



Deliverable 4.5

RIF Handbook

ECHORD++ Robotics Innovation Facilities

This handbook describes the Robotics Innovation facilities of the ECHORD++ project. Parts of it are for internal use only.

Robotics Innovation Facilities within ECHORD++

The FP7 project ECHORD++ (European Clearing House for Open Robotics Development, Grant Agreement Number 601116, www.echord.eu) aims at strengthening the cooperation between scientific research and industry in robotics, as a follow-up to ECHORD (2009 – 2013).

In addition to call-based experiments, small, focused research projects, ECHORD++ introduces a new concept to allow for light-weight access to research infrastructure and expertise. In three European countries, so-called RIFs, Robotics Innovation facilities are set up. RIFs are physical infrastructures in these countries. A RIF is a “living lab” with close ties to the (academic) host institution and industry, and at the same time, it is a test bed for new robotics technology. Robotics Innovation Facilities will allow new robot customers and users to collaborate with roboticists with no entrance barrier, and at very low cost – so that new communities can form. Operationally, the RIFs are open “experimental facilities” physically located at a university or research organisation. They provide equipment, services and personnel for anyone and everyone interested in robotics. In E++, we will pilot this concept by establishing three RIFs and study how they can work in an optimal way to attract researchers from other fields, robot users and customers, so as to generate new start-ups and support SMEs. Moreover, RIFs are an excellent opportunity to test new markets for manufacturers and start-ups at different stages, and this market analysis comes at no extra charge for them.

We especially encourage SMEs and start-ups to participate in these activities – RIFs are by their definition an ideal environment for developing and fostering new opportunities for commercialisation.

RIF access is without the need to formally become a new member of the ECHORD++ consortium (in contrast to the Experiment), and has a quick and regular decision procedure to evaluate light-weight application documents and to schedule stays in an interactive way. There are no fixed deadlines, the assessment of the applications will be done every 2 months.

Facts in short:

- Three physical facilities providing infrastructure and services
- Stay duration approx. 6 weeks, re-application after a successful stay possible
- No application deadlines
- No need to become a member of the ECHORD++ consortium
- Evaluation panel every 2 months
- Acceptance and scheduling horizon: 6 months

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Glossary of Terms

ECHORD++: European Clearing House for Open Robotics Development Plus Plus (E++ for short)

RIF: A Robotics Innovation Facility is a physical infrastructure supporting different user groups by providing state-of-the-art hardware, software components, and support in form of experienced staff.

SME: Small and Medium-sized enterprises form a specific target group for the experiments and the RIFs in E++. The term is used in exactly the same way as defined by the EC (http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index_en.htm)

Scenarios: represent the expected use of state-of-the-art robot technologies in the near future

Research foci: define the areas in which scientific advancement can be expected.

Experiment: An experiment is a small to medium sized scientific research and/or technology development project carried out by a team of one or more research institutions, robot manufacturers and robot and automation users, which typically lasts no longer than 18 months

1 General Concept of the RIFs (public)

1.1 Introduction

Robotics Innovation Facility (RIF) is a location where a single individual, a group of individuals or organisations can explore application of robots and automation to variety of problems and challenges. The ECHORD++ project has funded three RIFs. The three RIFs aim to assist participants in demonstrating robotics and automation solutions to problems that may be outside the capability or resources of a participant. The availability of hardware, software and expertise will facilitate a quick examination of potential solutions and show if a proposed approach to solve the challenge is feasible or not. Using a RIF to explore new product ideas or processes will enable the user to test various robots and interact with robotics and automation suppliers in a neutral environment. Moreover by streamlining the application process and lowering the engagement barrier it is anticipated that many participant outside of the normal robotics community will be able to participate in this enterprise.

In addition, the RIFs will strengthen and streamline the outreach to new constituencies by stimulating personnel exchange and more structured dialogue between all stakeholders. For examples, workshops and information days are planned at the RIFs.

The RIFs are located in Bristol, UK, Peccioli (near Pisa), Italy and Paris, France.

1.2 Users of RIFs

RIFs are addressing different user groups and provide specific benefits for them. The four user groups we envisage are as follows:

- **SMEs and start-ups:** to test products, prototypes and ideas, carry out feasibility studies, market analyses and acceptance studies. The RIFs will also encourage SMEs and (potential) spin-offs to intensively exchange knowledge with the host institution and other researchers and to use the equipment in the RIF. Depending on the SME this can go as far as "re-emulating" the conditions under which cooperations have become success stories. Accessing robotics and automation platforms free of charge, for a number of weeks with support from in-house expertise enables the participant to interact with the latest robotics and automation equipment. Participants will be gaining competitive advantage by use of robotics and automation in developing new products and processes. It is possible to obtain project funding to explore new products and processes by using the RIF engagement as part of a feasibility investigation and strengthening any further application for funded work. For any participant the use of RIF and its expertise will shorten development time and enables faster to market approach. Using a RIF to explore new product ideas or processes will enable the user to test various robots and interact with robotics and automation suppliers in a neutral environment.
- **Students:** students from different departments (CS, EE and ME – but also psychology, medicine and other disciplines) from different universities can apply for access to the RIF facilities and write their theses in close cooperation with users present in the RIF. This offer will be free, but students (or their home departments) will have to pay for their living expenses. Application will be simple: a one-sheet description of the work to be carried out will suffice.
- **New user groups:** outside the traditional robotics community, other researchers such as psychologists interested in e.g. human-machine interaction, usability and acceptance studies can make use of the RIF's services, infrastructure and equipment. They will have to apply for RIF time by submitting a short description of the planned work; their work will have to be synchronized with the other users far in advance on a best-match basis. For academics and individuals, RIF offers an opportunity for familiarisation and experimentation with robotics and automation for dissemination across society at large, schools, colleges, universities and other interested groups or to explore new ideas and applications.
- **E++ Experiments:** each experiment funded will be asked to spend a short time on one of the RIFs. More details can be found in the "ECHORD++ - Overview of the Experiments" brochure. ¹

¹ To see all these experiments at a glance, download the Experiments brochure:

http://echord.eu/public/wp-content/uploads/Experiments/ExperimentBrochure_Call1_v1-7.pdf

- **Workshop Attendees:** regular workshops are offered as part of the structured dialogue in a number of areas related to robotics, autonomous systems and automation. These workshops are open to all. In general these are introductory sessions targeting SMEs and delivered via a mix of lectures and hands-on sessions and delivered over two days over two consecutive weeks.

There is an additional benefit for robotics and automation suppliers and system integrators. They have opportunities for showcasing their products in a neutral environment and allow potential users to experiment and trial such offerings without the usual immediacy of commercial focus.

1.3 Stay duration and users working in parallel

The allocation of time slots at the RIFs will be carried out on six monthly time horizons. Currently a full engagement is nominally of six weeks duration. Depending on the available resources a minimum of four of engagements during a six-month period will be available. In some locations this may be more. But given this minimum and the three RIF locations, there will be approx. twelve engagements that occur every six months after which a new group will be invited.

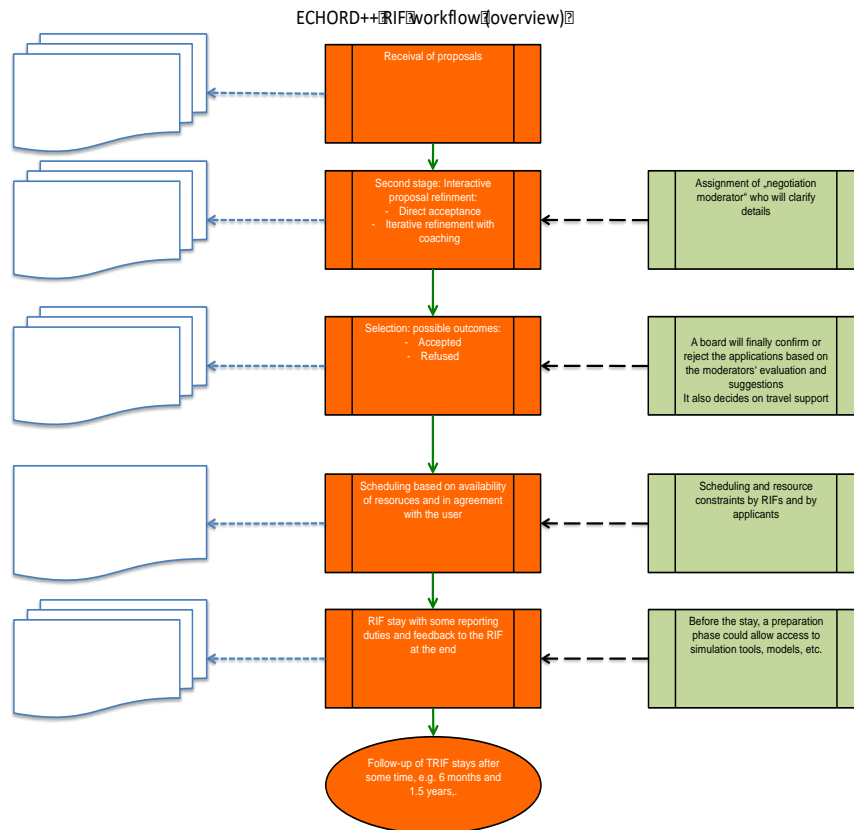
1.4 Scope and specialization of the RIFs

Within the general thematic context of ECHORD², each of the RIFs has its specialisations:

