bridge
STRATEGIC PLATFORMS

Strategic Platforms
Energy 2015

Energy harvesting, storage and management at Device and µgrid levels

« Expression of Interest »
Submission form and rules

Deadline: February the 19th at 14:00 pm

Submission of 2 paper and 1 electronic versions

More info?

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Information note

This document is dedicated to research teams willing to submit an Expression of Interest in the framework of the Bridge 2015 program. This stage aims to carry out a first selection of proposals. Only the teams that have passed the first stage evaluation will be invited to submit a full project proposal (FPP) and to participate to the final evaluation (second stage).

This document is made of two parts. The first part describes the Bridge program rules, objectives and context and presents the topics of this year while the second part is the effective Expression of Interest form that should be submitted to Innoviris by the deadline.

Table of content

Part I: program guidelines

1 Context and objective of the Bridge program

The Regional Plan for Innovation (RPI), approved by the Government in Brussels in 2006 and updated in 2012 defines the regional strategy in scientific research and technological innovation for the period 2007-2015. It is currently being updated for the period 2015-2020. Specifically, the strategy aims to combine a balanced way between the development of the competitiveness of existing industrial base in the Brussels-Capital and the concentration of resources on three areas:

- ICT (information and communication)
- Health
- Environment

Among the strategic areas developed under the RPI, the stimulation of innovation is one of the essential pillars. Concrete actions at this level involve upstream interventions by strengthening the technological potential of research units.

In this framework the Bridge action (Strategic Platforms) aims to support collaborative and multidisciplinary research projects conducted by universities, higher education institutions and collective research centres located in the Brussels Region. The program promotes technological transfer to Brussels companies, organisations and institutions, setting the bridge between academic and "industrial" research. A short to mid-term valorisation of the project results is expected. The objective of the action is to strengthen the potential of the region in strategic topics based on platforms put in place under the program and gathering a critical mass of research units and stakeholders.

For the emergence of the topic of the Bridge 2015 edition, Innoviris has followed a participative process to ensure a broad participation and interest both at the "industrial" and university level. A 8 step-process with consultation and validation was adopted:

- Step 1: 10 possible topics segments covering the whole R&D landscapewere defined based on overall priorities, relevant policy documents (e.g. H2020 themes, ERDF program, etc.);
- Step 2: the 10 segments were analyzed in order to define their relevance for an upcoming Bridge call. The analysis included the following elements: interviews with (sector) federations, comparison with previous or running (Innoviris) support schemes and integration of the experience of the Innoviris scientific advisors;
- Steps 3-4: based on this first analysis, 3 (broad) segments were retained which were afterwards confirmed by the relevant political authorities;
- Step 5: input from academic institutions Technology Transfer Offices (TTO) were collected in order to identify their research potential in the 3 broad segments;
- Steps 6-7: inputs from the discussion with the TTO and the material previously collected were consolidated to submit one topic to the political authorities who confirmed this election.
- Step 8: relevant stakeholders (industry, sector federation, etc.) were consulted in order to define research objectives matching the academic expertise and the needs from the industry;

This 8-step process ended on the topic *Energy harvesting, storage and management - Device and µgrid levels*.

2 Bridge 2015 edition – topic definition and context

ENERGY HARVESTING, STORAGE AND MANAGEMENT - DEVICE AND µGRID LEVELS

Background

Nowadays, more and more applications are required to be fully or partially autonomous from an energy point of view. Key pillars sustaining this autonomy are energy harvesting (EH), energy storage (ES) and energy management (EM) technologies.

At low energy levels, these technologies are particularly relevant in light ofcurrent trends in the Internet of Things (IoT), Smart Sensing and mobile devices.

Energy harvesting is a process by which ambient/waste energy (vibration, thermal, solar, electromagnetic radiation, human power …) is converted to useable electrical energy.

In the case of IoT and low power devices, EH represents an attractive alternative to batteries. Changing batteries in billions of devices is indeed not an option and disposing of billions of waste batteries has major environmental implications.

At device/sensor scale, application segments of EH range from consumer electronics (cellular phones, watches) to health care (wearable/implantable devices), environment (pollution sensing, …) or industrial applications (process control). The rapid progression of such technologies is explained by recent advances in electronics, material sciences and technology convergence as well as the uptake of wireless connectivity and remote applications.

