.2014-3: Developing smart factories that are attractive to workers

FoF.2014-4: Innovative product-service design using manufacturing intelligence

FoF.2014-5: Symbiotic human-robot collaborations for safe and dynamic multimodal manufacturing systems

FoF.2014-6: Support for cluster activities of FoF projects

FoF.2015-1: Manufacturing of custom made parts for personalised products

FoF.2015-2: Flexible production systems based on integrated tools for rapid reconfiguration of machinery and robots

FoF.2015-3: Industrial technologies for advanced joining and assembly processes of multi-materials

FoF.2015-4: Sustainable product life cycle management focused on reuse, remanufacturing and recycling related to advanced materials

FoF.2015-5: Integrated design and management of production machinery and processes

##### 2.1.4.2. CHALLENGE EEB – ENERGY-EFFICIENT BUILDINGS

EeB.2014-0: Advanced sustainable materials for building components, with lower embodied energy/carbon and improved insulation properties

EeB.2014-1: Innovative design tools for refurbishment at building and district level

EeB.2014-2: Mass manufacturing of prefabricated modules for refurbishment

EeB.2014-3: Development of new self-inspection techniques and quality check measures for efficient construction processes

EeB.2014-4: Support for cluster activities of EeB projects

EeB.2015-0: Improve material durability: development of innovative, sustainable and cost-efficient construction materials with longer performance and reliability via theoretical studies and experimental activities



EeB.2015-1: New tools and methodologies to reduce the gap between predicted and actual energy performances at the level of buildings and blocks of buildings

EeB.2015-2: Adaptable envelopes integrated in building refurbishment projects

EeB.2015-3: Innovative techniques to measure the contribution of critical components to energy efficiency

EeB.2015-4: Validation of an integrated approach to retrofitting of residential buildings

#### 2.1.4.3. CHALLENGE SPIRE – SUSTAINABLE PROCESS INDUSTRIES

SPIRE.2014-0: Development of novel materials and catalysts to convert CO<sub>2</sub> into renewable energy carriers

SPIRE.2014-1: Breakthrough innovations in recovery technologies: characterisation, separation and pre-processing

SPIRE.2014-2: Adaptable industrial processes allowing the use of renewables as flexible feedstock for chemical and energy applications

SPIRE.2014-4: Methodologies, tools and indicators for cross-sectorial sustainability assessment of energy and resource efficient solutions in the process industry

SPIRE.2015-1: New adaptable catalytic reactor methodologies for Process Intensification

SPIRE.2015-2: Energy and resource management systems for improved efficiency in the process industries

SPIRE.2015-3: Recovery technologies for metals and other minerals

SPIRE.2015-4: Solids handling for intensified process technology

## 2.2. ACCESS TO RISK FINANCE

Under 'Access to Risk Finance', Horizon 2020 will help companies and other types of organisation engaged in R&I to gain easier access to loans, guarantees and equity finance. The priority for 2014-2015 is to

continue and refine activities that have proved their value in supporting R&I under FP7 — the Risk-Sharing Finance Facility (RSFF) plus the RSI — and under CIP — GIF-1, the early-stage part of the High-Growth & Innovative SMEs Facility.

The coming two years will also see the launch of pilot equity and debt facilities supporting the technology transfer process and access to risk finance by larger midcap firms. In addition, firms of all sizes, and other types of organisation, will be able to get advice on how to make themselves more attractive to banks and potential investors. And to help prepare for new developments, studies will look into how best to encourage more business angel and crowdfunding investments in R&I; into the potential for a pan-European VC fund-of-funds with the EU as an investor; and at the possibilities for a prizes scheme.

As in the previous programmes, the debt and equity facilities will be run in a demand-driven manner and focus on attracting private investments into R&I. Also as before, financial intermediaries (banks, guarantee institutions, risk-capital funds, etc.) will be selected through open, transparent and non-discriminatory calls for expressions of interest, with risks and rewards, as a rule, equally shared. To locate banks or funds that provide risk finance supported by the EU, go to <http://access2eufinance.ec.europa.eu>

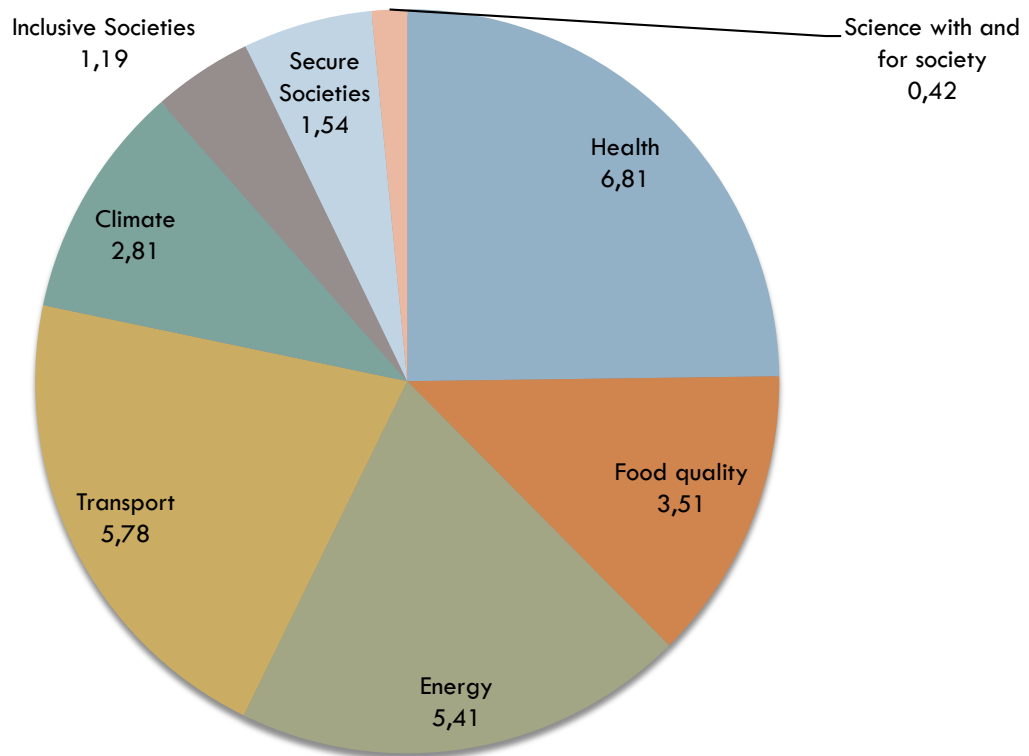
In 2014-2015[, subject to the successful conclusion of negotiations], the European Investment Bank (EIB) and the European Investment Fund (EIF) will play a significant role in implementing each financial instrument facility. Exploratory talks with other development banks are underway, and one or more may join EIB and EIF in running facilities on the European Commission's behalf.

### 2.3. INNOVATION IN SMALL AND MEDIUM-SIZED ENTERPRISES (SMES)

Both in the Europe and the US the net increase in jobs the economy can be attributed to small, innovative companies. So, SMEs' innovation activities are in public interest and in order to overcome market failures specific to SME the public supports SME innovation with grants, subsidised loans and services. However SMEs receiving innovation support often remain dissatisfied with the services they receive; while at the same time the public expects a higher return from the support provided to SME innovation activities. While major new drivers, like online collaboration or reverse innovation, for SME innovation are hardly recognised by the public support provided, established support services assist mainly clearly defined technical projects within single enterprises. Public support pays much less attention to the creation of favourable ecosystem for SME innovation in which public enterprises, direct and indirect customers, end-users, suppliers and enterprises with complementary skills are encouraged to collaborate for radical innovation that may not yet be described and formulated as project.

The topics below, which are addressed by calls for proposals and tenders, are elements of a broader action to develop the ecosystem of innovation support to SMEs in Europe. Where appropriate a highly specialised support service may be established at European level to complement existing national and regional services. Generally the actions are designed to provide opportunities to member states and regions to enhance their services through collaboration, peer-learning and uptake of new approaches. The Enterprise Europe Network present in all European regions and co-financed by them and the Member States is expected to play an important role for catalysing such development processes.

## PILLAR 3: SOCIETAL CHALLENGES (27,05 B)



Below you will find a list of selected topics that will be of interest in the community. The level of APP interest is in parantheses at the end of the call name, in a scale of low, medium, high.

### 3.1. HEALTH

#### 3.1.1. CALL FOR PERSONALISING HEALTH AND CARE

##### 3.1.1.1. UNDERSTANDING HEALTH, AGEING AND DISEASE

PHC 1 - 2014) Understanding health, ageing and disease: determinants, risk factors and pathways

PHC 2 - 2015) Understanding health, ageing and disease: systems medicine

##### 3.1.1.2. EFFECTIVE HEALTH PROMOTION, DISEASE PREVENTION, PREPAREDNESS AND SCREENING

PHC 3 - 2015) Health promotion and disease prevention: improved inter-sector co-operation for environment and health based interventions

PHC 4 - 2014) Health promotion and disease prevention: translating 'omics' into stratified approaches

PHC 5 - 2014) Evaluating existing screening and prevention programmes

PHC 6 - 2014) Improving the control of infectious epidemics and foodborne outbreaks through rapid identification of pathogens (see also SC2)

PHC 7 - 2014) Vaccine development for poverty-related and neglected infectious diseases: Tuberculosis

PHC 8 - 2015) Vaccine development for poverty-related and neglected infectious diseases – HIV/AIDS

### 3.1.1.3. IMPROVING DIAGNOSIS

#### PHC 9 - 2014) DEVELOPMENT OF NEW DIAGNOSTIC TOOLS AND TECHNOLOGIES: IN VITRO DEVICES, ASSAYS AND PLATFORMS

**Specific challenge:** The development of new diagnostics (more sensitive, robust and selective) for improved clinical practice demands the translation of multidisciplinary scientific and technological knowledge from diverse fields into clinical applications. Innovation in the diagnostics area relies on the development, translation and uptake of existing, new or evolving and often complex technologies. A wide range of multidisciplinary competencies need to be brought together to develop and bring new diagnostics to the patient. This is also a field where many small European companies are active.

**Scope:** Proposals will focus on the development of innovative in vitro diagnostic tools and technologies (not novel applications of existing ones). Tools and technologies will improve over state of the art, the performance of diagnosis, prediction, monitoring, intervention or assessment of therapeutic response based on in vitro devices, assays and platforms. Additionally, proposals may include approaches based on high-throughput screening, nanotechnologies or microfluidics, data analysis methodology, or point-of-care diagnostics.