- RIF @ Bristol Robotics Laboratory (RIF@Bristol), Bristol, UK, will provide assistance in areas related to Cognitive Workers for new Applications:
 - Manufacturing
 - Assisted Living
 - Medical engineering
 - Food and Agriculture
 - Edutainment
 - General robotics, automation, sensors and actuators
- RIF@ Scuola Superiore Sant'Anna (RIF@SSSA), Pecioli (near Pisa), Italy, will provide assistance in areas related to Outdoor Logistics and Agricultural Robotics
 - Robotic worker (in rubbish dump)
 - Logistics robots (autonomous transport of goods and autonomous transport of people, in urban area)
 - Robot co-worker in domestic environment (robot companion, in the domestic house and in the nursing home in Pecioli)
 - Edutainment robot (robot guide and robot companion, in museum and in the domestic house) as well as agricultural robotics. Domotics represents a technological science which studies all the things employed in the houses or the buildings facilitating the work of peoples
 - Agricultural robots for precision farming.
- RIF@CEA (Commissariat à l'énergie atomique et aux énergies alternatives), Paris, France, will provide assistance mainly related to Medical and Health Robotics, cobotics and collaborative robots.
 - Teleoperated surgical robots
 - multi-modal sensing of the operation site, cognitive interface between the surgeon and the robot system, smart instruments for minimally invasive surgery
 - Rehabilitation robotics
 - Teleoperation among other in medicine
 - Human gesture assistance to reduce Musculo Skeletal Disorders

² ECHORD++ has its scope pre-structured in two orthogonal dimensions, Scenarios (defining an application-orientation for the experiment) and Research Foci (defining scientific and technical domains for the work, see the Guide for Applicants for the first experiment call): <http://echord.info/portal/ProposalDocuments/download/4>

2 RIF Engagement process (not for experiments)³



- Application stage:
 - Proposal receival + notification message to applicant, relevant data see form page 47 + prioritization of RIF site (one or more specific RIFs with priorities), work to be done at the RIF, additional information to be detailed, some basic data and the description of the work is mandatory, the other items are optional (for the sake of a low entrance barrier), and can be completed interactively after the application deadline
 - 2nd stage, interactive refinement of application, clarification of details, by basically filling in optional parts of the proposal form. Filling of these parts has to be tracked by the system, with stakeholder and time stamp, this still does not lead directly to a full acceptance, a 'moderator' will be in charge of communicating with the applicant and guiding him/her to complete the necessary details
- Selection stage:
 - A board will finally confirm or reject the applications based on the moderators' evaluation and suggestions

³ For Experiments using the RIFs, see Guide for applicants

- It also decides on travel support where the request has to be included in the application
 - Information of the applicants, and the E++ quality and general management
- Scheduling stage:
 - Scheduling based on availability of resources and in agreement with the user
 - Function for interactive scheduling/re-scheduling of users and resources, also migration to other RIF
- Use:
 - Record keeping of additional activities, such as preparation activities ("homework" by RIF users using simulation, discussion of actual HW/SW set-up for the stay, market studies, selection of components with coaching by RIF etc.), also for QM and reporting
 - Reporting functionality, simple approval by RIF staff, just to check for sufficient amount of information
 - Feedback form to the RIF
 - Follow-up inquiries after e.g. 6 and 18 months after the stay
- Statistics
 - "Dashboard" for easy statistical and load information (maybe combined with scheduling tool, but also read-only access e.g. for the EC)
 - Possibility to add unforeseen statistical requests

2.1 Application, evaluation, and acceptance

2.1.1 Application Process

The engagement process starts with completing and submitting the web based 'RIF Project Proposal Form'. The application process is conducted as shown in the following diagram.

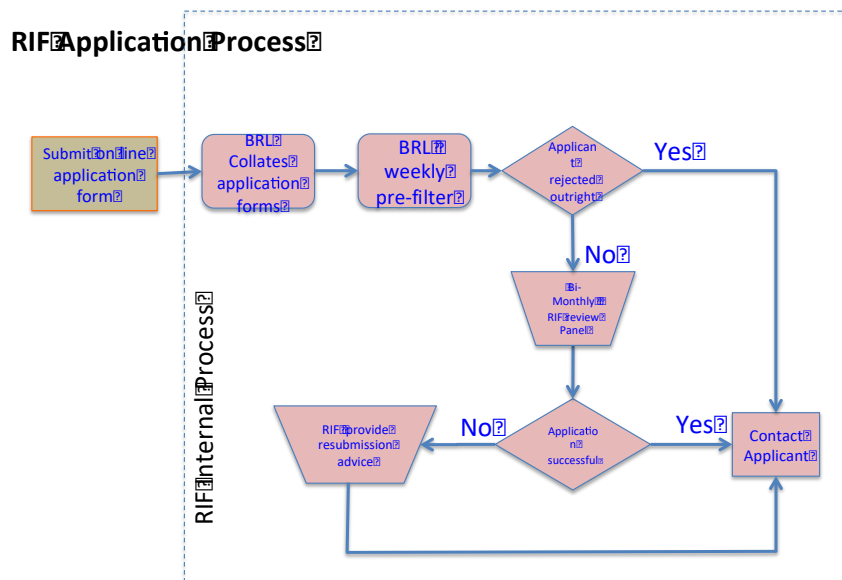


Fig1. Outline of RIF Application Process

All applications will be managed by the local RIF, where a designated person will carry out an initial review of each application.

The initial review will be concerned with the following points only:

- Have all sections of the form been completed?
⇒ An example of lack of compliance would be unfilled sections.
- Is the information provided appropriate?
⇒ An example of lack of compliance would be unreachable URL or a web address.
- Is there a clear focus for the proposed request?
⇒ An example of lack of compliance would be omission of a clear statement that informs the reviewers in determining if the applicant has considered the usefulness of a RIF stay and the type of equipment that may be used.

On completion of the initial review the applicants will be informed accordingly. The aim is to inform the unsuccessful applicants within a week of the initial review. There are no calls and applications can be submitted at any time

Application and negotiation (interactive completion of the application)

In cases where the RIF submission is very close to an acceptable standard, but would benefit from some additions or modification to improve the submission, the respected RIF will provide a short and focused assistance to the applicant so that submission can be improved so that the likelihood of success is increased. This, however, does not mean that the consultation will guarantee the success of the application or it can be carried out for an extended length.

2.1.2 Application Review Process

After the initial review process, approved applications will be reviewed by the local RIF Review Panel to be scored in accordance with the criteria detailed and listed below. The membership of the review panel will be drawn from within the local RIF staff.

On completion of the review process of each application, the local RIF Review Panel will complete the 'Scoring form'. Those applications that score a total of less than 40% will be rejected outright. The remainder will be allocated slots for the forthcoming six months depending on their score and RIF capacity. If the six monthly period is filled, the unallocated applicants may be taken forward to the next six month period, however, this is at the discretion of the review panel and is not automatic. Those applicants that are not allocated slots may elect to resubmit their proposal for a future consideration.

The applications forwarded for the full review will be assessed on a two-monthly basis and examples of criteria for assessments are:

(i) ALIGNMENT WITH ROBOTICS AND AUTOMATION

a. Proposal clearly addresses challenges in robotics, automation or a potential application area.

- i. EX. "This proposal will examine the feasibility of using an Electroactive Polymer to design a robot gripper for handling soft fruits....."
- ii. EX. "This proposal for stay in RIF will be used to characterise the compliance functionality of a electrohydraulic RCC device for use in...."

b. The proposers have stated a clear connection with robotics but in the form of software or firmware

- i. EX. "This proposal will examine the porting of a suit of new ROS algorithms for ease of integration of a robot and a vision sysem for visual servoing..."
- ii. EX. "This proposal will use the RIF facility to examine the human/ robot interaction where the user is infirm and elderly"

c. If the application is in support of an Experiment, the scenario and research focus must be clearly stated.

The proposal for Experiment has addressed this issue.

(ii) CLARITY AND FOCUS OF PROPOSED WORK

a. The proposal is clear in stating the purpose of the work, the aim and the objectives in a concise manner.

- i. EX "The outcome from this RIF engagement shall be the design and prototype of a compliant gripper for handling tomatoes"

b. It is clear from the proposal form the requirements of the engagement from the RIF in terms of equipment and expertise required.

- i. EX. "This proposal requires the use of the Baxter robot and expertise in developing ROS code"
- ii. EX. "The work will require the development of the manipulation routines for a 15kg polishing tool when polishing complex geometries"
- iii. EX. " The proposed work will develop a number of ROS routines for benchmarking the ABB IR120 robot currently in RIF@Bristol and the Stuaabli robot in RIF@Paris "

(iii) EVIDENCE OF COMMITMENT

- a. **The proposer has clearly stated the period of time they intend to spend in the RIF, the number of people that will visit the RIF and their clear tasks**
 - i. EX “The request is for six weeks visit to RIF@Paris. During the RIF engagement 2 personnel from XYZ will stay at the RIF for the full duration.
- b. **Where appropriate and possible the proposer will supplement the RIF equipment with those pieces of equipment that are specific to the engagement.**
 - i. EX. “The proposer will bring to the RIF one off XYZ vision system to interface with the ABB IR120 robot. This will be used for full duration of the trials at the RIF.”
- c. **There is a clear strategy for recording of findings and dissemination by way of seminars, workshops etc. to the RIF personnel.**
 - i. EX “ the applicant will deliver three one hour presentations at the start, middle and end of stay in the RIF to inform the RIF personnel and other members of the laboratory of the work carried out”
 - ii. EX. “The applicant will provide by way correspondence two summaries of the impact of engagement after six months and one year post completion of the engagement.”