To achieve broader market penetration, EH systems for low power autonomous devices still need to be improved in terms of conversion efficiency, reliability and cost (economic viability). Moreover, to deal with the intermittent nature of available energy sources or to build up energy for higher power applications, advanced storage technologies are necessary. Improvement are thus neededin storage capacity and duration, charge and discharge rate, efficiency, durability with time and use, safety, size, cost and environmental impact reduction. The same concerns apply to storage systems dedicated to partially autonomous devices that have limited access to the grid (portable devices, …).

In order to achieve a satisfactorylevel of service, smart energy management systems should also be developed to cope with the current state of EH/ES systems (energy source availability and storage level).

Knowledge and innovation production in EH, ES and EM at device level is of substantial importancefor the Brussels Region given its political commitment toward the concept of smart city.

At higher energy levels, “energy harvesting” and ES technologies are also key enablers of energy autonomy through µgrid at building block/district level.

µgrids are small-scale power grids that provide electricity to a restricted community. µgrids are typically a cluster of small Distributed Energy Resources (DER), loads and storage facilities (DES – Distributed Energy Storage) supervised by smart management tools. They can be connected to the main grid or operate in islanded mode (autonomously). The appeal of such systems is the fact that DER systems are located near the loads they serve, which limits investment in power transport and distribution and reduces loss. Other motivations are the integration of renewable sources and the strengthening of grid resilience. The µgrid can indeed be disconnected from the main grid in case of failure in the general network, which is particularly important for institutions that have critical missions (hospitals, …).

DER systems based on renewable energy can be associated with higher capacity energy harvesters that need to be coupled with DES facilities (given the generally intermittent nature of renewable sources). Improvements of both DER and DES are thus essential to facilitate µgrid wide deployment (with similar challenges as those mentioned above but for higher capacity) as well as new µgrid-supporting services linked to the availability of DER and DES (smart management).

The potential for impact and benefit of research in µgrid DER, DES and smart management is high for Brussels considering the number of institutions with critical missions (hospital, defense, …) located in the Region and the growing number of citizens' initiatives towards sustainable districts.

Besides technological improvements, questions relating to economic aspects, regulatory issues, environmental concerns and public acceptance must also be tackled before such technologies (at both device and µgrid levels) can be broadly deployed.

SCOPE

The research should focus on:

1. New and improved EH and ES technologies to enable fully autonomous or partially autonomous devices with optimized energy consumption while in operation. "Partially autonomous devices" refer to devices that have timely and optimized access to the grid.
2. New and improved "EH"/DER (Energy harvester – renewable energy generation) and DES technologies to enable the deployment of fully or partially autonomous µgrids at building block/district level and related smart management technologies

The topic is structured along 3 main axes:

Axis 1: "Energy Harvesting"

- Research on systems/material/platform and associated modeling tools to create improved EH systems that provide off-grid electricity where it is needed, from the surrounding environment (small devices/sensors level)
- Research on systems/material/platform and associated modeling tools for improved DER systems based on renewable energy (for µgrid applications)

Axis 2: Energy storage

- Research on systems/compounds and associated modeling tools for improved ES systems dedicated to partially autonomous devices (timely access to the grid) and fully autonomous devices (storage of energy delivered from energy harvesting devices).
- Research on systems/compounds and associated modeling tools for improved DES systems to be connected to a µgrid

Axis 3 under the framework of Axis 1 and/or 2: smart energy management in operation (device level or µgrid level)