**Expected impact:**

- New in vitro diagnostic tools and methods providing more accurate, more reliable and earlier disease diagnosis.
- Growth of the European diagnostics sector, in particular for SMEs

Type of Action: Collaborative Project (100%)

#### PHC 10 - 2015) DEVELOPMENT OF NEW DIAGNOSTIC TOOLS AND TECHNOLOGIES: IN VIVO MEDICAL IMAGING TECHNOLOGIES

**Specific challenge:** The development of new diagnostics (more sensitive, robust and selective) for improved clinical practice demands the translation of multidisciplinary scientific and technological knowledge from diverse fields into clinical applications. Innovation in the diagnostics area relies on the development, translation and uptake of existing, new or evolving, and often complex technologies. A wide range of multidisciplinary competencies need to be brought together to develop and bring new diagnostics to the patient. This is also a field where many European companies are active.

**Scope:** Proposals will focus on the development of innovative in vivo tools and technologies (not novel applications of existing ones). Tools and technology should aim at improving diagnosis, prediction, monitoring, image-based intervention or assessment of therapeutic response. Preference will be given to innovations that offer a clear advantage over existing tools and technologies. Development of In vivo medical imaging technologies should profit from existing high-tech engineering or physics solutions or innovative ideas and concepts coming from those fields.

**Expected impact:**

- New in vivo diagnostic tools and methods providing more accurate, more reliable and earlier disease diagnosis.
- Growth of the European diagnostics sector, in particular for SMEs

Type of Action: Collaborative Project (100%)

PHC 11 – 2014 and 2015) Clinical validation of biomarkers

### 3.1.1.4. INNOVATIVE TREATMENTS AND TECHNOLOGIES

PHC 12 - 2014) New therapies for chronic non-communicable diseases

PHC 13 - 2015) New therapies for rare diseases

PHC 14 – 2014/15) Clinical research on regenerative medicine

PHC 15 – 2015) Tools and technologies for advanced therapies

PHC 16 – 2014) Comparing the effectiveness of existing healthcare interventions in the elderly 21

PHC 17 – 2015) Establishing effectiveness of health care interventions in the paediatric population

### 3.1.1.5. ADVANCING ACTIVE AND HEALTHY AGEING

PHC 18 – 2014) Advancing active and healthy ageing with ICT: Service robotics within assisted living environments; and ICT solutions for independent living with cognitive impairment

PHC 19 – 2015) Advancing active and healthy ageing with ICT: Early risk detection and intervention

PHC 20 – 2015) Promoting mental wellbeing: in the ageing population

### 3.1.1.6. INTEGRATED, SUSTAINABLE, CITIZEN-CENTRED CARE

PHC 21 - 2014) Developing and comparing new models for safe and efficient, prevention oriented, health and care systems:

PHC 22 - 2015) Piloting personalised medicine in health and care systems

PHC 23 - 2015) Advanced ICT systems and services for Integrated Care

PHC 24 - 2014) Self-management of health and disease: citizen engagement and mHealth

PHC 25 - 2015) Self-management of health and disease: decisional support systems and patient empowerment supported by ICT

PHC 26 - 2015) Public procurement of innovative eHealth services

PHC 27 – 201x): eHealth Sectoral Prize

### 3.1.1.7. IMPROVING HEALTH INFORMATION, DATA EXPLOITATION AND PROVIDING AN EVIDENCE BASE FOR HEALTH POLICIES AND REGULATION

PHC 28 - 2015) Digital representation of health data to improve diseases' diagnosis and treatment

PHC 29 - 2014) Foresight for health policy development and regulation

PHC 30 – 2014) Advancing bioinformatics to meet biomedical and clinical needs

PHC 31 – 2015) New approaches to improve predictive human safety testing

PHC 32 - 2014) eHealth interoperability

## 3.1.2. CALL – CO-ORDINATION ACTIVITIES

HCO 1 – 2014) Innovation Partnership: Support for the European Innovation Partnership on Active and Healthy Ageing

HCO 2 – 2014) Joint Programming: Coordination Action for the Joint Programming Initiative (JPI) "More Years, Better Lives - the Challenges and Opportunities of Demographic Change".. 48

HCO 3 – 201x) Support for the European Reference Networks: Efficient network modelling and validation

HCO 4 – 2014) Support for international infectious disease preparedness research

HCO 5 -201x) Global Alliance for Chronic Diseases: prevention and treatment of type 2 diabetes

HCO 6 - 2014) ERA-NET - Establishing synergies between the Joint Programming on Neurodegenerative Disease Research and Horizon 2020

HCO 7 - 2014) ERA-NET: Cancer research programmes and activities

HCO 8 - 2014) ERA-NET: Brain related diseases research programmes and activities

HCO 9 - 2014) ERA-NET: Systems medicine for clinical needs research programmes and activities

HCO 10 – 201x) ERA NET: Rare Disease research implementing IRDiRC objectives

### 3.1.2.1. FAST TRACK TO INNOVATION – PILOT

## 3.2. FOOD SECURITY, SUSTAINABLE AGRICULTURE, MARINE AND MARITIME RESEARCH AND THE BIO-ECONOMY

### 3.2.1. SUSTAINABLE AND COMPETITIVE AGRI-FOOD SECTOR FOR A SAFE AND HEALTHY DIET (LOW)

#### 3.2.1.1. HEALTHY AND SAFE FOODS AND DIETS FOR ALL

- Topic SC2-19: Assessing health risks of combined human exposure to toxic substances from foods and drinking water // Instrument: CP – R&D Project // Year: 2015

### 3.2.2. UNLOCKING THE POTENTIAL OF AQUATIC LIVING RESOURCES (MEDIUM)

#### 3.2.2.1. DEVELOPING COMPETITIVE AND ENVIRONMENTALLY-FRIENDLY EUROPEAN AQUACULTURE

In 2014, a large initiative on aquatic farmed animal health is foreseen in the field of aquaculture. In addition to that, emphasis will be put on implementing our strategy for international cooperation by launching a platform for dialogue between EU and Latin America, as well as by building and expanding beyond the conclusions of the KBBE forum WG on farmed molluscs diseases. In the field of fisheries, a large initiative is foreseen aiming at supporting major policy developments stemming from the recent revision of the CFP, related in particular to the reduction of the discards in European fisheries.

In 2015, three large initiatives are foreseen, focused on forecasting impacts of climate change on fisheries and aquaculture sectors, on supporting the implementation of the MFSD and revised CFP (including a smaller initiative of governance in fisheries), as well as on the economic and market dimensions of fisheries and aquaculture.

NB: Other relevant topics can be found in the focus area Blue Growth.

- Topic SC2-21: Tackling disease related challenges and threats of European farmed aquatic animals // Instrument: CP – R&D Project // Year: 2014
- Topic SC2-23: Forecasting and anticipating effects of climate change on fisheries and aquaculture (INCO dimension) // Instrument: CP – R&D Project // Year: 2015

### 3.2.3. FOCUS AREA "BLUE GROWTH" (HIGH)

Like other Focus Areas, the Focus area "Blue Growth" requires particular coordination among services and inputs from different pillars and parts of the Horizon 2020. Therefore, the text included in this document in relation to the planned activities of the Blue Growth Focus Area is a "work in progress", under review by the members of the Interservice group established for the Focus Area. This version is the draft proposed by RTD.E before the ISG meeting of 4 June 2013, and includes not only topics proposed by RTD.E but also by other services.

### 3.2.3.1. SUB-CHALLENGE: SUSTAINABLY EXPLOITING THE DIVERSITY OF MARINE LIFE (MEDIUM)

- Topic BG-1: Bio-discovery of novel marine-derived biomolecules (E2) // Instrument: CP – R&D Project // Year: 2015

Specific Challenge: Because of the huge marine biodiversity and the physical and chemical conditions in the marine environment, seas and oceans possess the capacity to produce a variety of molecules with unique features, unmatched chemical diversity and structural complexity, which explains the increased recognition of marine organism as a source for bioactive compounds with biotechnological, and pharmaceutical application. However, while an increasing number of marine biomolecules-derived products are being commercialized, in the quest to discover interesting new products, more emphasis will be needed to go beyond the current frontiers in terms of both the source of the materials that can be potentially exploited and the technologies currently employed. Scope: The projects should be industry-driven. They should aim to innovative approaches to go beyond the current frontiers in terms of marine resource identification, supply, improvement on technical aspects of the discovery pipelines (e.g.. separation, structure elucidation, identification of the active profile, dereplication strategies etc) as well as production in suitable biological systems. The possible activities are expected to cover the innovation chain from research, to development, and proof of concept. Legal aspects linked to securing access to marine resources, including linked infrastructures and bioresources banks and collections, their sustainable use as well as Access and Benefit Sharing aspects, should be properly considered. Expected impact: The projects will strengthen the competitiveness of the European marine biotechnology industry. By reducing the technical bottlenecks in the marine biodiversity pipelines, improving access to marine resources data and streamlining the legal aspects towards a clear access, the projects will have a structuring impact on the European Research area in this field and will give support to the EU Blue Growth initiative, finally, making the whole sector more attractive to investment by the biotechnology industry

- Topic BG-2: Marine industrial Biomaterials with new and improved functionalities (E2) // Instrument: CP – R&D Project // Year: 2014
- Topic BG-3: Enhancing the industrial exploitation potential of Marine-derived enzymes (E2) // Instrument: CP – CTM Project // Year: 2015
- Topic BG-4: Marine biodiversity for better valuing marine life (to be moved in 1?) (I3) // Instrument: CP – R&D Project – two stage [possibility of including clustering activities with the biodiversity topic on 'status & trends'] // Year: 2015

Specific Challenge: Marine biodiversity and ecosystems are essential to the functioning of our biosphere and to human well-being both directly and indirectly through the ecosystem services they provide. However the scale of natural and anthropogenic changes occurring in the oceans and the impact of these changes on marine biodiversity and ecosystems are cause for serious concern. Despite increased attention given to marine biodiversity, the current pace of efforts to protect it is insufficient. Thus in order to ensure a holistic and comprehensive response to rapidly changing marine biodiversity, research is needed to increase our knowledge of marine biodiversity from genes to ecosystems at all relevant temporal and spatial scales and its link to essential ecosystem services of societal benefit. Scope: Activities under this topic should be aimed at developing spatio-temporal scenarios for biodiversity change supported by ecosystem, socio-economic and climatic models and assessing the implications of those changes in the ecosystem services they provide and related societal benefits. It will be crucial to establish a base-line of marine biodiversity status which will require monitoring and definition of observation protocols and environmental targets. This would enable the creation of a value system to account for provision and loss of marine biodiversity and ecosystem goods and services and to support effective management decisions. Identification of new economic opportunities will be important, through the application of the knowledge generated in areas such as fisheries, aquaculture, biotechnology (e.g. discovery of novel marine bioactive compounds for human health) and ecotourism, while preserving marine biodiversity. Expected Impact: Advance on the preservation of marine biodiversity and more sustainable management and exploitation of marine resources and ecosystems in the EU. Improved science-based policy design and implementation. Achievement of EU and international biodiversity targets (e.g. EU 2020 Biodiversity Strategy, Convention on Biological Diversity (CBD), Rio+20).