(iv) POTENTIAL IMPACT

- a. **The proposal is clear in identifying the potential return on time and effort invested in carrying out the engagement with the RIF. This may be in terms of monetary return, new course development, establishment of new approach to solving a robotic problem etc. A key aim of ECHORD++ is the exploitation of the near to market opportunities and by extension the potential impact of those opportunities, clarity in this aspect of the proposal is critical.**
 - i. EX. “The result from the engagement will be used to launch a new affordable pneumatic manipulator that will contribute circa €150000 per annum to sales”
 - ii. EX. “The XYZ robot in the RIF will be used to develop new training material for delivery to our client resulting in €100000 additional sales per annum”
 - iii. EX. “The testing of the new robot actuator will assist us in reducing the potential failure modes, resulting in savings of €50000 per annum on warranty costs”
 - iv. EX. “Trials of the new software will demonstrate the improved dynamic performance of the robot and provide benchmarking data and increase expected sales in by approximately 10% in welding robots”

(v) NOVELTY OF PROPOSED WORK

- a. **The proposal must state clearly those aspects of the work, which are new and have not been witnessed before; this may be in terms of a new product, a new process or the application of an existing technology in a new area.**
 - i. EX. “The end-effector uses Coanda Effect to pluck ripe strawberries from plants with minimal damage thus increasing yield while enhancing quality”
 - ii. EX. “The RIF engagement will enable trials to take place to demonstrate the image capture quality of the new ‘snake’ robot when used for the inspection of internal features of complex machinery”
 - iii. EX. “The software based on Bayesian analysis will demonstrate the improved search capability of the platform and reduce SLAM error radius”

(vi) SIZE OF ORGANISATION

- a. **A key focus of ECHORD++ is to address the needs of SMEs, start-ups and micros. This does not exclude large organisations, however, it is preferred for larger companies to have small size collaborators during their visits to the RIF.**
 - i. EX. "XYZ is a registered company and currently employs three people"
 - ii. EX. "XYZ employs 120 people at its abc site and is a subsidiary of MNP"
 - iii. EX. "The organisation is a teaching institute and has 300 full time academics staff"

(vii) CLARITY OF CONTINUATION STRATEGY

- a. **Post engagement strategy is clearly stated:**
 - i. EX. "The RIF visitor has made a commitment to report to ECHORD++ project the outcomes from the engagement activity on a follow up session."
 - ii. EX. "On completion of the project at RIF@Bristol, XYZ will undertake the process of submitting an application for funding via ECHORD++ 'Experiment' to continue the project"
 - iii. EX. "The consortium will use the results from the RIF stay to formulate an application for H2020 funding"
 - iv. There is a clear route for seeking funds from ECHORD++ Experiment, Horizon 2020, commercial sources or local funding agencies for continuation of the project.

(viii) PRESENCE OF AN EXPLOITATION STRATEGY

- a. **For those engagements in particular when based on results of Experiments there is a detailed and clear strategy for securing funds and partners for the commercial exploitation of the proposed work.**
 - i. EX. "On completion of trial period at the RIF the consortium has secured funding for development of preproduction examples of the robot"
 - ii. EX. "The software demonstrated at the RIF will be sold on commercial bases, licenses are being negotiated"
 - iii. EX. "Funds have been secured to start production for sales of the robot"

RIF Bi-Monthly Review Process for Ad-Hoc Engagement

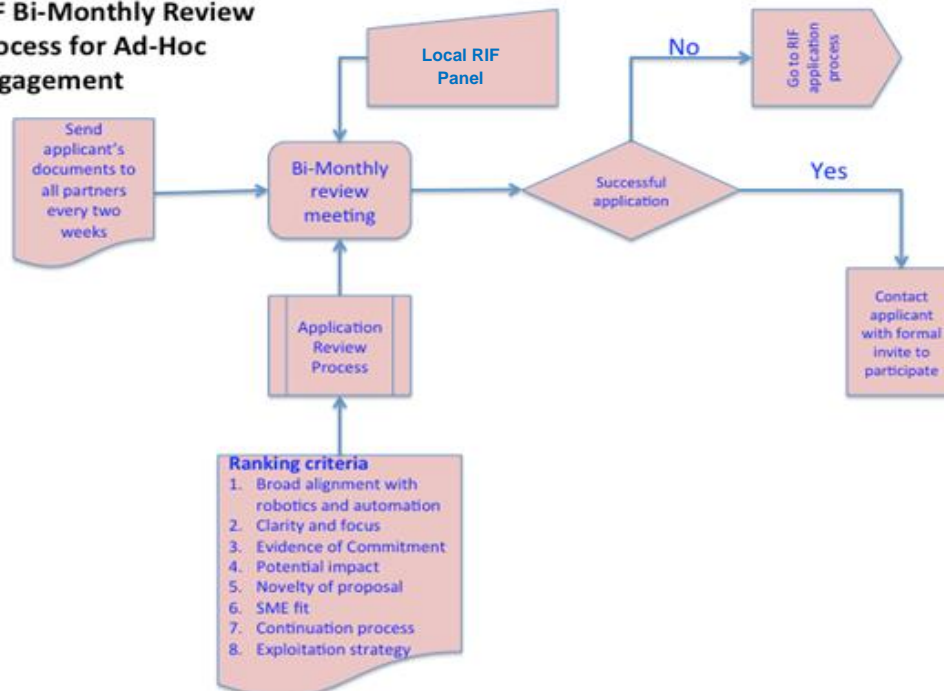


Fig1 Two-Monthly review process for short engagement with RIF

2.1.3 Results notification

Results will be communicated to the applicants shortly after bi-monthly meetings. An appeal process is not offered. Those applicants that have been successful and plan to take up the offer of RIF residency will undergo an exploratory meeting to determine the full nature of the engagement, objectives, resources required and engagement start and end dates. In Bristol, RIF clients are required to complete a formal contract of engagement detailing the terms of the engagement and to include a work schedule with agreed milestones and objectives prior to commencement of work.

Re-application or extension of a stay

In the event of an unsuccessful initial application an opportunity to reapply will be granted.

Fair treatment of all applicants

All applications for RIF engagement will be assessed by a local RIF Review Team. All assessment will be in accordance with the weighting table shown on page 29.

2.2 Access to equipment

Where the competence in the safe use of equipment can be assured it would be possible for an applicant to request the use of equipment in a RIF without necessarily any involvement from the RIF personnel. Again the limits for this will be in respect of the duration of the RIF engagement.

Applicants are encouraged to carry out as much work as possible at their own facility or using simulation software where available at any of the RIFs before occupying hardware time at a given RIF.

Each RIF is responsible for providing a central scheduling of its resources.

2.3 Travel Support

There will be a limited travel support to RIF users in order to allow for access even if there is no RIF geographically close to the user's location. The travel grants will be used to enable users to participate in and with the RIFs rather than perceiving distance as a barrier to engagement.

The terms for applying to access travel support are provided below:

- The grant will be available on a "match-funding" basis.
 - Eligibility criteria of applicant:
 - Registered within the European Union
 - An SME, SME-like non-profit organisations
 - Submitted RIF proposal been approved
- Allocation of assistance will be based on the location of the applicant from the allocated RIF:
- Over 500 km 50% match funding up to a maximum of €500 reimbursed, this shall include subsistence
 - The maximum that can be reimbursed for flights of over 500 km will be 1000€, this shall include subsistence.
- Grants will be awarded based on the cheapest reasonable travel costs not more than actual costs for the stay; they are meant per RIF engagement not per person.
 - ECHORD++ Experimenters are not eligible to access travel grants.

These rules are a first attempt and will be revised after the first 3 months of fully operational RIFs. In this phase, all decisions have to be approved by the evaluation board (see 3.5).

2.4 IP regulations, use of results, acknowledgement of E++ support (public)

RIF collaborators will own the IP developed during the RIF engagement. RIFs do not claim any rights to any of the IPs developed during the engagement. Where more than one collaborator participates in the same RIF engagement it is incumbent on the collaborating parties to agree on an IP sharing process. The RIFs do not participate in this process but require to see the agreement before they start of the work. All results obtained during a RIF engagement belong to the visiting parties and RIF makes no claim to this. All visiting parties must ensure that appropriate statements that acknowledge the support provided by RIFs are transmitted to the respective RIFs as evidence for later reporting to the commission.

2.5 Contract, Service limitations, liability,

Terms and conditions of engagement vary locally, and are available on request from the respective RIF.

2.6 Reporting duties

The successful applicant must undertake to provide a short report concerning the application of the results obtained from the engagement six months, one year and eighteen months after the completion of the project. It is important to ensure that the dialogue between ECHORD++ and the applicants is maintained after the completion of the RIF stay.

3 Internal part (for ECHORD++ core consortium and EC only)

3.1 Application handling (also technically)

All formal applications are controlled directly by the local RIF.

3.2 Application first stage review

All applications are reviewed and feedback provided to the applicant by the respective RIF.

3.3 Interactive application completion

Applications will be accepted at any time and are not subject to specific calls. All applications will be reviewed and the result will be conveyed to the applicants and when necessary, assistance will be provided.

3.4 Evaluation criteria

The following are guidelines for the application review panel to assess and score an application. For each of the eight criteria a score out ten will be awarded based on its appropriate alignment with a descriptor for that criterion. The sum of the eight scores will be used for ranking of the applications.