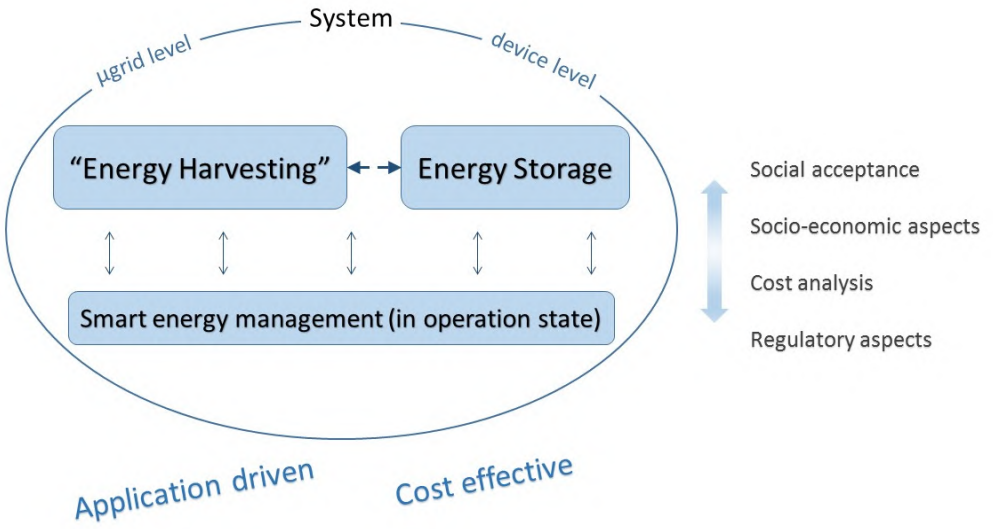
- Research on new approaches to optimize the way a fully or partially autonomous (timely access to the grid) device manages its energy consumption (linked to the status of its energy storage/or harvesting systems). This refers to the global optimization – i.e. all the processes involved – of the energy use of a device with minimum impact on the level of service (trade-off).
- Research on new µgrid supporting services linked to the smart management of DER, DES.

Axes 1 and 2 can be addressed independently; however we encourage proposals that adopt a global/whole system approach:

- integration of EH and ES technologies and possibly optimization of energy use (device in operation)
- integration of DER and DES technologies and possibly smart µgrid management.

In addition, a multidisciplinary approach is obviously expected

The technologies developed should be cost efficient and application driven. Aside from technological aspects, social acceptance and socio-economic, market, regulatory and environmental issues should also be addressed where relevant (in addition to technical issues).



Project topics may include (this list is not exhaustive):

- new energy harvesting (EH) hardware, devices, systems, or techniques
- new distributed energy resource (DER) hardware, devices, systems, or techniques
- new energy storage (ES) hardware, devices, systems, or techniques
- new distributed energy storage (DES) hardware, devices, systems, or techniques
- significantly improved EH and/or ES performance or environmental impact through attention to novel materials, electronics, system design, power management
- significantly improved DER and/or DES performance or environmental impact through attention to novel materials, electronics, system design, power management
- robust hybrid energy harvesting devices combining sources, control and storage elements
- approaches to enable energy harvesting or storage at significantly lower cost
- approaches to enable distributed generation or storage at significantly lower cost
- security and/or reliability of energy scavenging/storage systems (part of the research project)
- device scale modelling and simulation linked to materials and systems (EH/DER, Storage)
- new approaches, algorithms, etc. to optimize a device energy consumption in operational state (related to the EH and storage aspects for fully or partially autonomous device)

- new approaches, algorithms, etc. for µgrid smart management (linked to DER/DES, …)
- Complementary research (part of a research project involving technological aspects): regulatory, policy, commercial, market, environmental and public acceptability aspects, taking a whole systems approach:
    - techno-economic modelling
    - economic and regulatory models
    - environmental impacts
    - public attitudes/acceptance
    - commercial market and business case for energy harvesting and storage
- demonstration of EH/AS, including wearables, health, transportation, and the Internet of Things (challenging real world applications). This aspect should only be one part of the research project. While we support the development of concrete applications, this has to be the results of a broad strategic research, conducted within this call, and cannot be the sole purpose of the project.
- demonstration of µgrid-connected DER/DES in real world application (building blocks, part of hospitals, …). This aspect should only be one part of the research project. While we support the development of concrete applications, this has to be the results of a broad strategic research, conducted within this call, and cannot be the sole purpose of the project.

Projects should not include (not exhaustive):

- Main grid modeling and management tools
- Smart meters technologies
- High power storage and “harvesting” (GWatt levels)

Expected impact

The outcome of projects should contribute to making Brussels a smarter and greener city. Innovative solutions are expected to emerge from the projects and foster new technological pathways for Brussels that will contribute to meeting energy challenges.