- Topic BG-5: Integrated bio refineries for multi products from algae (large scale initiative 2016 !) // Instrument: CP – CTM Project (large-scale demonstration / pilot projects) // Year: 2016

### 3.2.3.2. SUB-CHALLENGE: OFFSHORE (MEDIUM)

Preparatory action – CSA (2014)

- Topic BG-6: Preparing for the future offshore economy (H2, K3) // Instrument: CSA // Year: 2014
- Topic BG-7: Delivering the Sub-sea technologies for new services at sea (H2) // Instrument: CP – R&D Project (large-scale demonstration / pilot projects) // Year: 2014

Specific challenge: Oceans used to be a passage way, to carry goods or people from port to port. Only for fishing it was a place to harvest a valuable resource. This is progressively changing, as shown by the oil & gas community who has started for a while the exploitation of oilfields at sea. The cost of energy, combined to the scarcity of resources and the difficulty to manage on land the impact on the environment are now pushing towards more and more activity at sea beyond fishing and oil and gas extraction: harvesting marine renewable energy, producing fresh water, fish farming and algae growing, seabed mining, etc. The Marine technologies and Engineering which needs to be developed to enable these new markets, and therefore create jobs and growth can be sorted in three groups: the ship of the future (clean, safe and thrifty, therefore smart), the seaborne or surface activities (multi-use offshore platforms, etc.), and the subsea activities. Scope: It is proposed to address feasibility studies and definition studies (including demonstrators) of the main components required to work undersea. The main challenges are the “deep, cold, far and big” boundaries, with ultra deep water (down to 6,000m), arctic regions, long subsea tie backs, extended seabed installations, etc. In addition, it is expected to face new technology challenges like corrosive products, heavy / viscous liquids, high pressure - high temperature systems, etc. as well as the control of the potential impact on the environment of these activities. The areas of

interest are the following: 1) Subsea Construction systems: ROV and Diving, 2) Specialised "Robots" and AUVs, deployment, recovery and docking systems and 3) Subsea "factory" Machineries. Expected impacts: 1) Support to the Blue Growth agenda and the new maritime / offshore economy; 2) Safety of the new / offshore maritime economy; 3) Support to scientific underwater / deep sea observation;

### 3.2.3.3. SUB-CHALLENGE: SEABED MINING (LOW)

Preparatory action – CSA (2014)

- Topic BG-8: Seabed mining – preparing next steps (H2, ENTR) // Instrument: CSA // Year: 2014

### 3.2.3.4. SUB-CHALLENGE: OCEAN OBSERVATION TECHNOLOGIES/SYSTEMS (HIGH)

- Topic BG-9: Developing in-situ Atlantic Ocean Observations for a better management and exploitation of the maritime resources (I3, E2) // Instrument: CP – R&D Project // Year: 2014 // International dimension: transatlantic initiative

Specific challenge: The challenge is to conduct the Research and Innovation activities necessary to the deployment of an Integrated Atlantic Ocean Observing System (IAOOS), building on existing capacities on both sides of the Atlantic. The Atlantic Ocean is the most prominent maritime domain situated at the doorstep of Europe. However, the exploration, exploitation and protection of this maritime domain require a knowledge base and predictive capabilities which are currently fragmented or not yet available. The creation of this knowledge base and predictive capability requires systematic collection of ocean observations recorded both remotely and in-situ. Central to the development of the IAOOS will be the acquisition and use of in-situ observations and their integration with remote sensed data across the whole Atlantic Ocean in order to fill out the existing observational gaps. Scope: The IAOOS will cover the Northern Atlantic, and the Southern Atlantic, including the part bordering Antarctica and Arctic. Another focus of the topic will be to fill the observational gaps regarding the in-situ part of the IAOOS including required spatial and temporal coverage, interoperability, the new ocean observation technologies and the full range of chemical and biological sensors. The research and innovation necessary to underpin the full and open discovery and access to the ocean observations and facilitating the exchange of ocean observation as promoted through GEO (Group on Earth Observation) at the scale of the Atlantic Ocean will require the participation of international partners from both sides of the Atlantic. Expected impact: Enhanced societal and economic role of the Atlantic Ocean in Europe. Increased temporal and geographic coverage of observational data in the Atlantic Ocean. Integration of standardised in-situ key marine observations into process models and forecast systems. Improved modelling outputs and reduced cost of data collection in support of ocean-related industrial and societal activities. Increased competitiveness of European industry and particularly SMEs within the marine industrial sector. Increased safety for offshore activities and coastal communities. Informed decisions and documented processes within key sectors (manufacturing, ICT, maritime industry, environment technology, marine science and fisheries). Improved implementation of European maritime and environmental policies (e.g. MSFD, CFP, EU IMP). Enhanced documentation necessary to cope with global challenges such as climate change, scarceness of natural resources and global scale hazards.

- Topic BG-10: Acoustic and imaging technologies (H2) // Instrument: CP – R&D Project // Year: 2014 // International dimension: transatlantic initiative

Specific challenge: Acoustic and imaging technologies, combined with data processing, have made considerable progress in the past 20 years and can provide remarkable insights on the state of marine ecosystems, from the water column to the seabed (and its habitats). Acoustic technologies can be active (echosounder, multibeam sonar) or passive (devices to "listen" and interpret marine sounds). They offer promising perspectives for characterising seabed and sea column habitats, species and ecology and can strongly support marine environment and fisheries management, as well as offshore activities and safety (e.g. detection of seeps, geologic events... etc.). The characterisation of seabed sediments, geology, wrecks or debris is also crucial for the development of major offshore projects, particularly in the energy field (offshore wind farms). Imaging technologies have also proven to be powerful instruments to characterise the marine environment, its biomass, biodiversity and pollution. They can therefore be of important support to marine environment and fisheries management (e.g. marine litter and plastics assessment for the Marine Strategy Framework Directive - MSFD). Scope: Research could cover innovative technologies to improve the performance of sensors needed for acoustic detection or imaging, as well as the (fixed or mobile) platforms supporting them and signal processing to interpret raw data. It could be aimed at supporting marine environment policies (MSFD), fisheries management (Common Fisheries Policy), the maritime economy (seabed and sea column characterisation for offshore activities) or safety of offshore activities. Research projects should bring together marine scientists, technology providers and end-users. Expected impacts: Support to the implementation of marine environmental and fisheries policies (MSFD – CFP). Support to the Blue Growth agenda. Support to the safety of maritime / offshore economy

### 3.2.3.5. OTHER ACTIONS PROPOSED (TO BE AGREED) // PROPOSED BY DG RTD/E (HIGH)

- Topic BG-13: Market replication of innovative solutions for blue growth // Instrument: CP – CTM Project // Year: 2014
- Topic BG-14: Supporting SMEs efforts for the development and deployment of innovative solutions for blue growth // Instrument: SME Instrument // Year: 2014
- Topic BG-15: Building with nature – smart and sustainable dredging // PROPOSED by DG RTD/H2 under offshore challenge // Instrument: CP // Year: tbc // Duration: 3-4 years.



Specific challenge: With 80% of the world's population living in lowland urban areas by 2050, climate change, sea level rise and increase societal demands, surface water infrastructure development in those areas is facing new challenges, particularly the need to balance the sustainable functioning of ecosystems with the demand for development and use. As regards dredging and hydraulic infrastructures, a paradigm shift from "Building in Nature" to "Building with Nature" is necessary to ensure a sustainable future. The "Building with Nature" concept responds to the need of aligning the interests of economic development and care for the environment: working with the natural system in such a way that society's infrastructural needs and the interests of stakeholders are met, while new opportunities are created for nature. In other words, "Building with Nature" aims to be proactive, utilizing natural processes and providing opportunities for nature as part of the hydraulic infrastructure development process. While some work has been done to develop the concept, there is a need to push it further by studying how it could be applied in different maritime basins, with their different economic, geophysical and ecological conditions. Scope: A cornerstone of the "Building with Nature" approach involves detailed analyses of physical, ecological and social systems. It will therefore require a multidisciplinary team and approach. The project will review all existing knowledge, research and practices in this area. It will select a number of European geographical areas and ecosystems, representative of the diversity of European sea basins. It will seek to apply the building with Nature concept by observing the ecosystem processes and suggest innovative designs for main hydraulic infrastructures / dredging works. It will develop general principles and more specific guidelines adapted to the different maritime basins / ecosystems. Models and simulation tools will be developed to apply the concept to different conditions. One (or more) pilot projects will be undertaken, to demonstrate the added value of the "Building with Nature" concept with a particular hydraulic infrastructure. Expected impacts: Increased sustainability and climate resilience of hydraulic infrastructures and dredging works. Improved global competitiveness for the European "hydraulic infrastructures" industries. Promote "building with nature" practices through scientifically based and location-specific design rules and environmental norms that fit better with the local environment. Support the development of a blue and sustainable maritime economy.

- Topic BG-16: Response capacity to oil spills and marine pollution (to be further elaborated – Trans-Atlantic dimension?) // PROPOSED by DG RTD/I
- Topic BG17: Strengthening international cooperation in the field of marine sciences // Instrument: CSA // Year: 2014

Specific-Challenge: The effects of global change, both natural and anthropogenic have a well-documented impact on Atlantic marine ecosystems and services. Their influence impacts at all scales, by way of abiotic and biotic interactions, from the global scale cascading down to influence services on basin, regional and local scales requiring thus a globalization of the management of the marine environment. At present there is a lack of an international research collaboration framework to address this "grand challenge of sustainable management of the oceans" in an environment of Global Change. Scope: In order to foster such a framework this action should contribute to: the development of new research collaboration strategies and identify synergies and areas for collaborative action. This effort would require the identification of approaches for implementing and managing collaborative research projects sensitive to national research funding agencies, maximising sharing of existing knowledge (or of new knowledge being generated) and data, identifying best practices for the exploitation of projects results and fostering networking of researchers. To capitalize on knowledge exploitation and its impact this action should develop effective tools to inform and advise policy makers and managers across the Atlantic. Importantly, the initiative should contribute to the establishment of an effective cooperation and coordination of research programmes in the EU Member States within an international framework thus creating the basis for the development of future large-scale joint international marine research programmes. Links with Atlantic countries (e.g. US and Canada) are required. Expected impact: Effective international cooperation and coordination of marine research programmes between the countries bordering the two sides of the Atlantic, based on a strategy for joint international research programmes in marine sciences. Increased coherence and coordination of international S&T cooperation programmes across Europe building on relevant FP7 activities. Implementation of the objectives of the EU Maritime Strategy for the Atlantic Ocean Area and the Atlantic Ocean Cooperation Research Alliance .