3.4.1 ALIGNMENT WITH ROBOTICS AND AUTOMATION

10.0 Project's aim is to use/develop or design a system that include robotics and an integrated system and is directly related to ECHORD++ research foci and scenarios

9.0 Project's aims are to use/develop or design a system that include robotics and is directly related to ECHORD++ research foci and scenarios

8.0 Project's aims are to use/develop or design a system that include automated system and is directly related to ECHORD++ research foci and scenarios

7.0 Project's aim is to use/develop or design systems that include robotics and automation

6.0 Project's aim to use/develop and design robotic systems

5.0 Project's aim to use/develop and design automated systems

4.0 Project's aim to use/develop robotic systems

3.0 Project's aim to use/develop automated systems

2.0 Project's aim does not align with robotics or automation

1.0 No aims have been stated

3.4.2 CLARITY AND FOCUS OF PROPOSED WORK

10. There is a clear focus with well-defined time lines and deliverables and specific equipment requirements. The software required for modelling for example, and expertise needed from the RIF is detailed. The test protocols are clearly defined. The focus is stated in a clear sentence as "The focus of this engagement is to"

The applicant has examined the details of facilities as described on the RIF web sites and is fully conversant with RIF capabilities.

9.0 There is a clear focus with well-defined time lines and deliverables and specific equipment requirements. The software required for modelling for example, and expertise needed from the RIF is detailed. The test protocols are clearly defined. The focus is stated in a clear sentence as "The focus of this engagement is to"

The applicant lacks knowledge of RIF capabilities and has requested assistance which can not be provided with RIF equipment.

8.0 There is a clear focus with well-defined time lines and deliverables and specific equipment requirements. The software required for modelling for example, and expertise needed from the RIF is detailed. The test protocols are not clear. The focus is stated in a clear sentence as "The focus of this engagement is to"

The applicant lacks knowledge of RIF capabilities and has requested assistance which can not be provided with RIF equipment.

7.0 There is a clear focus with well-defined time lines and deliverables and specific equipment requirements. The software required for modelling for example, and expertise needed from the RIF is not stated. The test protocols are not clear. The focus is stated in a clear sentence as “The focus of this engagement is to”

The applicant lacks knowledge of RIF capabilities and has requested assistance which can not be provided with RIF equipment.

6.0 There is a clear focus with well-defined time lines and deliverables and specific equipment requirements. The software required for modelling for example, and expertise needed from the RIF is not stated. The test protocols are not clear. The focus is stated in a clear sentence as “The focus of this engagement is to”

The applicant lacks knowledge of RIF capabilities and has requested assistance which can not be provided with RIF equipment.

5.0 There is a clear focus with well-defined time lines and deliverables and specific equipment requirements. The software required for modelling for example, and expertise needed from the RIF is not stated. The test protocols are not clear. The focus is not stated in a clear sentence.

The applicant lacks knowledge of RIF capabilities and has requested assistance which can not be provided with RIF equipment.

4.0 There is lack of clear focus, though some evidence of a project plan and deliverables and specific equipment requirements is presented. The software required for modelling for example, and expertise needed from the RIF is not stated. The test protocols are not clear. The focus is not stated in a clear sentence.

The applicant lacks knowledge of RIF capabilities and has requested assistance which can not be provided with RIF equipment.

3.0 There is lack of clear focus, very little evidence of a project plan and deliverables and specific equipment requirements is not presented. The software required for modelling for example, and expertise needed from the RIF is not stated. The test protocols are not clear.

The applicant lacks knowledge of RIF capabilities and has requested assistance which can not be provided with RIF equipment.

2.0 There is lack of clear focus, very little evidence of a project plan and deliverables and specific equipment requirements is not presented. The software required for modelling for example, and expertise needed from the RIF is not stated. The test protocols are not clear.

The applicant lacks knowledge of RIF capabilities and has requested assistance which can not be provided with RIF equipment. There is, however, some evidence that the applicant has some ideas about their needs from a RIF engagement.

1.0 There is no evidence suggesting a focus for the work proposed.

3.4.3 EVIDENCE OF COMMITMENT

10. The applicant is fully committed to the engagement with a request to participate in any work carried out in the RIF. This is manifested by the request to visit the RIF throughout the duration of the work. The applicant has already carried out some preliminary work before visiting the RIF. The applicant has produced hardware and software that may be used during the stay in RIF. This may be evidence by the purchase or acquisition of items currently not available in the RIF to use during the practical sessions in the RIF. There are computer models and CAD drawings of various elements that may be used during the engagement. The applicant has included sessions to be conducted in their place of work to supplement the stay in RIF. The work requested is a significant part of a larger project and the applicant has expressed and demonstrated the strategic nature of this engagement in their overall long-term plans.

9.0 The applicant is fully committed to the engagement with a request to participate in any work carried out in the RIF. This is manifested by the request to visit the RIF throughout the duration of the work. The applicant has already carried out some preliminary work before visiting the RIF. The applicant has produced hardware and software that may be used during the stay in RIF. This may be evidence by the purchase or acquisition of items currently not available in the RIF to use during the practical sessions in the RIF. There are computer models and CAD drawings of various elements that may be used during the engagement. The applicant has included sessions to be conducted in their place of work to supplement the stay in RIF.

8.0 The applicant is fully committed to the engagement with a request to participate in any work carried out in the RIF. This is manifested by the request to visit the RIF throughout the duration of the work. The applicant has already carried out some preliminary work before visiting the RIF. The applicant has produced hardware and software that may be used during the stay in RIF. This may be evidence by the purchase or acquisition of items currently not available in the RIF to use during the practical sessions in the RIF. There are computer models and CAD drawings of various elements that may be used during the engagement.

7.0 The applicant is fully committed to the engagement with a request to participate in any work carried out in the RIF. This is manifested by the request to visit the RIF throughout the duration of the work. The applicant has already carried out some preliminary work before visiting the RIF. The applicant has produced hardware and software that may be used during the stay in RIF. This may be evidence by the purchase or acquisition of items currently not available in the RIF to use during the practical sessions in the RIF.

6.0 The applicant is fully committed to the engagement with a request to participate in any work carried out in the RIF. This is manifested by the request to visit the RIF throughout the duration of the work. The applicant has already carried out some preliminary work before visiting the RIF.

5.0 The applicant is fully committed to the engagement with a request to participate in any work carried out in the RIF. This is manifested by the request to visit the RIF throughout the duration of the work.

4.0 The applicant is fully committed to the engagement with a request to participate in any work carried out in the RIF. This is manifested by the request to visit the RIF throughout the duration of the work.

3.0 The applicant is committed to the engagement with a request to participate in work carried out in the RIF but only on occasional bases.

2.0 There is some evidence of commitment but it is not clearly specified

1.0 There is no evidence of any attempt at engagement with work done and only interest in the eventual results.

3.4.4 POTENTIAL IMPACT

10. The application details the financial, technological and societal impact of the results of the engagement. The potential impact based on forecasted outcome from the engagement is realistic as agreed by both the applicant and the RIF review team. There is a clear focus, an agreed timeline and deliverables and the deliverable dates for the post engagement phase where the results will be exploited. The financial return from the outcome is clearly outlined, as are the technological and societal impacts. There is a clear description of the extent and depth of effects of the engagements after the completion of the engagement. These might describe the mechanism for obtaining financial return for example by the sale of products or expertise resulting from the engagement. The description may detail the extent to which the technology developed, as the results of the engagement will be implemented in relevant areas. The societal impact may be in the form devices, techniques, implements that may help the aged or improve the living environment.

9.0 The application details the financial, technological and societal impact of the results of the engagement. The potential impact based on forecasted outcome from the engagement is realistic as agreed by both the applicant and the RIF review team. There is a clear focus, an agreed timeline and deliverables and the deliverable dates for the post engagement phase where the results will be exploited. The financial return from the outcome is clearly outlined, as are the technological and societal impacts. There is a clear description of the extent and depth of effects of the engagements after the completion of the engagement. These might describe the mechanism for obtaining financial return for example by the sale of products or expertise resulting from the engagement. There is no indication of technology or societal impacts and no examples of such outcomes.

8.0 The application details the financial, technological and societal impact of the results of the engagement. The potential impact based on forecasted outcome from the engagement is realistic as agreed by both the applicant and the RIF review team. There is a clear focus, an agreed timeline and deliverables and the deliverable dates for the post engagement phase where the results will be exploited. The financial return from the outcome is clearly outlined, as are the technological and societal impacts. There is a clear description of the extent and depth of effects of the engagements after the completion of the engagement. However, there is no description of the mechanism for obtaining financial return for example by the sale of products or expertise resulting from the engagement. There is no indication of technology or societal impacts and no examples of such outcomes.

7.0 The application details the financial, technological and societal impact of the results of the engagement. The potential impact based on forecasted outcome from the engagement is realistic as agreed by both the applicant and the RIF review team. There is a clear focus, an agreed timeline and deliverables and the deliverable dates for the post engagement phase where the results will be exploited. The financial return from the outcome is clearly outlined, as are the technological and societal impacts. There is no clear description of the extent and depth of effects of the engagements and no description of the mechanism for obtaining financial return for example by the sale of products or expertise resulting from the engagement. There is no indication of technology or societal impacts and no examples of such outcomes.

6.0 The application details the financial, technological and societal impact of the results of the engagement. The potential impact based on forecasted outcome from the engagement is realistic as agreed by both the applicant and the RIF review team. There is a clear focus, an agreed timeline and deliverables and the deliverable dates for the post engagement phase where the results will be exploited. The financial return from the outcome is clearly outlined, however, there are no technological or societal impacts. There is no clear description of the extent and depth of effects of the engagements and no description of the mechanism for obtaining financial returns for example by the sale of products or expertise

resulting from the engagement. There is no indication of technology or societal impacts and no examples of such outcomes.