Particular attention should be paid to the valorization of the projects and their impact on the Brussels economical, societal and public landscape; mid-term valorization is expected. Specifically, the Bridge action aims to promote technological transfer to Brussels-based institutions, organizations and companies. This may also take the form of new businesses and activities in the field through the creation of spin-off companies as well as of global IP licensing, ...

Given this objective, project consortia should partner with at least one Brussels-based mentor (not subsidized). Mentors will preferably be companies; however associations or public institutions are also eligible. Mentors should show their active interest in the valorization of projects results (technology implementation) for internal use or for integration into their core business activities.

3 Program structure and eligibility conditions

3.1 Consortium

The research projects should be conducted by a consortium of research teams (partners) from at least 2independent institutions.Each partner is represented by a “Promotor”; i.e. a professor or an experienced researcher from the research institution. A promotor should not be associated with more than 2 Expression of Interest.

Eligible institutions (beneficiaries) are universities, higher education institutions and collective research centres that have at least one research sitelocated in the Brussels-Capital Region.

Complementarity of the partners and interdisciplinary of their collective expertise are key elements of consortia.

3.2 Valorisation

The program promotes technological transfer to Brussels (and beyond) companies, organisations and institutions. A particular attention should be paid to the potential impact of the projects on the Brussels economical, societal and public landscape. Short to mid-term valorization is expected.

Examples of valorisation are:

- Spin-off creation
- Transfer of knowledge through IRD (Industrial Research & Development) projects, consultancy services, ...
- Technology and knowledge transfer to companies, non-profit organisation or public institutions
- Sale / licensing of IP to organisation
- …

Part of the valorisation aspects should also concern the results broad disseminations.

3.3 Mentorship

Project consortia should partner with at least one Brussels-based mentor (not subsidized).

Mentors will preferably be companies; however associations or public institutions are also eligible. Mentors should show their active interest in the valorization of projects results (technology implementation) for internal use or for integration into their core business activities.

The mentors will be involved all along the project to validate and/or give inputs regarding the valorisation, the exploitation or the dissemination of the results. It is up to the mentor to clearly describe the way the mentor organization will be involved.

As a matter of examples, different levels of mentor involvement are depicted here under (ordered in ascending level of involvement):

- Level 1 – inspiration/technological watch
  The mentor organization is interested in the project in a passive way. Mentor representative attend project follow-up committees or dissemination activities to keep up to date of results in the field.

- Level 2 – challenging role
  The mentor has more regular contacts and interactions with the project consortium. He gives his active feedback on the project.

- Level 3 – collaboration
  The mentor shareswith the consortium its expertise and results linked to the project and gives some access to its facilities. More time and human resources are involved.

- Level 4 – Pilot case

The mentor is involved in a project use case. He was involved in the pilot case definition and will benefits from it. Pilot case in for instance implemented in its facilities/activities.

- Level 5- Effective collaboration
  Specific human resource(s) of the mentor are dedicated to the project (part of the project team).

At least one of the mentors should be involved at level 2 and higher, the higher involvement the better.

3.4 Platform

A platform gathers partners (consortium), mentor and other stakeholders associated to a project. Exchanges between different projects (and associated platforms) are encouraged to build broader knowledge and expertise in the field.

3.5 Project duration

The project duration is minimum 2 years and maximum 3 years.

3.6 Funding

The funding covers 100% of the partners' budget. Eligible costs are personnel costs (PC), working costs (WC), equipment costs and overhead (10% WC + PC). Mentor organizations are not eligible for any funding.

3.7 Evaluation process, calendar, eligibility and evaluation criteria

A two-stage evaluation scheme applies. The first stage "Expression of Interest" aims to carry out a first selection of proposals. Only the teams that have passed the first stage evaluation will be invited to submit a full project proposal (FPP) and to participate to the final evaluation (second stage).

The main deadlines are the following:

- Launch of the call for Expression of Interest (EoI): December the 15th2015
- Deadline for the submission of the EoI: February the 19th 2016
- Evaluation and selection of EoI (first stage evaluation): end of February –March 2016
- Call for Full Project Proposal (for projects that have passed the first stage evaluation): beginning of April 2016
- Deadline for the submission of full project proposals (FPP): beginning of June 2016
- Evaluation of the FPPs: jury (experts of the field) organized between mid of June and end of July 2016
- Selection decision made by the government: September 2016
- Start of the project: between October and end of December 2016.