- Topic BG-18: European polar research cooperation // Proposed instrument: CSA // Year: 2014
- Topic BG-19: Improving the preservation and sustainable exploitation of Atlantic marine ecosystems // Proposed instrument: CP – R&D project – 2 stages // Year: 2014
- Topic BG-20: Further consolidating the ERA in marine sciences // Instrument: CSA/ERA-NET (tbc) – Single stage // Year: 2015

Specific challenge: Addressing the oceans and seas issues is a complex endeavour. On the one hand they are an ecological treasure to be preserved and on the other hand they represent a very important economic element to be exploited. A better understanding of the nature and conditions of the seas will result in a better and more sustainable exploitation of them, and it is here where research arises as an element of the utmost importance. However the large number of research funding agencies and the extension of coastal areas in Europe make necessary the engagement of resources in a single direction among all the European sea basins and the strengthening of common strategies. The process of connecting EU research systems started many years ago with the launch of the ERA initiative and related EU Framework programme instruments, Articles 185 and Joint Programming Initiatives. However to achieve a globally competitive ERA for Europe to play a leading role in addressing grand challenges, such as the ones associated to our seas and oceans, national research systems must be more open to each other and to the world, more inter-connected and more inter-operable. Scope: This action should target: the consolidation of existing marine research funding networks and other key players around the ERA objectives mentioned above. It should define ways of implementing pan-European and regional strategic marine research agendas including research infrastructures roadmap developed under previous initiatives (e.g. SEAS-era, JPI Oceans) in areas with high European added value and innovation potential. The action should also propose measures supporting other ERA priorities such as: improving researchers' mobility, training and attractive careers; facilitating gender equality and gender mainstreaming in research; improving access to and transfer of scientific knowledge including via digital ERA. Expected impact: Enhanced global impact of EU funded research in the field of Marine sciences through improved collaboration, synergies and critical mass. Creation of a European Research Area in marine research. Enhanced knowledge and technology transfer and innovation between research industry and other stakeholders. Optimized use and planning of research infrastructures. Improved policy making including implementation of the EU Integrated Maritime Policy and its environmental pillar, and the Marine Strategy Framework Directive.

## 3.3. ENERGY

### 3.3.1. FOCUS AREA: COMPETITIVE LOW-CARBON ENERGY (HIGH)

One of the major challenges Europe will face in the coming decades is to make its energy system clean, secure and efficient, while ensuring EU industrial leadership in low-carbon energy technologies. To help achieve such ambitious objectives, this Focus Area aims to develop, and accelerate the time to market of, affordable, cost-effective and resource-efficient technology solutions to decarbonise the energy system in a sustainable way, secure energy supply and complete the energy internal market, in line with the objectives of the Strategic Energy Technologies Plan (SET-Plan). The scale and ambition of research and innovation needed requires enhanced cooperation between all stakeholders, including the EC, the Member States, the industry and the research community. The EU is committed to reduce its greenhouse gas emissions 20 % below 1990 levels by 2020, and intends a further reduction to 80-95 % by 2050. In addition, renewables should cover 20 % of final energy consumption in 2020, and a large part of it by 2050, as identified in the Energy roadmap 2050. A reduction of at least 60% of GHGs by 2050 with respect to 1990 is required from the transport sector, while by 2030, the goal for transport will be to reduce GHG emissions to around 20% below their 2008 level.<sup>9</sup> Time is pressing. The solutions that will be developed and rolled out to the market in the next ten years will form the backbone of the energy system for the many years ahead. Besides, the energy system needs to evolve to accommodate, among others, much higher levels of integration of renewable energy. It is essential that the society understand the existing challenges and the implications of their possible solutions, so as to ensure sustained public acceptance.

#### 3.3.1.1. E - ENABLING DECARBONISATION OF THE FOSSIL FUEL-BASED POWER SECTOR AND ENERGY INTENSIVE INDUSTRY THROUGH CCS (HIGH)

*Specific challenge:* The EU is committed to an overall reduction of greenhouse gas emissions of at least 80% by 2050. Nonetheless, fossil fuels will continue to be used in Europe's power generation as well as in other industrial processes for decades to come. Therefore, the 2050 target can only be achieved if the emissions from fossil fuel combustion are eliminated from the system. This will require the application of Carbon Capture and Storage (CCS). The assessments made in the context of the EU's Roadmap for the transition to a competitive low carbon economy in 2050 and the Energy Roadmap 2050 see CCS as an important technology contributing to decarbonisation scenarios in the EU, with 7% to 32% of power generation using CCS by 2050. The application of CCS to industrial sectors other than power (e.g. steel, cement, refining) is expected to deliver half of the global emissions reduction from CCS by 2050. In the near future, these industrial applications will open up new opportunities and avenues for CCS that can accelerate its deployment. For all applications, the demonstration of CO<sub>2</sub> storage is of major importance. Therefore, two key challenges in the short-term for driving CCS to deployment are geological storage and the industrial application of CCS.

*Scope:* Proposals should address one of the respective key challenges as presented above, or a combination of them. For geological storage, focus should be on progressing technologies that already reached TRL 4-5 to TRL 6-7. Projects should enable, under real testing conditions, development and demonstration of best practices for the entire storage cycle, from site characterisation to operation, monitoring and mitigation/remediation of leakage, and including education and training. Knowledge sharing as well as early and sustained engagement of the local community is essential. Collaboration activities between EU project(s) under this topic and selected Australian project(s) endorsed by the Australian government will be encouraged. For industrial applications, focus should be either on progressing solutions that already reached TRL 4-5 to TRL 6-7, or developing next generation technologies by bringing them from TRL 2 or above to TRL 5. Knowledge sharing as well as early and sustained engagement of the local community is essential.

*Expected impact:* Demonstration of safe and environmentally sound CO<sub>2</sub> storage will play a key role in optimising the safe operation of storage sites and in fine-tuning regulatory issues, in promoting confidence in CO<sub>2</sub> storage and building public awareness of CCS. Projects should contribute to accelerating the development and deployment of CCS through an enhanced and effective cooperation in research and innovation between various stakeholders and Member States, thereby allowing a more efficient use of existing financial resources and promoting knowledge sharing. The cost- and resource-effective application of CCS in industrial processes, including bio-CCS and CO<sub>2</sub> re-use, will expand the available options for CCS and provide a stepping stone to its wider deployment.

*Instruments:* CP, ERA-NET for pilot/demonstration projects (ERANET possibly in 2015, subject to positive feedback from MS); CP for projects aiming at developing next generation technologies

## 3.4. TRANSPORT

<sup>9</sup> White Paper 'Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system' COM(2011) 144 final.

### 3.4.1. CALL 'BLUE GROWTH' (TRANSPORT CHALLENGE CONTRIBUTION) (HIGH)

1. The offshore challenge - Preparing the future maritime economy (not related to us since it is funding for survey/policy work) // Form of funding: Coordination and Support Action – Single stage // Year: 2014
2. Delivering the Sub-sea technologies for new services at sea // Form of funding: Collaborative Project (100%) – Two stage // Year 2014

Specific challenge: The development of a new maritime economy necessitates tackling a range of technological challenges. One such challenge is the ability to remotely execute unmanned underwater operations ranging from simple observation / data collection and transmission of information to more complex industrial operations. Existing technologies derived from marine research (Remotely Operated Vehicles - ROVs, Autonomous Operated Vehicles – AUVs) must be industrialised, i.e. made more robust, reliable and sophisticated (in terms of operating capabilities) and with increased autonomy. Another challenge is the ability to operate at even higher depths (down to 6,000m), and in extreme conditions (e.g. Arctic regions, with corrosive products, heavy / viscous liquids, high pressure - high temperature systems, etc.). The control of the potential impact on the environment of these activities is also important.

Scope: Proposals should address feasibility studies and definition studies (including demonstrators) of the main components required to work undersea. The areas of interest are the following:

- Remotely Operated Vehicles and Subsea Construction systems
- Specialised "Robots" and Autonomous Underwater Vehicles, deployment, recovery and docking systems.
- Subsea "factory" Machineries.

Expected impact: The research will:

- Enable the sustainable exploitation of deep sea resources by European industries and support to EU Blue Growth agenda.
- Increase safety of the existing and new offshore maritime economy.
- Improve the scientific capacity to observe and understand the deep sea environment and resources.

3. Response capacities to oil spills and marine pollutions // Form of funding: Collaborative Project (100%) – Two stage // Year: 2015

Specific challenge: The development of deep sea resources exploitation (particularly offshore Oil and Gas) is moving maritime operations to extreme pressure and low temperature conditions, with many unknown factors and limited response capacity. As shown by the Gulf of Mexico accident in 2010, besides the lack of appropriate means to deal with a large scale pollution event at high depth / pressure, it is particularly challenging:

- to predict the evolution of the pollution (e.g. oil spill).
- to design an appropriate response combining the right mix of interventions (e.g. mechanical collection, burning oil on surface, use of dispersants, bioremediation, natural dispersion or transformation of spilled oil...).

Recently the Galway event on transatlantic marine research partnership highlighted the need to "Develop and maintain the capacity for rapid response to unanticipated and episodic events that require immediate scientific investigation to advance knowledge".

Scope: The research should aim at developing an integrated response capacity to major pollution events (particularly oil & gas) in extreme oceanic conditions. The integrated approach should combine oceanographic prediction of the pollution behaviour, understanding of impact of pollution, physical intervention and bioremediation and their impact on ecosystems, the use of specialised vessels and underwater (autonomous) vehicles. It should improve capacity to predict the evolution of the pollution and its impact on the marine environment as well as the response capacity, with integrated models and tools that can support decision making in the management of such events. It can also cover, as appropriate, recommendations for infrastructure works to help protect sensitive ecosystems in high risk areas. The research activities should foster transatlantic cooperation.

Expected impact: The research will lead to:

- Contribution to the safety of the new / offshore maritime economy and create a better environment for blue growth investments.
- Preservation of the marine environment and marine ecosystems and protection of coastal economies and communities.
- Contribution to the implementation of the EU regulation on safety of offshore oil and gas prospecting, exploration and production activities.
- Improvement of societal acceptance of offshore activities.