5.0 The application details the financial, technological and societal impact of the results of the engagement. The potential impact based on forecasted outcome from the engagement is realistic as agreed by both the applicant and the RIF review team. There is a clear focus, an agreed timeline and deliverables and the deliverable dates for the post engagement phase where the results will be exploited. However, the financial return from the outcome is not provided and there are no technological or societal impacts detailed. There is no clear description of the extent and depth of effects of the engagements and no description of the mechanism for obtaining financial returns for example by the sale of products or expertise resulting from the engagement. There is no indication of technology or societal impacts and no examples of such outcomes.

4.0 The application details the financial, technological and societal impact of the results of the engagement. The potential impact based on forecasted outcome from the engagement is realistic as agreed by both the applicant and the RIF review team. There is a clear focus but no agreed timeline and deliverables and the deliverable dates for the post engagement phase are not stated. The financial return from the outcome is not provided and there are no technological or societal impacts detailed. There is no clear description of the extent and depth of effects of the engagements and no description of the mechanism for obtaining financial returns for example by the sale of products or expertise resulting from the engagement. There is no indication of technology or societal impacts and no examples of such outcomes.

3.0 The application details the financial, technological and societal impact of the results of the engagement. The potential impact based on forecasted outcome from the engagement is realistic as agreed by both the applicant and the RIF review team. There is no clear focus and no agreed timeline and deliverables and the deliverable dates for the post engagement phase are not stated. The financial return from the outcome is not provided and there are no technological or societal impacts detailed. There is no clear description of the extent and depth of effects of the engagements and no description of the mechanism for obtaining financial returns for example by the sale of products or expertise resulting from the engagement. There is no indication of technology or societal impacts and no examples of such outcomes.

2.0 The application details the financial, technological and societal impact of the results of the engagement. The potential impact based on forecasted outcome from the engagement is unrealistic and is not agreed by the applicant and the RIF review team. There is no clear focus and no agreed timeline and deliverables and the deliverable dates for the post engagement phase are not stated. The financial return from the outcome is not provided and there are no technological or societal impacts detailed. There is no clear description of the extent and depth of effects of the engagements and no description of the mechanism for obtaining financial returns for example by the sale of products or expertise resulting from the engagement. There is no indication of technology or societal impacts and no examples of such outcomes.

1.0 The application has no details of any financial, technological or societal impact of the results of the engagement.

3.4.5 NOVELTY OF PROPOSED WORK

10 The proposed RIF engagement will seek and demonstrate a novel and innovative solution to the problem posed and presents a new solution method using new software, hardware or integration. The result of the engagement is a new marketable product or methodology that has not been available in this form. The projected effect is '*transformational*' resulting in a product that does not currently exist. An example of this type of innovation is the personal computer and the creation of a new industry. In the context of RIF engagement the aim would be to **demonstrate either a software or hardware version of the *real* product.**

9. The proposed RIF engagement will seek and demonstrate a novel and innovative solution to the problem posed and presents a new solution method using new software, hardware or integration. The result of the engagement is a new marketable product or methodology that has not been available in this form. The projected effect is '*transformational*' resulting in a product that does not currently exist. An example of this type of innovation is the personal computer and the creation of a new industry. In the context of RIF engagement the aim would be to **demonstrate either a software or hardware of a *key and critical* element of the real product.**

8. The proposed RIF engagement will seek and demonstrate a novel and innovative solution to the problem posed and presents a new solution method using new software, hardware or integration. The result of the engagement is a new marketable product or methodology that has not been available before. The projected effect is '*transformational*' resulting in a product that does not currently exist. An example of this type of innovation is the personal computer and the creation of a new industry. In the context of RIF engagement the aim would be to **demonstrate a *simulated* version of the product.**

7. The proposed RIF engagement will seek and demonstrate a novel and innovative solution to the problem posed and presents a new solution method using new software, hardware or integration. The result of the engagement is an incremental improvement in product or methodology that has not been available before. The projected effect is '*incremental*' resulting in a product that does not currently exist. An example of this type of innovation is the iPad and the creation of a new or enhancement of an existing market. In the context of RIF engagement the aim would be to **demonstrate either a software or hardware version of the *real* product.**

6. The proposed RIF engagement will seek and demonstrate a novel and innovative solution to the problem posed and presents a new solution method using new software, hardware or integration. The result of the engagement is an incremental improvement in product or methodology that has not been available before. The projected effect is '*incremental*' resulting in a product that currently is not available. An example of this type of innovation is the iPad and the creation of a new or enhancement of an existing market. In the context of RIF engagement the aim would be to **demonstrate either a software or hardware of a *key and critical* element of the real product.**

5. The proposed RIF engagement will seek and demonstrate a novel and innovative solution to the problem posed and presents a new solution method using new software, hardware or integration. The result of the engagement is an incremental improvement in product or methodology that has not been available before. The projected effect is '*incremental*' resulting in a product that currently is not available. An example of this type of innovation is the iPad and the creation of a new or enhancement of an existing market. In the context of RIF engagement the aim would be to **demonstrate a *simulated* version of the product.**

4. The proposed RIF engagement will seek and demonstrate a novel and innovative solution to the problem posed and presents a new solution method using new software, hardware or integration. The result of the engagement is a marginal improvement in product or methodology that has not been available before. The projected effect is '*Marginal*' resulting in

a product that currently is not available in this form. An example of this type of innovation is the optical mouse and the creation of a new or enhancement of an existing market. In the context of RIF engagement the aim would be to **demonstrate either a software or hardware version of the *real* product.**

3. The proposed RIF engagement will seek and demonstrate a novel and innovative solution to the problem posed and presents a new solution method using new software, hardware or integration. The result of the engagement is a marginal improvement in product or methodology that has not been available before. The projected effect is '*Marginal*' resulting in a product that currently is not available in this form. An example of this type of innovation is the optical mouse and the creation of a new or enhancement of an existing market. In the context of RIF engagement the aim would be to **demonstrate either a software or hardware of a *key and critical* element of the real product.**

2. The proposed RIF engagement will seek and demonstrate a novel and innovative solution to the problem posed and presents a new solution method using new software, hardware or integration. The result of the engagement is a marginal improvement in product or methodology that has not been available before. The projected effect is '*Marginal*' resulting in a product that currently is not available in this form. An example of this type of innovation is the optical mouse and the creation of a new or enhancement of an existing market. In the context of RIF engagement the aim would be to **demonstrate a *simulated* version of the product.**

1.0 No innovation is apparent

The following table summarizes the point scheme for novelty aspect.

	Demonstrated on a real product	Demonstrated on a key element of the product	Demonstrated on a simulated version of the product
Transformational effect	10	9	8
Incremental effect	7	6	5
Marginal effect	4	3	2

3.4.6 SIZE OF ORGANISATION

Organisation with up to 2 people is awarded a score of 10

Organisation with up to 5 people is awarded a score of 9

Organisation with up to 10 people is awarded a score of 8

Organisation with up to 20 people is awarded a score of 7

Organisation with up to 30 people is awarded a score of 6

Organisation with up to 50 people is awarded a score of 5

Organisation with up to 100 people is awarded a score of 4

Organisation with up to 250 people is awarded a score of 3

Organisation with up to 500 people is awarded a score of 2

Organisation with up to 1000 people and over is awarded a score of 1

3.4.7 CLARITY OF CONTINUATION STRATEGY

10 Post engagement with the RIF, a proposal for 'Experiment' by full set of partners has been agreed and a declaration made that the proposal is available for the RIF review panel if required. There is a clear, logical and realistic project plan with identifiable deliverable due dates for post RIF period.

9.0 Post engagement with the RIF, a proposal for H2020 funding by full set of partners has been drafted and this can be made available to the RIF review and the next application date for H2020 is provided. There is a clear, logical and realistic project plan with identifiable deliverable due dates for post RIF period.

8.0 Post engagement with RIF, a proposal for funding from other funding agencies has been drafted and those funding agencies are clearly stated. There is a clear, logical and realistic project plan with identifiable deliverable due dates for post RIF period.

7.0 The participant has demonstrated the availability of external resources needed to continue with the work after RIF engagement and documentary evidence to support this can be obtained. There is a clear, logical and realistic project plan with identifiable deliverable due dates for post RIF period.

6.0 The proposer has own funds to proceed with continuation of work and a clear identification of resources needed to proceed to the next stage. There is a clear, logical and realistic project plan with identifiable deliverable due dates for post RIF period.

5.0 The Proposer has a very clear strategy for post RIF stage, this is demonstrated by clear, logical and realistic project plan with identifiable deliverable due dates.

4.0 The proposer has engaged a consultant to identify funding routes forward and has a clear, logical and realistic project plan with identifiable deliverable due dates for post RIF period.

3.0 There is a clear, logical and realistic project plan with identifiable deliverable due dates for post RIF period, but no indication of a funding mechanism for the next stage.