2015	2016											
Decemb.	January	February	March	April	May	June	July	August	Septemb.	Octob.	Novemb.	Decemb.
	Call open for Expressions of Interest (EoI)		Evaluation and selection of EoI	Call open for Full Project Proposals (FPP)		FPPs evaluation and selection		Governmental decision		<-- Start -->		

FIRST STAGE (Expression of interest)

Eligibility criteria - EoI

- the submission deadline has been respected

- the consortium gathers research teams (partners) from at least 2 independent research institutions that have at least one research site located in Brussels,
- promotors of research teams are not associated with more than 2 EoI
- at least one mentor located in Brussels is associated to the project (letter of intention joined to the EoI),
- the project duration is between 2 and 3 years
- the project meets the topic of the Bridge 2015 edition
- clarity of the descriptions and completeness of the required information (regarding the EoI form template)

Pre-evaluation criteria – EoI

- Scientific relevance and innovative aspects of the project
- clarity of the objectives and research questions
- coherence and complementarityof the partners
- coherence and complementarity of the submitted projects
- potential of short to mid-term valorisation

Innoviris reserves the right to consult experts in the field for this pre-evaluation step.

<u>SECOND STAGE</u> (Full Project Proposal – FPP)

Eligibility criteria - FPP

- the submission deadline for the FPP has been respected
- eligibility criteria of EoI still apply for the FPP
- the FPP content is in line with the EoI content

Evaluation criteria for the FPP

- Project innovation and scientific relevance
- Clarity and pertinence of the objectives
- Correlation between the stated objectives and the means proposed (relevance of the methodological approach, realism of the planning, adequate dedicated resources)
- Expertise and complementarity of the consortium partners (research groups), synergy between partners
- Valorisation potential
- Valorisation strategy

Part II: Expression of Interest - Form

This part is related to the Effective Expression of Interest form.

The template starting on the next page must be carefully filled in and submitted to Innoviris by the deadline (February the 19th 2016). The first part of this document (guidelines) should not be part of the Expression of Interest.

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STRATEGIC PLATFORMS

Project title

« Expression of Interest »
Submitted under the program Bridge 2015

Energy harvesting, storage and management at Device and µgrid levels

Deadline: February the 19th at 14:00 pm

Submission of 2 paper and 1 electronic versions to:

Innoviris
Chaussée de Charleroi, 110
1060 Brussels
jverstraeten@innoviris.be

1 Stakeholders

1.1 Partners

COORDINATOR – Partner 1

Host Institution	Name: ……
Research unit	Name: …… Research activities: …….. …… ……
Promotor	Name: …… Position: …… E-mail: …… Phone: …… Specific research skills: ……
Profile of the researchers	*Explain briefly the profile of the researcherswho will be involved in the project*
Role in the project	*Describe the role of the Partner 1 in the project and the specific skills he will bring to the project*
Responsible for the project at the host institution interface / Technological Transfer Office (TTO)	Name: …….. Phone: ……..

Partner 2

Host Institution	Name: ……
Research unit	Name: …… Research activities: …….. …… ……
Promotor	Name: …… Position: …… E-mail: …… Phone: …… Specific research skills: ……
Profile of the researchers	*Explain briefly the profile of the researcherswho will be involved in the project*

Role in the project	*Describe the role of the Partner 1 in the project and the specific skills he will bring to the project*
Responsible for the project at the host institution interface / TTO	Name: …… Position: …… Phone: ……

Partner x

Host Institution	Name: ……
Research unit	Name: …… Research activities: …… …… ……
Promotor	Name: …… Position: …… E-mail: …… Phone: …… Specific research skills: ……
Profile of the researchers	*Explain briefly the profile of the researcherswho will be involved in the project*
Role in the project	*Describe the role of the Partner x in the project and the specific skills he will bring to the project*
Responsible for the project at the host institution interface / TTO	Name: …… Position: …… Phone: ……

1.2 Mentors

Mentor 1

Organization	Name: …… Legal form: …… Address: ……
Contact person	Name: ……: Position: ……: E-mail: ……: Phone: ……:

Level of involvement	*Check the appropriate level* *(see section 3.3 of the guidelines for a description of the involvement levels)* ☐ – Level 1 – inspiration/technological watch ☐ – Level 2 – challenging role ☐ – Level 3 – collaboration ☐ – Level 4 – Pilot case ☐ – Level 5 – Effective collaboration ☐ – Other: ……
Motivation	*Explain briefly the motivation of the mentor 1 to be involved in the project*

Mentor x

Organization	Name: …… Legal form: …….. Address: ……..
Contact person	Name: ……..: Position: ……..: E-mail: ……..: Phone: ……..:
Level of involvement	*Check the appropriate level* *(see section 3.3 of the guidelines for a description of the involvement levels)* ☐ – Level 1 – inspiration/technological watch ☐ – Level 2 – challenging role ☐ – Level 3 – collaboration ☐ – Level 4 – Pilot case ☐ – Level 5 – Effective collaboration ☐ – Other: ……
Motivation	*Explain briefly the motivation of the mentor x to be involved in the project*

2 Project

Title: ……

Keywords: ……

2.1 Research proposal

3pages max

Describe the project objectives:

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Define briefly the addressed problems by relating them to the current state of knowledge:

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Justify the originality of the proposal and its innovative character (added value regarding the state of the art)

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Emphasize the quality of the proposal by exposing the proposed approaches and methods

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2.2 Accordance to the topic

10 lines max
See section 2 of the program guideline for the definition of the topic

Explain how the project meets the topic scope "Energy harvesting, storage and management at device and µgrid levels"

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2.3 Publications in the field

Give a list of maximum 5 most relevant publications of the partners in direct relation with the proposed research

- ……
- ……
- ……
- ……
- ……

3 Potential valorisation of the results

1 page max

As a reminder: the program promotes technological transfer to Brussels (and beyond) companies, organisations and institutions. Projects should have an impact on the Brussels economical, societal and public landscape. Short to mid-term valorization is expected. Examples of valorisation are: spin-off creation, transfer of knowledge through IRD (Industrial Research & Development) projects, …, technology and knowledge transfer to companies, non-profit organisation or public institutions; sale / licensing of IP to organisation, …Results dissemination is also expected.

Explain how the project outcome will be valorised and what will be the impact for the Brussels Region

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4 Mentorship

1 page max

Join a letter of interest of each mentors

Describe how the mentors will bespecifically involved. How will they interact with the partners and eventually other mentors and what are their specific interests in the project.

5 Budget estimate

Partner X (reasearch unit / institution)	
from 01/10/2016 to ../../….	
	€
Personnel costs	0 €
Working costs	0 €
Equipment costs	0 €
Sub-contracting costs	0 €
Overheads *10% (Personnel costs + working costs)*	0 €
Total	**0 €**

Partner Y (reasearch unit / institution)	
from ../../…. to ../../….	
	€
Personnel costs	0 €
Working costs	0 €
Equipment costs	0 €
Sub-contracting costs	0 €
overheads *10% (Personnel costs + working costs)*	0 €
Total	**0 €**

Partner Z (reasearch unit / institution)	
from ../../…. to ../../….	
	€
Personnel costs	0 €
Working costs	0 €
Equipment costs	0 €
Sub-contracting costs	0 €
overheads *10% (Personnel costs + working costs)*	0 €
Total	**0 €**

Global total	**0 €**

6 Signatures

Partner 1 – Coordinator

By signing the document, I certify that:

- I have read the program guidelines
- all the information provided in this document are correct

Promotor

Name: ……

Signature:

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Authority of the promotor
(Rector, president, …, of the host Institution)

Name: ……..

Position: ……..

Signature:

Responsible person at the host institution interface/TTO

Name: ……..

Signature:

Partner x

By signing the document, I certify that:

- I have read the program guidelines
- all the information provided in this document are correct

Promotor

Name: ……..

Signature:

-

If different that for other partners:

Authority of the promotor
(Rector, president, …, of the host Institution)

Name: ……..

Position: ……..

Signature:

If different that for other partners:

Responsible person at the host institution interface/TTO

Name: ……..

Signature:

7 Appendix: letter of Interest from mentors (mandatory)