3. Building with nature – smart and sustainable dredging // Form of funding: Collaborative Project (100%) – Two stage // Year: 2014

## 3.5. CLIMATE ACTION, RESOURCE EFFICIENCY AND RAW MATERIALS

The objective of the Societal Challenge 'Climate action, resource efficiency and raw materials' is to achieve a resource – and water – efficient and climate change resilient economy and society, the protection and sustainable management of natural resources and ecosystems, and a sustainable supply and use of raw materials, in order to meet the needs of a growing global population within the sustainable limits of the planet's natural resources and eco-systems. Activities will contribute to increasing European competitiveness, raw materials security and improving well-being, whilst assuring environmental integrity, resilience and sustainability with the aim of keeping average global warming below 2°C and enabling ecosystems and society to adapt to climate change and other environmental changes. In this Work Programme, activities will contribute strongly to the Focus Areas 'Waste: a resource to recycle, reuse and recover raw materials', 'Water innovation: boosting its value for Europe', 'Blue growth: unlocking the potential of the oceans' and 'Disaster-resilience: safeguarding and securing society, including adapting to climate change', while also contributing to the Focus Areas 'Smart cities and communities', 'Low carbon energy' and 'Energy-efficiency'.

### 3.5.1. A.1 CALL – WASTE: A RESOURCE TO RECYCLE, REUSE AND RECOVER RAW MATERIALS

Proper waste prevention and management represent a major opportunity for European society, notably in terms of job creation, access to valuable raw materials and resources, and cost effective ways of reducing greenhouse gases. This focus area therefore aims to boost the development of innovative, environmentally friendly and cross-sectoral waste management solutions, to build a better understanding of environmental impact of human activities, and to seize new and significant market opportunities by positioning Europe as a global market leader in related innovation and technology: the global waste market, from collection to recycling, is estimated at €400 billion p.a. and full compliance with EU waste policy could create an additional extra 400 000 jobs within the EU and an extra annual turnover of € 42 billion. It also aims to raise societal awareness in order to use resources efficiently, turning the waste sector into a carbon sink, as well as mitigate the dependency of Europe on imported raw materials. Activities will therefore address the whole production and consumption cycle, from waste prevention and the design of products and processes to waste disposal or reuse, including organisational, management and behavioural changes, and fostering business models that bring residual waste close to zero. Activities will focus on key sectors, such as industrial manufacturing, energy, agriculture and marine and will encompass the collection, recovery, recycling and transformation of valuable materials from urban and industrial waste streams, including municipal waste, construction and demolition waste, high tech products, and bio-waste. The Public-Private Partnerships on Sustainable Process industries and on Bio-Based Industries will contribute to the objective of this focus area. This focus area will respond to needs identified in the European Innovation Partnership on Raw Materials, also covering the supply of raw materials through sustainable extraction (e.g. novel mining techniques) and finding substitutes. Actions in this area will support the Europe 2020 Resource-efficient Europe Flagship – in particular its milestone that by 2020 waste will be managed as a resource – the Eco-innovation Action Plan, the Communication 'Innovating for sustainable growth: a bioeconomy for Europe', the Raw Material Initiative strategy and the European Innovation Partnership on Agricultural Productivity and Sustainability.

It should be noted that the following topics under the LEIT pillar of Horizon 2020 also contribute directly to the objectives of this Focus Area:

- FoF.2015-4 Sustainable product life cycle management focused on reuse, remanufacturing and recycling related to advanced materials
- SPIRE.2014-1 Breakthrough innovations in recovery technologies: characterisation, separation and pre-processing

Contribution to the objectives of this Focus Area will also potentially be made actions under the JRC's Key orientations:

- Single market, growth, jobs and innovation: 'Analysis of the determinants for a sustainable supply of raw materials'
- Low carbon economy and resource efficiency: 'Implementation of the waste legislation including criteria for End-of-Waste and best available techniques for waste management'
- Public health, safety and security: 'Analysis of reduction potentials of food waste and increased food security along the supply chain' [tbc]

### WASTE 6\_2014: Roadmap for electronic waste // Type of action: Coordination Action – Single stage

Specific challenge: The rising trend of electronic waste throughout Europe has a very negative impact on the environment and on human health. In addition, given the scarcity of raw materials in Europe, including rare earth elements, steps should be taken to increase the recycling and the treatment of electronic waste. Scope: The action will take a coordinated and far reaching approach [including any appropriate research and deployment actions] to develop a European roadmap for the treatment of electronic waste from the ICT sector, which is the fastest growing sector of the global economy today. The action will aim to minimise the environmental effect of ICT and increase the recycling of raw materials which Europe currently imports and which are critical for the construction of ICT products and so the competitiveness of its ICT industry. Behavioural, social, political, cultural and institutional aspects should be taken into account in the development of the roadmap. A variety of different stakeholders (notably representatives across the whole ICT sector, standardisation organisations, waste management and recycling companies, public authorities/regulators) will be addressed through this action. Expected impact: Increased recycling rates and new/improved technologies to recycle electronic waste through increased knowledge and improved metrics of the situation of ICT waste in Europe. Increased recovery of critical raw materials from electronic waste.

### 3.5.2. A.2 CALL – WATER INNOVATION: BOOSTING ITS VALUE FOR EUROPE

Water is an invaluable resource for human health, food security, sustainable development and the environment, and is an economic sector of growing importance for Europe. However, water resources are constantly under pressure from climate change, urbanisation, pollution, overexploitation of freshwater resources and increasing competition between various user groups, and the improvement of the state of water resources will trigger substantial

economic benefits. The objective of the Water Framework Directive – to achieve good status by 2015 – will be met only in around half of the European waters, making major additional action necessary. The aim of this challenge is therefore to seize these new and significant market opportunities by positioning Europe as a global market leader in related innovation and technology. The world market for drinking and waste water reached €250 billion in 2008, with corresponding investments of more than €33 billion per annum. The market for technologies to adapt to climate change – like protecting from floods and droughts – is rapidly growing, considering that the cost of repairing damages is estimated to be about 6 times higher than the cost of adaptation. There is significant potential to boost the competitiveness and growth of the European water sector, which includes 9 000 active SMEs and provides 600 000 direct jobs in water utilities alone. A 1% increase of the rate of growth of the water industry in Europe may mean between 10 000 and 20 000 new jobs, while synergies with other sectors may generate even larger returns (some estimates indicate that the application of ICT in water management and monitoring could produce growth of 30% per year). The integrated portfolio of activities will address innovative tools and methodologies, including advanced ICT and earth observation technologies, for risk assessment, mitigation and adaptation strategies. It will also address eco-innovative, integrated and cross-sectoral solutions for water management such as: wastewater and drinking water treatment technologies; water reuse systems; closed water cycles in industry; enhanced desalination technologies; improved materials; process, behaviour and technologies to enhance water and energy use efficiency; and appropriate management systems and strategies that incorporate water, wastewater, storm water and energy systems and duly consider changes in its availability due to climate change or other stressors. Specific actions will rely on relevant needs identified in the Blueprint to Safeguard Europe's Water and the Strategic Innovation Plans of the European Innovation Partnerships (EIPs) – in particular the EIP 'Water', launched in 2012. Actions in this area will support the Europe 2020 Resource-efficient Europe Flagship, and the general Union Environment Action Programme to 2020.

It should be noted that the following topic under the LEIT pillar of Horizon 2020 also contributes directly to the objectives of this Focus Area:

- Y2.3-3: Materials innovations for the use of cooling water in power plants
- Y2.4-10: Low-energy solutions for drinking water production – pilot plants.

Contribution to the objectives of this Focus Area will also potentially be made actions under the JRC's Key orientations:

- Low carbon economy and resource efficiency: 'Implementation of the Water Framework Directive and the related directives, including monitoring and model-based assessment of water resources and demand in the EU and globally, chemical and microbiological monitoring, flood risk assessment, drought monitoring and forecasting, and information systems' and 'Contribution to initiatives for a water-efficient Europe in 2020, including an assessment of desalination potential'
- Agriculture and global food security: 'Modelling soil, water and ecosystem dynamics in order to improve their sustainable management in agricultural systems' [tbc]
- Solidarity with developing countries: 'Scientific advice, dissemination of information, and capacity-building of national scientific and government partners in developing countries, in particular in the field of natural resource management through applied space technologies, and with a focus on climate change, forestry, biodiversity and ecosystem services, and water' and 'Analysis, technical assistance, development of ICT tools, and organisation of workshops to support related multilateral or bilateral agreements and cooperation initiatives, with a focus on climate change, forestry, biodiversity and water' [tbc]

### WATER 7\_2015: Increasing confidence in seasonal-to-decadal predictions of the water cycle // Type of action: Collaborative Project (100%) – Two stage

Specific challenge: Water is a basic requirement for life and effective management of water resources is necessary in order to provide some of society's basic needs. Climate change affects the hydrological cycle in many different ways, including changes in precipitation patterns and extreme events (e.g. floods, droughts). Higher temperatures and changes in extremes are projected to affect water quality and exacerbate water pollution, with negative impacts on ecosystems and human health as well as on water system reliability and operating costs. These changes will directly influence the way water resources are managed at local, regional and continental level. Despite considerable progress made in the past ten years, forecasting natural water cycle variability and responses to anthropogenic threats including climate change, especially at regional scales, still suffers from severe limitations. Improved prediction systems are increasingly necessary to better inform decision makers and support policy making in Europe and beyond. Scope: The aim is to maximise the reliability of predictions of rainfall changes (frequency, severity) and of water cycle variability at local/regional scales in Europe, over various timescales under different climate scenarios and to improve the forecasting of related extreme events. Research should quantify the uncertainty in precipitation projections and predictions at both regional and EU level; it should hence focus on linking different types of models (climate, hydrological, impact) that should be routinely coupled to improve estimates of the effects of future changes on the water cycle and their socio-economic consequences. Particular attention should be given to the downscaling of global models and the development/validation of regional climate models that will more accurately simulate the impacts of climate change on water resources. Well-designed communication of the research outputs to policy makers should be envisaged to support climate change adaptation measures. Expected impact: More efficient management of water resources in Europe. Better implementation of the river basin management planning (RBMP) of the Water Framework Directive. Contribution to the implementation of the EU Climate Change Adaptation Strategy.