2.0 There is an unrealistic and impractical continuation strategy.

1.0 There is no continuation strategy.

3.4.8 PRESENCE OF AN EXPLOITATION STRATEGY

10- A potential test product is likely and a **budget has been allocated** to develop a product based on the results of RIF engagement and market analysis has been carried out indicating a sizable market, marketable products are planned and beta test sites identified. A business plan has been drawn up and a number of potential clients have been identified and engaged

9- A potential test product is likely and **capital expenditure permission has been granted** to develop a product based on the results of RIF engagement and market analysis has been carried out indicating a sizable market, marketable products are planned and beta test sites identified. A business plan has been drawn up and a number of potential clients have been identified and engaged

8- A potential test product is likely and **capital request has been submitted and initial indications are positive** to develop a product based on the results of RIF engagement and market analysis has been carried out indicating a sizable

market, marketable products are planned and beta test sites identified. A business plan has been drawn up and a number of potential clients have been identified and engaged

7- A potential test product is likely and **discussions are underway with banks seeking funds for further development** of a product based on the results of RIF engagement and market analysis has been carried out indicating a sizable market, marketable products are planned and beta test sites identified. A business plan has been drawn up and a number of potential clients have been identified and engaged

6- A potential test product is likely and **business angles and VC have been contacted** and have indicated their interest by requesting detailed discussions and meetings have been organised. A product based on the results of RIF engagement and market analysis has been carried out indicating a sizable market, marketable products are planned and beta test sites identified. A business plan has been drawn up and a number of potential clients have been identified and engaged.

5- A potential test product is likely and **likely expenditure to finance product launch** has been established. A market analysis has been carried out indicating a sizable market, marketable products are planned and beta test sites identified. A business plan has been drawn up and a number of potential clients have been identified and engaged.

The product has been demonstrated to handful of potential users and they have indicated their likely intent to acquire the product after field trials

4- A potential test product is likely and **no financial analysis has been carried out**. A market analysis has been carried out indicating a sizable market, marketable products are planned and beta test sites identified.

3- A potential test product is likely. An outline product has been demonstrated to handful of potential users and they have indicated their likely intent to acquire the product after field trials

2- A potential test product is likely, but it is unlikely that it will be demonstrated and little evidence of an exploitation route exists.

1- A potential test product is unlikely to result from the engagement

Table 1 Project scoring table

Client										
Reviewers										
Date										
SCORING CRITERIA FOR RIF APPLICATIONS										
ALIGNMENT WITH ROBOTICS AND AUTOMATION	VERY LITTLE ALIGNMENT									HIGHLY ALIGNED WITH AUTOMATION AND ROBOTICS
	1	2	3	4	5	6	7	8	9	10
COMMENTS										
CLARITY AND FOCUS OF PROPOSED WORK	NOT CLEAR AND NO FOCUS									VERY CLEAR AND HIGHLY FOCUSED
	1	2	3	4	5	6	7	8	9	10
COMMENTS										
EVIDENCE OF COMMITMENT	NO REQUEST FOR STAY OR REGULAR VISITS TO LAB									REQUEST FOR STAY IN THE LAB FOR THE DURATION
	1	2	3	4	5	6	7	8	9	10
COMMENTS										
POTENTIAL IMPACT	THERE IS NO POTENTIAL FOR IMPACT									A CLEAR IMPACT IS INDICATED
	1	2	3	4	5	6	7	8	9	10
COMMENTS										
NOVELTY OF PROPOSED WORK	THE WORK HAS NO NOVELTY									THE WORK IS VERY NOVEL
	1	2	3	4	5	6	7	8	9	10
COMMENT										
SIZE OF ORGANISATION	VERY LARGE ORGANISATION									MICRO OR VERY SMALL
	1	2	3	4	5	6	7	8	9	10
COMMENTS										
CLARITY OF CONTINUATION STRATEGY	NO EVIDENCE OF POSSIBLE CONTINUATION									THERE IS A CLEAR EVIDENCE OF ROUTE FORWARD
	1	2	3	4	5	6	7	8	9	10
COMMENTS										
PRESENCE OF AN EXPLOITATION STRATEGY	NO EVIDENCE OF EXPLOITATION OF POTENTIAL OUTCOME									VERY CLEAR ROUTE OF EXPLOITATION
	1	2	3	4	5	6	7	8	9	10
COMMENTS										

3.5 Evaluation board (structure, participants, procedures)

The local RIF Review Panel will comprise of at least two members of the local RIF staff.

3.6 Scheduling and possible re-assignment of location

The scheduling of engagements and resource management are controlled locally by each RIF. If it is determined that an alternative RIF may be more suitable / appropriate to fulfil an approved engagement, a dialogue between the two RIFs will be undertaken to explore a re-assignment of location. A final decision will be made between the two RIFs and the RIF client.

3.7 Resource planning and scheduling

3.7.1 Human Resources

Permanent staff

All RIFs have a core of personnel that are funded by the ECHORD++ project. Depending on the contracts of employment such personnel adhere to the local institute and EU employment regulations. In all cases it is of paramount importance that time spent by permanent staff on ECHORD++ related activities are collected via time sheets.

Visiting scholars

It is likely that RIFs will provide opportunities for scholars from many institutes to have access to the equipment to pursue area of research that may benefit from the resources available in a RIF. Such visitors will be covered by those rules that govern the normal workplace requirements in terms of insurance, accidents and liabilities. More over, such personnel have also no claim to IP if they are working with a third party unless that agreement has been arrived at outside the remit of RIF and ECHORD.

Non-permanent staff

A RIF may access, depending on the availability of funds, personnel from the host institute or in some cases from outside suppliers. There is no vetting process other than those required by local regulations of the host institutes.

3.8 RIF's risks and mitigation strategies

Reasonable effort shall be made to ensure the availability of all the required resources to carry out the work outlined in the agreement between a RIF and a visitor at the time of his visit. The RIFs will display the current working status of all equipment on their respective websites and it is the responsibility of the applicants to ensure that they consult the appropriate website prior to their visit to a given RIF.

In common with all other complex and multifaceted endeavours there are potential likelihoods for aspects of delivery from the RIFs that may not emerge. These may be caused by the operational procedures of a RIF; for example a robot breaking down and hence preventing the performance of a certain crucial task. Or the operational schedule may be interrupted due to absence of key personnel and thus preventing the occurrence of certain activities. It may also be that the participants whether on the short engagement or the longer Experiment may not be ready with their input and hence prevent the delivery of an output. For all these cases a risk register is created and mitigation strategies are identified from the outset to ensure the smooth running of RIFs as far as possible.

4 Lists of individual RIF descriptions including resources (HW, SW, services) at each RIF, to be updated as needed

4.1 RIF@Bristol

4.1.1 General information

RIF@Bristol is located in Bristol, England.

Please visit www.brl.ac.uk for map, location etc. BRL is located near Parkway train station and served by a network of motorways. Bristol has an international airport with flights to many destinations in Europe.

Bristol Robotics Laboratory is the largest multi-disciplinary robotics facility in the UK and has an international reputation as a leading research centre in advanced robotics research. Professor Melhuish with Dr. Pipe as Deputy Director leads BRL. BRL is a partnership between the University of Bristol and the University of the West of England and with over 60 researchers it has a broad portfolio. BRL infrastructure includes workshops, rapid prototyping facilities, wet labs, 2,400m² of project laboratories and two arenas with motion capture systems. BRL has many collaboration partnerships, both national and international and is experienced in managing large multi-site projects. Two experienced units specializing in business and enterprise serve BRL.

General profile. The University of the West of England (UWE) is a modern, growing university in the thriving harbour side city of Bristol. UWE Bristol is one of Britain's most popular universities, with around 30,000 students and 3,000 staff and is the largest provider of Higher Education in the South West of England. UWE is one of the fastest growing research institutions in the UK.

The University of Bristol (UNIVBRIS) is consistently ranked among the leaders in UK higher education. According to The Times Higher Education World University Rankings 2009, it is among the top 35 universities in the world. Research-intensive and with an international reputation for quality and innovation, the University has 17,000 students from over 100 countries, together with more than 5,500 staff. In terms of the number of applications per undergraduate place, Bristol is arguably the most popular university in the country. The University is also recognised as a leading centre for the exploitation of knowledge through partnership with industry and the creation of spinout companies, and for imaginative engagement with the public.

4.1.2 Resources

The facility will provide the following hardware and software:

Hardware

- 1 x IRB 120 ABB industrial robot (3 kg payload),
mounted in a bespoke safety cage for use with classic industrial research and development.
- 1 x Staubli RX 120 6 axis industrial robot arm with force feedback (22kg payload)
mounted in a bespoke safety cage for use with classic industrial research and development.
- 1 x Kuka LBR iiwa Lightweight arm (5kg payload)
mounted in a bespoke safety cage for use with classic industrial research and development.
- 1 x Kuka KR60-3 (30 – 60kg payload)
mounted in a bespoke safety cage for use with classic industrial research and development.
- 1 x Kuka LBR 14 R820 iiwa (14kg payload)
- 1 x ABB YuMi (0.5kg payload)
- 1 x Universal Robots UR5 (5kg payload)
- 1 x Rethink Robotics Baxter Robot (4kg payload)
- 1 x Aldebaran Pepper Robot (humanoid robot)
- A fully operational work station for production of prototypes featuring: Emco lathe & Milling machine with digital readouts
- Vicon vision system
- 2 Neobotix MPO-700 mobile platform, fully sensed robots for industrial, medical and assisted living applications.
- A Schunk SVH advanced humanoid robotic hand.
- Conveyor belt with embedded microcontroller.
- National Instrument data logging and instrumentation equipment
- A variety of hand and power tools.
- A Pace soldering station with Bofa extraction units.
- A power supply unit.
- An oscilloscope.
- An Assisted Living testing arena. A structure which imitates that of a typical bungalow for assisted living investigations.