Additional input to this Focus Area expected from Research Infrastructures e.g. Integrating Activities, Environment section:

- IA.12 (ENV2) Research infrastructures for hydrological/ hydrobiological research: Infrastructures for hydrological/ hydrobiological research (hydrological, hydrometeorological and hydrochemical aspects as well biological/ ecological indicators).
- IA.16 (ENV34) Research infrastructures for environmental hydraulic research: Infrastructure for environmental hydraulic research (best facilities to help solve climate change adaptation problems; harmonising and organising the flux of data).

### 3.5.3. A.3 CALL – CLIMATE ACTION, RESOURCE EFFICIENCY AND RAW MATERIALS

During the 20th century, the world increased both its fossil fuel use and the extraction of material resources by of the order of a factor of ten. This era of seemingly plentiful and cheap resources is coming to an end. Raw materials, water, air, biodiversity and terrestrial, aquatic and marine ecosystems are all under pressure. The growing impacts from climate change and environmental problems, indicate that the planet is approaching its sustainability boundaries. Based on current trends, the equivalent of more than two planet Earths will be needed by 2050 to support the growing global population. There needs to be a decoupling of economic growth from resource use. Actions under this Work Programme will therefore focus on the transition towards a low-carbon society, the development and deployment of cost-effective and sustainable technological and non-technological solutions, mitigation and adaptation measures, and a stronger understanding of societal responses to these challenges. They will also focus on ensuring that ecosystems and biodiversity are protected, valued and appropriately restored in order to preserve their ability to provide resources and services in the future. Research and innovation actions under this Work Programme will also focus on securing reliable and sustainable access to and exploitation of raw materials and ensure a significant reduction in resource use and wastage. Eco-innovation has the capacity to provide valuable new opportunities for growth and jobs. Solutions developed will enable the transition towards a green economy that takes into account the sustainable use of resources. These actions shall, when appropriate, interface with relevant European Innovation Partnerships and Joint Programming Initiatives. Given the transnational and global nature of the climate and the environment, their scale and complexity, and the international dimension of the raw materials supply chain, activities are foreseen at EU level and beyond. The multi-disciplinary character of the necessary research also requires pooling complementary knowledge and resources in order to effectively tackle this challenge in a sustainable way. Reducing resource use and environmental impacts, whilst increasing competitiveness, will require a decisive societal and technological transition to an economy based on a sustainable relationship between nature and human well-being. Actions will also seek to improve research and innovation delivery and dissemination to support policy-making and to empower actors at all levels of society to actively participate in this process. In addition to bilateral and regional cooperation, Union level actions will also support relevant international efforts and initiatives.

#### 3.5.3.1. FIGHTING AND ADAPTING TO CLIMATE CHANGE: EARTH SYSTEM MODELLING (LOW)

- CH5\_2\_2014: Science in Support of Climate Services for Europe // Type of action: ERA-NET – Single stage

Specific challenge: It is essential that government, public, private and decision makers across Europe can effectively access and utilise science-based climate information to reduce the vulnerability to impacts of climate-related hazards, enhance the adaptive capacity and to allowing users to fully exploit related opportunities. Trans-national research collaboration should increase consistency of research on climate variability, change and its impacts, broaden the existing knowledge base, foster interdisciplinary approaches and close existing information gaps. Close interaction must be established between the climate knowledge community and the users of climate information and knowledge. Providers must understand and account for different users' needs and translate climate information and knowledge in a meaningful and relevant manner, including co-generation of the resulting services and co-designing the delivery mechanisms to make those services accessible to users. Scope: The aim is to launch a joint call to develop better tools, methods and joint standards on how to produce and use reliable data, new sets of simulations and impact indicators relevant for users' needs. These are required to assess impacts of future climate variability and extreme conditions for specific regions, sectors and time periods at regional and local scale and the links with existing and evolving risk management and policy instruments. Climate services must be based on a two-way exchange of information and data between science and society, including uncertainties, as well as on tailored decision-making support that is scientifically credible and meets the needs of users. This should also include consideration of specific request for services and multi-drivers risk analyses, which require an inter- and transdisciplinary dialogue among scientists of different disciplines, information providers and end-users. The ERANET should promote a wide representation of EU Member States. Expected impacts: Significantly improved quality and consistency of data, information and knowledge, relevant for innovative and sustainable climate policy making and satisfying to the needs of the end users and enhancing the quality and relevance of the outputs from the climate science and service community. Better sharing of information on different users' requirements, and on how to assess and interpret science-based climate information and build-up a community of engaged climate service providers. Improved sense of ownership, confidence and trust in climate services and enhanced two-way exchange of the science and knowledge needed to support climate services. Scientific support to the development of COPERNICUS operational activities. European contribution to the Global Framework for Climate Services (WMO-GFCS). Support to the implementation of the EU Strategy on Adaptation to Climate Change (2013).

#### 3.5.3.2. SUSTAINABLY MANAGING NATURAL RESOURCES AND ECOSYSTEMS: BIODIVERSITY, ECOSYSTEMS AND ECOSYSTEMS SERVICES (LOW)

- CH5\_4\_2014: Causalities between changes in biodiversity, ecosystems and ecosystem services // Type of action: Collaborative Projects (100%) – Two-stage

Specific challenge: Biodiversity plays an essential role in providing – directly or indirectly – supporting, provisioning, regulating and cultural services which are crucial for human well-being. However, the causality relationships between changes in biodiversity, ecosystem functions and their services and, subsequently, in human well-being are not well understood. This impairs our capacity to sustainably use ecosystems and their services, while preserving the ecosystems' capacity for a continued and sustainable provision of ecosystem services, and to design socially and environmentally sustainable management options for their restoration. Scope: Through a systemic and inter-disciplinary approach develop a robust knowledge base for: linking variability at different dimensions and scales of biodiversity to ecosystem functions and ecosystem resilience, and in turn to ecosystem service provision and the human well-being; predicting effects of multiple dynamic drivers on the relationship between biodiversity and ecosystem functions and services at various management-relevant spatial-temporal scales; quantifying synergies and trade-offs among ecosystem services and their interactions with human well-being; and developing innovative and harmonised indicators to monitor changes in ecosystem status and their services. Expected impact: Contribute to evidence-based management decisions and policy-making through enhanced knowledge and predictive capacity of the biodiversity and ecosystem services relationship. Creation of

innovative ecosystem service oriented management concepts and tools for the conservation and sustainable use of biodiversity and ecosystem services. Better achieve targets of the EU2020 Biodiversity Strategy as well as other environmental policies (e.g. soil and forest strategies). Increased coherence and synergies among sectoral responses.

### 3.5.3.3. DEVELOPING COMPREHENSIVE AND SUSTAINED GLOBAL ENVIRONMENTAL OBSERVATION AND INFORMATION SYSTEMS: STRENGTHENING OBSERVATION NETWORKS (SPACE-BASED, AIRBORNE AND PARTICULARLY IN-SITU) (MEDIUM)

- CH5\_15\_2015: Strengthening the European Research Area by bringing together national and regional research and innovation programmes on Earth Observation // Type of action: ERA-NET – Single stage

Specific challenge: The specific challenge is to ensure that decision makers have access to the information they need, when they need it, and in a format they can use, by bringing together and strengthening European national and regional research and innovation programmes in the domain of Earth Observation. Many European countries and pan-European organisations are conducting research and innovation programmes on Earth Observation but these activities remain quite fragmented and need to be better integrated at institutional level to reach a critical mass that would enable Europe to be better positioned with regard to its main competitors. Scope: The ERA-NET will launch a joint call on the observing and monitoring of changes affecting the Earth's atmosphere, oceans and landscapes with human activities being a major driver of these changes in the domain of climate, energy, food security, natural hazards, health, and natural resources. The ERA-NET will address the issue of the coherence of European participation within GEO and provide a research and innovation component to the Copernicus programme. Expected Impact: Better addressing of user requirements through sustained operation of comprehensive and coordinated European Earth observation networks, shared architectural components and related information infrastructure. Better-informed decision making in the domains of climate, energy, food security, natural hazards and health. Improved open and unrestricted data sharing across borders and disciplines, and interoperability amongst observational, modelling, data assimilation and prediction systems to maximise value and benefits of Earth observation investments.

### 3.5.3.4. DEVELOPING COMPREHENSIVE AND SUSTAINED GLOBAL ENVIRONMENTAL OBSERVATION AND INFORMATION SYSTEMS: USE OF COMPREHENSIVE ENVIRONMENTAL EARTH OBSERVATION AND INFORMATION SYSTEMS (HIGH)

- CH5\_16\_2014: Making Earth Observation Data usable for ecosystem modelling and services // Type of action: Collaborative Project (100%) – Two-stage

Specific challenge: Maximum use should be made of the investment in Earth Observation data and information when developing ecosystem models and sustainable ecosystem services, to deliver major benefits to citizens, businesses and governments. In this context there is a need to develop innovative solutions that will provide open and unrestricted access to interoperable ecosystem Earth Observation data and information. Overcoming this challenge will contribute to assessing the status of our planet's ecosystems and developing sustainable ecosystem services. This is a demanding task, which is not made any easier by our still fragmented and limited ability to collect, store, integrate, analyse and share the required Earth Observations. Scope: Actions should focus on recovering existing data, supporting new measurements and observations and making all data available to scientists, stakeholders, policy makers and citizens concerned to provide a full picture of the state and temporal evolution of ecosystems in internationally recognised protected areas. Pilot actions in selected protected areas are needed to test the further development of the Global Earth Observation System of Systems (GEOSS) and a developmental knowledge base for the Copernicus (Global Monitoring for Environment and Security) initiative. Expected Impact: New products and ecosystem services, based on improved access to and long-term storage of ecosystem Earth Observation data and information. Improved evidence-based environmental policy making and administrative efficiency. Enhanced participation of citizens in social and political decisions regarding protection and management of key ecosystems. Increased transparency in public administration and the provision of better public services concerning natural resources.

- CH5\_17\_2015: Developing 'next-generation' in-situ community observatories // Type of action: Collaborative Project (100%) – Two-stage

Specific challenge: The specific challenge is to develop 'next-generation' in-situ community observatories using innovative Earth Observation technologies to generate new and original applications, thereby strengthening in-situ environmental monitoring capabilities. This challenge includes leveraging emerging technologies, developing services and actively engaging in governance at all levels and scales in the domain of land cover/land use. This calls for the stimulation of innovative approaches and tools to handle complexity, interactions and interfaces, and to facilitate knowledge transfer, assessment, valuation, uptake and exploitation of data and results for policy, industry and society at large. 'Next-generation' in-situ community observatories, often referred to as citizens' observatories, have the potential to provide such innovative environmental approaches and solutions that can be integrated into the public, commercial and private sectors. Scope: The focus of this topic is to conduct suitable prototyping and pilot phase activities to test and validate the concept of 'next-generation' in-situ community observatories and the direct transfer of environmental knowledge for policy, industrial, research and societal use. In this context a strong engagement of the industrial sector, in particular SMEs, in the activities undertaken will be needed. The data collected will complement those from existing systems (e.g. the Copernicus land service) and surveys, including national surveys. Expected Impact: Better decision-making through the empowerment and active role of citizens and citizen's associations in environmental monitoring, co-operative planning and environmental stewardship. Enhanced implementation of governance and global policy objectives. Support to GEOSS and Copernicus.

## 3.6. INCLUSIVE, INNOVATIVE AND REFLECTIVE SOCIETIES

### CONDITIONS FOR THIS CALL

- ✓ For collaborative projects the Commission considers that projects requesting a contribution from the EU of between €2,0 million and €3,0 million would allow the specific challenges set out in this call to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.
- ✓ For Coordination and Support Actions the Commission considers that projects requesting a contribution from the EU of between €1,0 million and €2,0 million would allow the specific challenges set out in this call to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

#### 3.6.1. CALL 8 – ACHIEVING IU AND ERA: 46,5 M - 2014/2015 BUDGET (HIGH)

The challenge of the call is to support the implementation of the Europe 2020 strategy and more particularly to contribute to the achievement and the functioning of Innovation Union (IU) and the European Research Area (ERA). To foster the improvement of research and innovation policies in Europe, the evaluation of those policies, based on the IU 34 commitments, is necessary as well as the training of innovation leaders. In parallel, horizontal support for public-public partnerships and activities to accelerate the open labour market for researchers are expected to contribute to the implementation of the European Research Area.

1. Economic impact of the Innovation Union // 2014 // Form of funding: Collaborative Project (100%) – Single stage // EUR 3.0 M
2. Training innovation leaders // 2014 // Form of funding: Collaborative Project (70%) – single stage // EUR 5.0 M
3. Accelerating the open labour market for researchers according to ERA principles: H2020-2014-EURAXESS-III – Expanding support for researchers from all over the world // 2014 // Form of funding: Coordination and Support action (100%) – Single stage // EUR 4.0 M
4. Towards joint programming-Horizontal support for public-public partnerships (P2P) under Horizon 2020 // 2014 // Form of funding: Coordination- and support action (100%) – Single stage // EUR 3.0 M

**Specific Challenge:** In order to strengthen public-public partnerships and support Member States and their research funders in the preparation, implementation and monitoring of jointly implemented actions it is necessary to provide a common framework. The ERA-NET scheme has supported collaboration between Member States (MS) and their research programmes since the beginning of FP6. It has developed into a powerful tool creating joint transnational calls with a total volume of currently 2 billion € and a broad variety of additional activities between programmes that strongly support the realisation of ERA. Since its start in 2008, the joint programming process and the joint programming initiatives have gained considerable momentum and have led to the development of strategic research agendas, visions ahead and first joint activities, which in general have taken the form of common calls.

**Scope:** Proposals may cover the following areas:

- a) Development and implementation of a user-led 'information, learning and support platform' for Public-public partnerships under Horizon 2020 - The action shall focus on the development of a user-led 'information, learning and support platform' for Public-public partnerships under Horizon 2020 that support the information, monitoring and evaluation needs of all users, provide learning materials and functionalities including annual events and ensure the maintenance of a web-based portal with direct and indirect IT services. The action shall take into account the experiences gained from current actions (ERA-LEARN, NETWATCH, JPI to co-work). Proposers must demonstrate the ability to respond to user needs of the main stakeholders involved and ensure a representative participation.
- b) Optimising modalities and implementation of P2Ps - Actions shall be user driven and support improved and coherent implementation of P2Ps, e.g. the further development and common application of Framework Conditions for JPIs, the support for the development and



implementation of a Joint Programming 'Knowledge Hub' concept for Less Research Intensive countries or other conceptual and methodological approaches.

Expected impact: The selected actions should enhance the preparation, implementation, monitoring and impact assessment of public-public partnerships within and beyond Horizon 2020. They should provide further opportunities to share experiences and develop common approaches among the main stakeholders engaged in designing and deploying the broad structures and functions for the coordination and cooperation of national and regional research programmes. This will also contribute to the relevant priorities identified in the ERA Communication.

5. Accelerating the open labour market for researchers according to ERA principles: Pilot call Accreditation HRS4R // 2015 // Form of funding: Coordination and Support Action (100%) – Single stage // EUR 2.0 M
6. Accelerating the open labour market for researchers according to ERA principles-EURAXESS outreach to industry // 2015 // Form of funding: Coordination and Support Action (100%) – Single stage // EUR 1.5M
7. Institutions with innovative concepts for implementing ERA: IIC-1- Joint Call (26 A joint call under discussion with Units B2, B3, B6, C1 and Dir. D) or do we say TOPIC??? // 2014 // Form of funding: Coordination and Support Action (100%) – Single stage // EUR 25.0 M

Specific Challenge: The specific challenge is to mobilise research actors at grassroots level to implement the reforms needed to establish the European Research Area, notably the reforms contributing to achieving the following four priorities:

- Accelerate the opening of the labour market for researchers
- Optimal circulation, access to and transfer of scientific knowledge
- Optimal transnational co-operation and competition
- Gender equality and gender mainstreaming

Activities at the level of Member States' governments and Research stakeholder organisations are important but not enough. They must be complemented by activities of the actors themselves in order to create commitment and momentum for genuine change.

Scope: "Institutions presenting innovative concepts for the rapid implementation of ERA principles, including the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers, the Commission Recommendation on the management of intellectual property in knowledge transfer activities and the Code of Practice for universities and other public research institutions, will be supported." (Specific Programme implementing Horizon 2020, Challenge 6.2 Innovative societies (proposal)). The topic aims to bring together different actors committed to carry out activities that will support the implementation of the ERA principles as published in the ERA Communication of 17 July 2012 and endorsed by the Council Conclusions of 11 December 2012 ([http://ec.europa.eu/research/era/pdf/ere-communication/era-communication\\_en.pdf](http://ec.europa.eu/research/era/pdf/ere-communication/era-communication_en.pdf) [www.consilium.europa.eu/uedocs/cms\\_data/docs/pressdata/en/intm/134168.pdf](http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/intm/134168.pdf)). The different actors ( including in particular universities and research institutions, research funding organisations, researcher associations, service providers, innovation support offices, organisations providing training of different kinds, etc.) with innovative concepts must form networks or groupings fulfilling the applicable conditions (at least three entities from three different countries).

Applicants may ask for grant support to develop activities under the following five ERA key priority domains and one optional:

- HR strategies
- Doctoral training
- Internationalisation
- Optimal circulation, access to and transfer of scientific knowledge
- Research Infrastructures

Optional

- Innovative bottom-up concepts not covered by the five ERA key priority domains

All proposals should have a modular approach, with activities in at least three domains. The aim of the call is to further develop the ERA principles. The proposal can focus on a particular strength which must be in one of the five ERA key priority domains. The activities of this lead domain must be addressed fully and must cover at least half of the total activities and costs. The proposal should also cover at least two of the other key priority domains which can be further developed. The third domain can also include activities in the optional innovative bottom-up concept. Proposals will be evaluated in all (at least three) domains covered in the proposal.

Each project would receive a grant of up to EUR 1 million for a period of up to two years. The proposals addressing the lead domain "Research Infrastructures" could receive a grant of up to EUR 2 million for a period of three years as they should support the training of staff managing and operating different types of research infrastructures of pan-European interest (single sited, distributed, virtual), the exchange of good practices between facilities and the development of an interactive online training material. It is expected that only one proposal in the lead domain "Research Infrastructures" will be selected for funding, provided that it has passed the thresholds of all evaluation criteria.

It is expected that coordinating entities have already endorsed the Charter & Code before the deadline for submission of proposals or indicate their commitment to endorse them in writing in the course of the project. They should be able to demonstrate implementation of the principles underlying the Charter & Code, for example via active participation in the

Human Resources Strategy for Researchers (<http://ec.europa.eu/euraxess/index.cfm/rights/strategy4Researcher>). The coordinating entities of the proposals selecting as lead domain "Research Infrastructures" must demonstrate previous experience in training staff managing European Research Infrastructures. Applicants should also be able to demonstrate that they have a strategy in place addressing the following issues: 'Advertising vacancies on the EURAXESS jobs portal' and 'Filling research positions according to open, transparent and merit-based principles.

Expected impact: The activities under this call will allow a wide range of actors to do better in areas which are essential to their performance as actors or facilitators of collaborative research and innovation. The activities will directly enhance their administrative capacities and, indirectly, foster the quality of research by increasing the volume and diversity of exchanges across the European Research Area and beyond. Participants will feel more empowered to engage in cross-border and cross-sector exchanges (e.g. university business cooperation). Policy impact: The aim is to achieve a real "ERA impact". By reaching out to the grassroots level, this call will help to broaden the range of actors truly engaged in the implementation of ERA and thus broaden the popular acceptance of what is until now a relatively unknown political endeavour (compared to, for example, the widely known 'Bologna' reforms in higher education, establishing the European Higher Education Area). Involving research actors at grassroots level, freely cooperating on issues of common interest, will produce concrete examples of what is called *solidarité de fait*, and complement work being done by Member States and Research stakeholder organisations. Innovation impact: The enhanced capacities of research organisations to act freely according to their mission will have a positive effect on their ability to generate ideas for innovative goods and services for society. These organisations will be in a stronger position to interact fruitfully with innovators in industry and the public sector. Social-economic impact: The increased potential to innovate of a wide and growing range of research actors will contribute to the socio-economic performance of the societies in which they operate.

8. Randomized Control Trials for Innovation policy // 2014 // EUR 3.0 M

9. Pilot Synchronised Call // Budget: €5 million // Form of funding: Collaborative Project (70%) – Single stage

### 3.6.2. CALL 11 – COOPERATION WITH THIRD COUNTRIES: 60M 2014/2015 BUDGET (HIGH)

International cooperation is a key aspect of the Union's research and innovation policy. In a fast-changing international context, engaging more actively and more strategically with international partners, including through Horizon 2020, is of the utmost importance if the Union is to remain a global leader in research and innovation. The Union's strategy for international cooperation in research innovation (COM(2012) 497) proposes a dual approach to international cooperation in Horizon 2020. First and foremost, Horizon 2020 is open to the participation of researchers from across the world. Secondly, international cooperation is mainstreamed across the societal challenges and enabling and industrial technologies of Horizon 2020. In each of these, a careful identification and prioritisation process has led to the inclusion of targeted international cooperation activities, in which the area and partner for cooperation are identified upfront, and where cooperating with international partners adds value in achieving objectives of the Union.