Software

- Solid Works Computer aided design and analysis software
- Robot simulation software
- Data logging and statistical analysis software
- Modelling software for control
- Automation40 Schematic software

Services

- Market analysis
- Rapid prototyping
- Prototype design and production
- Experimenting and testing
- Knowledge exchange workshops in:
 - Introduction to mechatronics
 - Microcontrollers and embedded systems
 - Introduction to Robotics
 - Sensors and interfacing
 - Systems integration
 - Automation 4.0
 - Business Start-up
 - Intellectual Property & Finance
- Concept proofing
- Error recovery
- Internet of things

4.1.3 Examples of work undertaken:

- Development of robotic assembly cells
- Advisory service on application of robots in machining
- Development of robots for education and entertainment
- Robots in assisted living
- Use of robots in food and agriculture
- Design of automated materials handling systems
- Development of sensors and actuators

4.2 RIF@SSSA

4.2.1 General information

The Scuola Superiore Sant'Anna (SSSA) is one of the five Italian special status university institutions, also called "Scuole Universitarie Superiori", which provides an education of excellence. It is a public university in its own right, which comprehends 6 research institutes, 1.800 students and 100 academic staff and holds over 100 patents and has spun off 43 companies since 1991, 20 by the BioRobotics Institute alone. The latter, located at the "Polo Sant'AnnaValdera" in Pontedera, Pisa, wants to act as a linking bridge to international centres of knowledge and to create a new concept of engineers that are scientists, inventors, entrepreneurs, able to invent and solve problems, and to create new companies in high technology sectors (biomedical engineering, microengineering, robotics, mechatronics). The BioRobotics Institute is composed of about 150 persons (more than 90 are PhD students). The average age is 31.5 years with a percentage of foreign students of 10%. The women are 31%.

The BioRobotics Institute offers a wide spectrum of state-of-the-art **research facilities and workshops** on campus and owns a **business incubator**, as well as seven additional laboratories and research centers located in Tuscany, among them the **Assistive Robotics lab (Service Robotics and Ambient Assisted Living Lab)**, Peccioli, Pisa. The Assistive Robotics lab has been collaborating with the **Municipality of Peccioli** (a small town close to Pisa) since 1995, on the topics of Services to elderly citizens through the design of service centres, the set-up of a domotic apartment for experimental research, the experimental application of rehabilitation technologies. This solid experience brought to identify the lab in Peccioli as a "**Robotics Innovation Facility**" (RIF) within the ECHORD++ project.

The Peccioli RIF consists of outdoor and indoor settings, where different scenarios could be developed, tested and evaluated, such as (i) Robotic worker (in rubbish dump), (ii) logistics robots (autonomous transport of goods and autonomous transport of people, in urban area), (iii) robot co-worker in domestic environment (robot companion, in the domotic house and in a nursing home), (iv) edutainment robot (robot guide and robot companion, in museum and in the domotic house) as well as agricultural robotics, (v) medical robotics (hospital and rehabilitation center) and (vi) agricultural robotics (biofarms in Peccioli area).

The BioRobotics Institute also provides: The Advanced Robotics Technology and Systems Laboratory (ARTS Lab), the Center of Research In Microengineering (CRIM), the Center for Research on the technology and support services for the Longevity (EZ-Lab), the joint lab of rehabilitation at Auxilium Vitae (Volterra), the centre of excellence on computer assisted surgery (Pisa) and the new Research Centre on Sea Technologies and Marine Robotics (Livorno).

4.2.2 Resources

Hardware

- 2 Scitos G5 equipped with:
- 1 Laser scanner SICK
- 1 Laser scanner Hokuyo
- 1 Asus xtion pro
- 1 Pan-tilt unit
- A Kinova jaco arm
- 2 Kinect
- A Stargazer
- 2 Segway rpm200
- An outdoor wifi network
- An outdoor surveillance monitoring system
- NAO Next Gen Humanoid Robotic Platform (*new*)
- KUKA youBot omni-directional mobile platform (*new*)

Sensor Network

- Wireless sensor network for smart environments
- ZigBee based home automation system
- Wearable sensor for physiological parameters
- Personal localization system (GSM/GPRS/GPS)
- Posture assessment (Inertial Sensors)
- Pir Sensor, Temperature Sensor, Humidity Sensor, Light Sensor, Door Sensor

Services

- Acceptability and dependability assessment
- Benchmarking
- Legal issues, insurance, ethical issues & economical issues
- Knowledge exchange workshops

Facilities

Please note that the following facilities offer mainly the environment. The equipment is still under definition.

- 1 Landfill
- 1 Kitchens Warehouse
- 1 Domotic Home
- 1 Museum
- 1 Nursing Home
- Local Industries
- Research Centre on Sea Technologies and Marine Robotics
- Peccioli town
- Medical Robotics
- Auxilium Vitae Rehabilitation Center
- Locomotion Disorders Laboratory
- Neuro-Developmental Engineering Laboratory
- Center for Micro-BioRobotics
- 2 Biofarms
- 1 Breeding farm

4.2.3 Examples of work undertaken:

- Development of sensorized fridge
- Definition of the the characteristics of an indoor portable sismic sensor

4.3 RIF@CEA

4.3.1 General information

RIF@CEA is located within the premises of CEA, LIST, Interactive Robotics Laboratory in Saclay, about 20km south west from Paris. It can be easily accessed from Paris and its two international airports using RATP and SNCF train services.

CEA (Atomic Energy Commission) is a French government-funded scientific and technological research organisation. CEA is active in three main fields: energy, information and health technologies, and defence and national security.

CEA LIST is a Research Institute inside CEA. Located at the heart of Saclay area (Paris region), the CEA LIST Institute focuses its research activities on developing innovative technologies for smart and complex systems. Its R&D programmes, with potentially major economic and social implications, centre on interactive systems (ambient intelligence), embedded systems (architecture, software and systems engineering), sensors and signal processing (industrial control systems, health, security and metrology). Dedicated to technological research, CEA LIST's more than 700 researchers and technicians strive to encourage innovation and technology transfer through long-term industrial partnerships. The dynamism of the Institute's teams, their project-based culture and their consistently high standard of scientific excellence underpin this objective. CEA LIST is a natural partner for industry seeking breakthrough technology, from the initial concept down to working demonstrators.

The Interactive Robotics Laboratory of CEA LIST includes 45 researchers and PhD students. Its research activities focus on service robotics, remote handling and collaborative robotics, with applications in the fields of energy (nuclear, oil&gaz), industry and health (surgery and rehabilitation).

Robotics research at CEA initially started in the 60s and 70s to address the need of remote manipulation of nuclear material in environments non accessible to humans. Force feedback telerobotics is now also used in other hazardous environments like tunnel boring, space or offshore. In the industrial context, the research performed at CEA anticipates and accompanies the current evolution of production from large scale manufacturing of standard items to customized and individualized products. This evolution requires the development of more dextrous and easily programmable robots which can be used as versatile, reconfigurable and intelligent means of production. On the other hand, collaborative robotics in permanent interaction with humans offers another solution. By providing a force and gesture assistance to the operators, collaborative robots allow to minimize musculoskeletal disorders caused by manual tasks while maintaining human flexibility and adaptability. The Interactive Robotics Laboratory also works on future service robotics, with focus on personal assistance requiring more dexterity, mobility and autonomy (intelligent systems). Finally, the force feedback, haptics and cobotics technologies developed in the laboratory are applied in surgery and rehabilitation.

The laboratory is structured to provide technological innovation integrated into industrial prototypes. Core technologies are new robotic architectures, high performance actuation, force and supervised control, method and software tools. Research activity is organised in 3 main applicative themes: remote handling, collaborative robotics and autonomous dextrous manipulation.

4.3.2 Resources

Hardware

- Tele and co-robotics surgical platform for MIS, open surgery and surgeons training
- High performance bi-manual master station for telesurgery and virtual surgery training (integrated platform with two 6 DOFs hybrid haptic interfaces, among which one with active prop allowing realistic simulation of active tools, audio and visual feedback)
- Rehabilitation robotics or human assistance for industrial application platform
- Two 7 DOFs high performance ABLE arm exoskeletons.
- Assistive robotics platform for disabled people
- One Kinova 6 DOF Jaco robot equipped with a 3 fingers gripper and mounted on a Robosoft Robulab 10 mobile platform
- A fully equipped 200 m2 apartment representative of future living environments of disabled people: MobileMii (MobileMii contains home domain and video surveillance equipment usable for technical validation)
- Collaborative robotics and telerobotics platform for industrial applications
- One A6.15 RB3D 7 DOFs collaborative robot
- One COBOMANIP from Sarrazin technology – collaborative robot for assistance to load handling
- Staubli RX90L and TX90LTX90 6-axis industrial robot for tele-operation or hybrid command (force and position control)
- Artemis AGV (automated driverless vehicles) from BA system
- VR platform for virtual prototyping and training for industrial applications
- One 3D TV equipped with a real time simulation environment for physical interactions.
- One collaborative robot dedicated for SME logistic and industries (*To be operational in 2015*)
- Two advanced high transparency 6 DOF robots usable as collaborative robots or telerobotic slave robots (*availability to be confirmed in 2015*).
- Representative surgical environment composed of an adjustable operating table, a patient mock-up (*availability to be confirmed in 2015*).
- An endoscopic trainer (pelvitainer, e.g. a Laprotrain) and an endoscope (and a Viky EP motorized endoscope positionner if the pelvitainer is not equipped with a camera) (*availability to be confirmed in 2015*).
- Other Robots focused on cobotics and collaborative robotics needs could be added in the future