The horizontal international cooperation activities to be supported as part of this challenge will complement this dual approach and support international cooperation as a cross-cutting aspect of Horizon 2020 by developing a range of activities aimed at supporting the cooperation with particular third countries and regions. The focus of these activities will be to support the policy dialogues in research and innovation with the Union's international partners.

Topic: Supporting the policy dialogue with the Union's international partners // Form of funding: Coordination and Support Action – Single stage

Specific Challenge: The aim is to enhance and focus the Union's cooperation with its international partners, in terms of both countries and regions. This relates in particular to:

- ❖ The approach to setting international cooperation priorities with the Union's international partners needs to become more strategic, which implies making it more selective by using in a consistent manner the four selection criteria put forward in the Commission's new international cooperation strategy (COM(2012) 497), i.e.:
  - Research and innovation capacity;
  - Opportunities for access to existing, new or emerging markets;
  - Contribution to the Union's international commitments, as reflected in the Millennium Development Goals, the post-2015 development framework or Rio+20;
  - Lessons learnt from previous cooperation.
- ❖ Research and innovation actors in the Union and in its partner countries and regions need to be provided with more and better opportunities for engaging in bottom-up cooperation on topics of their own choice;
- ❖ The cooperation between research and innovation actors mentioned above needs to be further facilitated by building trust and creating a level playing field through the use of common principles for engaging in international cooperation;

Scope: Projects should support the institutional policy dialogue between the Union and the country or region in question. They should also strengthen the cooperation between research and innovation actors, in particular through Horizon 2020.

To achieve this, projects should cover the following set activities:

1. Providing information and evidence to support priority setting in international cooperation, as part of the institutional S&T cooperation policy dialogue. This can, for instance, include:

- a. mapping and analysis of the research and innovation system (e.g. key players, competences, priorities etc) of the international partner;
  - b. carrying out an analysis of the international partner's research and innovation system as regards potential for cooperation with the Union, in particular in light of its research and innovation capacity and the opportunities for accessing existing new, existing or emerging markets through international cooperation;
  - c. monitoring and evaluating the cooperation between the Union and the international partner, including monitoring and analysis of the cooperation undertaken through Horizon 2020, also based on stock-taking and lessons learned from previous actions supported through Union funding with the relevant country/region;
  - d. setting up and maintaining a platform to share and disseminate information.
  - e. This should be differentiated as much as possible according to the societal challenges, enabling and industrial technologies and, where appropriate, other parts of Horizon 2020. [QUESTION: further focusing needed?]
2. **Analysing the framework conditions governing the cooperation between the Union and the partner in question (e.g. as regards Intellectual Property Rights protection, standards, access to finance, regulations governing research and innovation funding programmes, etc), including to identify any obstacles or hindrances, and contributing to the promotion and implementation of the common principles for engaging in international cooperation which will be developed as part of the implementation of the Union's new strategy for international cooperation (see COM(2012) 497);**
  3. Encouraging research and innovation actors to make full use of the opportunities offered by Horizon 2020 (through both the general opening and the targeted international cooperation activities) to engage in mutually beneficial cooperation, notably through the setting up of web-based information systems or through the organisation of awareness raising and information dissemination activities and through twinning and the organisation of brokerage events, conferences or workshops;
  4. Contribute to strengthen the complementarities and synergies between activities funded through Horizon 2020 and those funded through other Union policies and instruments addressing the countries and regions concerned, as well as between Union activities and those of the Member States;
  5. Ensuring effectiveness and impact by performing adequate quality control on the project deliverables, including through an external review committee and by defining and implementing a pro-active and comprehensive communication plan to ensure optimal dissemination and uptake of the project's results

For the following countries and regions (or regional organisations), projects will cover the full set of activities outlined above: USA, Canada, Japan, South-Korea, Australia, Mexico, Brazil, Russia, India, China, South-Africa, the Mediterranean Partner Countries, the Eastern Partnership, the African Union, Latin-America and the Caribbean (LAC), the Pacific, ASEAN and the Gulf Cooperation Council. They are considered to be the key international partners of the Union on the basis of their strategic importance and their strong involvement in previous Framework Programmes.

A maximum of one project will be supported per key partner country and/or region. These projects will cover all activities outlined above.

In addition, projects with the following countries and regions will be supported: Argentina, Algeria, Chile, Egypt, Jordan, Morocco, New Zealand, Tunisia, Ukraine, the Black Sea region and the Middle-East. Also in these cases, a maximum of one project will be supported per key partner country and/or region. For these countries and regions, projects will only cover activities 3, 4 and 5.

Projects will be implemented through balanced partnerships, ensuring adequate involvement of public authorities and other stakeholders (e.g. funding agencies, research organisations, industry, civil society) of the participating countries. Projects will build on the results of existing cooperation initiatives, and in particular those funded through the FP7 Capacities part 'Activities of International Cooperation'.

Expected impact:

More strategic priority setting for cooperation with the third country/region in question through increased use of objective information;

Stronger interaction between European researchers and those in the third country/region in question;

Stronger participation of the third country/region in Horizon 2020.

### 3.6.2.1. II. SUPPORT THE DEVELOPMENT OF R&I POLICIES (LOW)

#### A. Support the achievement of ERA

##### a) Overall implementation of ERA

- (1) Data gathering and analysis of the policy developments and reforms: Studies in 2014 and 2015: Funding scheme: Public procurement. // Timeframe: 2014 / 2015 // Indicative budget: EUR 0.5 million from the 2014 budget; EUR 0.5 million from the 2015 budget. //// Expert groups in 2014 and 2015: Funding scheme: Coordination and Support Action – Expert contracts // Indicative budget: EUR 0.21 million from the 2014 budget; EUR 0.21 million from the 2015 budget.
- (2) Methodologies and statistical analysis to assess the economic impact of different actions: Studies in 2014 and 2015: Funding scheme: Public procurement. // Timeframe: 2014 / 2015 // Indicative budget: EUR 0.1 million from the 2014 budget; EUR 0.1 million from the 2015 budget. //// Expert

- groups in 2014 and 2015: Funding scheme: Coordination and Support Action – Expert contracts // Indicative budget: EUR 0.1 million from the 2014 budget; EUR 0.1 million from the 2015 budget.
- (3) Communication of ERA policy: Studies in 2014 and 2015: Funding scheme: Public procurement. // Timeframe: 2014 / 2015 // Indicative budget: EUR 0.475 million from the 2014 budget; EUR 0.475 million from the 2015 budget. //// Expert groups in 2014 and 2015: Funding scheme: Coordination and Support Action – Expert contracts // Indicative budget: EUR 0.1 million from the 2014 budget; EUR 0.1 million from the 2015 budget.
- (4) Support to the activities of Research Stakeholder Organisations (SHOs): Studies in 2014 and 2015: Funding scheme: Public procurement. // Timeframe: 2014 / 2015 // Indicative budget: EUR 0.175 million from the 2014 budget; EUR 0.075 million from the 2015 budget.

**Support to the activities of Research Stakeholder Organisations (SHOs) which signed the Joint Statements and Memoranda of Understanding with the Commission, through further development of the stakeholder platform or by other means as to facilitate the communication of their activities in relation to ERA, the actions taken to implement SHOs commitments and related policies :**

b) Accelerating the open labour market for researchers

- (1) Expert evaluators: Funding scheme: Coordination and Support Action – Expert contracts // Indicative budget: EUR 0.25 million from the 2014 budget and 0.1 in 2015
- (2) Presidency Conference in Latvia: Funding scheme: Grant to identified beneficiary // Indicative budget: EUR 0.15 million from the 2014 budget
- (3) Data collection and analysis on researchers in higher education and research institutions in the EU and abroad // Funding scheme: (Coordination and Support Action - Public procurement through a framework contract up to 2 contracts. // Timeframe: Third quarter of 2014 // Indicative budget: EUR 1.2 million from the 2014 budget
- (4) Biennial EURAXESS Services Network Conference 2015 // Funding scheme: (Coordination and Support Action – Public procurement through a framework contract. // Timeframe: Third quarter of 2014 // Indicative budget: EUR 0.50 million from the 2014 budget
- (5) Support to EURAXESS Services and EURAXESS cross-cutting activities // Funding scheme: Coordination and Support Actions - Public procurement (- up to 6 public procurements through a framework contract -) // Timeframe: first and second semester of 2014 and first and second semester of 2015 // Indicative budget: EUR 0.80 million from the 2014 budget and EUR 0.50 million from the 2015 budget
- (6) Support to EURAXESS LINKS: Funding scheme: (Coordination and Support Actions - Public procurement - up to 2 public procurements through the EURAXESS-Links framework service contract covering 2014 and 2015); (Coordination and Support Action - Public procurement through a framework contract in 2015 ); Public procurement. The call will consist in 2 lots covering the animation of the Links Network including activities to raise its awareness. // Timeframe: first quarter of 2014 / second semester of 2015 / call for tender to be published during the second semester of 2014 // Indicative budget: EUR 1million from the 2014 budget / EUR 6,2 million from the 2015 budget/ ceiling of EUR 23 million of the Framework Contract 2016-2020
- (7) Pan European Supplementary Pension Fund: Funding scheme: (Coordination and Support Action - Public procurement through one open call for tenders in 2015. // Timeframe: second half of 2014 // Indicative budget: EUR 1,5 million from the 2014 budget
- (8) Biennial EURAXESS LINKS Conference: Funding scheme: (Coordination and Support Action - Public procurement in 2015. // Timeframe: second half of 2015 // Indicative budget: EUR 0.25 million from the 2015 budget

- (9) Virtual Mobility: Funding scheme: "(Coordination and Support Action - Public procurement through a framework contract in 2014 ) // Timeframe: Third quarter of 2014 // Indicative budget: EUR 0.2 million from the 2014 budget

c) Towards Joint Programming

- (1) Centralised evaluation of proposals: Funding scheme: Coordination and Support Action – expert contracts // Timeframe: 2014 and 2015 // Indicative budget: EUR 0.2 million from the 2014 budget and 0.1 from the 2015 budget
- (2) Strategic evaluation of Joint Programming: Funding scheme: Coordination and Support Action - public procurement through a framework contract // Timeframe: 2014 // Indicative budget: EUR 0.5 million from the 2014 budget

### 3.7. SECURE SOCIETIES CHALLENGE

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