Software

- Access to XDE interactive multi-physics simulation software runtime licences. XDE is a software suite developed at CEA since more than 12 years and featuring interactive multi-physics simulation of multibody systems, rigid and (simply) deformable objects and contacts as well as a biomechanical digital human able to interact with its environment. Composed of different modules (XDE Physics, X-Fitting, X-Robotics, X-Ergonomics), XDE has applications in Virtual Prototyping, ergonomy studies, maintenance in virtual and mixed reality, training to dexterous gestures, robotics and cobotics simulation

- Access to TAO (Computer Assisted Telerobotics) runtime licences. TAO is a telerobotics controller developed at CEA since more than 20 years and featuring force feedback master/slave control, robotics trajectory control, cartesian/joint position control, virtual Mechanisms, position/force homothetic setting, gripper pursuit with camera, 3D graphical supervisor.
- Access to SCORE 3D supervisor runtime licences
- Access to the AVISO assistive robotics programming environment Entail

Services

- Advices on the management of intellectual property rights
- Assistance to technology transfer
- Advices on how to deal with ethical, legal and societal issues in robotics
- Knowledge exchange workshops
- Experimenting and testing
- Concept proofing

4.3.2 Examples of work undertaken:

- Development and test of novel sensors for surgery
- Development and test of novel intra-corporeal dexterous surgical tools
- Test of rehabilitation cursus
- Test of new application in cobotics

5 Description of web tool functions

At Bristol, a cloud based Project Management tool is used to schedule each engagement at RIF@Bristol. RIF clients can be provided access to their respective project, allowing for real-time, remote status updates and communications.

6 Project Proposal template

When filling the RIF Project Proposal Form please consult sections 2.1.2 and 3.4

RIF Project Proposal Form

1.1	Registered Name of the Business (not the Trading Name)	
1.2	Full Address	
	Post Code	
	Business Contact name	
	Position	
	Contact Telephone and email	
1.3	Organisation Size	New <input type="checkbox"/> SME <input type="checkbox"/> micro <input type="checkbox"/> large <input type="checkbox"/>
1.3a	Number of Employees	
1.4	Organisation Sector(s) (check all that apply)	<input type="checkbox"/> Mechanical Engineering <input type="checkbox"/> Microelectronics <input type="checkbox"/> Environmental <input type="checkbox"/> Biotech <input type="checkbox"/> Systems Engineering <input type="checkbox"/> other? <input type="checkbox"/> Education <input type="checkbox"/> Medical and Assisted Living <input type="checkbox"/> Agricultural <input type="checkbox"/> Logistics <input type="checkbox"/> Retail
1.5	Please keep me informed of:	<input type="checkbox"/> E++ Project news <input type="checkbox"/> related innovation support news
1.6	Planned start date	
1.6b	Estimated project duration	

1.7	<p>Set out the aim of the proposed project and its purpose, in no more than 25 words starting with the words “To..... “</p> <p><i>(This description will be used on the public website to describe the project)</i></p>
1.8	<p>Outline the organisation’s business, clearly stating its revenue generating activities, or funding sources if not yet generating revenues, in no more than 100 words</p>
1.9	<p>Explain the knowledge and capability that the business is seeking to develop, and why it is both innovative and strategically important in no more than 200 words.</p> <p><i>Include: Knowledge, capability & resources required from RIF / Innovative content of the proposed work / Strategic importance to your business</i></p>

Contract template (example for RIF@Bristol)



[client_recipient_format1]
[client_name]
[client_address_multiline]

ECHORD++ Robotics Innovation Facilities (“RIF”) facilities and research support in the Bristol Robotics Laboratory (“RIF Collaboration”)

UWE ref: [our_ref]- [project_title] Date of RIF Collaboration Agreement: [today]

Dear [client_recipient_format2]

Re: University of the West of England, Bristol (“UWE”) ECHORD++ Robotics Innovation Facilities (“RIF”) facilities and research support Grant Scheme (‘the Scheme’) for support RIF Collaboration Projects to eligible organisations related to the UWE collaborative contract ECHORD ++ funded by the European Commission FP7 Project entitled: ‘European Clearing House for Open Robotics Development Plus Plus’ in short ‘Echord++’ (“The Project”).’

RIF Instrument Title: [project_title] (“the RIF Instrument”) as detailed in Schedule A attached.

I am pleased to inform you that subject to the terms of this Agreement (“the RIF Award Agreement”) UWE offers [client_name] ("the Recipient") an in kind RIF Award supported by the European Commission funded project entitled ‘European Clearing House for Open Robotics Development Plus Plus’ in short ‘Echord++’ to undertake the RIF Project in accordance with the Application (“Project Application”) submitted to UWE attached at Schedule A. UWE and

the Recipient are also referred to as The Parties and the Party in the singular throughout this RIF Award Agreement.

1 Basic details of the offer are;

- a) **RIF Award Start Date: before: [start_date]**
- b) **RIF Award to be completed by: [end_date]**
- c) **The RIF Award relates to the in kind value of use of in house UWE (laboratory) facilities and inhouse UWE technical and research support as detailed in this Agreement including Schedule B (“In Kind Support”) to support the Recipient in progressing the RIF Project detailed in Schedule A. The Parties agree that the In Kind Support represents fair and reasonable consideration. For the avoidance of doubt, the Parties agree that no cash payment will be made by UWE to the Recipient, whether during or upon completion of the RIF Project.**

2 As part of the RIF Award, the Recipient agrees to provide a RIF Evidence Form (“RIF Form”) (a copy of which has been e-mailed to you and a further copy can be provided on request) to the satisfaction of UWE and the Recipient complying fully with the terms of the RIF Award Agreement, including but not limited to agreeing to and providing a further report twelve (12) months after RIF Project completion (“12 Month After Completion Questionnaire”).

3 The offer should be accepted by a Director or Duly Authorised Officer of the Recipient signing a duplicate copy of the RIF Award Agreement in the section below. The signed RIF Award Agreement should then be returned to UWE.

4 Intellectual Property

4.1 For the avoidance of doubt, UWE has no interest in the ownership of any intellectual property or rights developed under or arising as a result of the RIF Project, or in the terms of any intellectual rights licences executed, beyond ensuring that the results detailed in the RIF Project Application proposal are capable of being achieved. UWE has no financial interest in or claim over any financial benefits arising directly or indirectly from the RIF Project beyond the Recipient providing sufficient reporting and data as required by the European Commission funded project entitled ‘European Clearing House for Open Robotics Development Plus Plus’ in short ‘Echord++’.

4.2 UWE shall retain all rights to intellectual property which it owns prior to the commencement of the RIF Project or which it develops independently of the RIF

Project. The Recipient shall use all reasonable endeavours to ensure that any potentially valuable results are exploited.

- 5 At the sole discretion of each Party, if the Parties consider that additional research work or other work between the Parties is required the Parties agree to put in place an agreement for such additional research work or other work on terms to be agreed in writing by the Parties and signed by the authorised signatories of the Parties.

6 Publicity and Publication

- 6.1 The Recipient hereby gives ECHORD++ permission to use, publish and allow others to use and publish the details of the RIF Project sufficient to comply with any reporting or data requirements the European Commission ("EC") funded project entitled 'European Clearing House for Open Robotics Development Plus Plus' in short 'Echord++'.
 - 6.2 A short summary of the stay and a list of RIF users will be made public in order to promote the RIF concept and ECHORD++ in general. Confidentiality needs will be respected
 - 6.3 All publicity related to the RIF Project should be agreed in writing with UWE prior to publication, such UWE agreement not to be unreasonably withheld.
 - 6.4 ECHORD++ will only disclose confidential information relating to the RIF Project and/or its results with the prior written agreement of the Recipient.
Notwithstanding the foregoing, the Recipient agrees to cooperate with UWE in the creation of case studies for publication by UWE ECHORD project highlighting the benefits arising directly and indirectly from the RIF Award.
 - 6.5 The Recipient shall acknowledge UWE's and EC's support in any press release, publicity material or publication relating to the RIF Award by including the following wording in any publication or presentation: ["This project received support funding by European Commission"] together with the UWE and EC logos, with the EC logo, ECHORD++ logo having at least equal prominence to the UWE logo.
- 7 During the period of this Agreement UWE grant the Recipient a licence to use the space and facilities at UWE as detailed in Schedule B during the hours and for the purposes detailed in Schedule B.
 - 7.1 the Recipient agrees to inform UWE in writing of all breakages of equipment, glassware and any damage to any UWE property caused by any employee or visitor of the Recipient and to pay UWE the full cost as notified in writing by UWE to the Recipient for replacement or repair of such property within thirty days of being requested to do so.

7.2 the Recipient agrees to seek permission from UWE for any equipment which it wishes to bring on to the premises and to insure and keep insured any such items of equipment.

8 The Recipient agrees to comply with all Health and Safety requirements while at UWE premises and to notify visitors of such requirements.

9 Confidentiality

9.1 Both Parties agree not to use or disclose Confidential Information belonging to the other Party to any employee or to any third party unless:

- a) such employee or third party has a need to know the Confidential Information in order for that Party to perform its obligations under this Agreement; and
- b) such employee or third party is bound by that Party's policies requiring non-disclosure or has executed and delivered to that Party an agreement similar to this paragraph restricting its use and disclosure of the Confidential Information.

9.2 The obligations in this paragraph shall remain in effect indefinitely but shall not apply to information which is:

- a) made public at any time by the Party whose Confidential Information it is, or by others with the permission of that Party;
- b) lawfully in the possession of that Party before the date of receipt from the other Party without any obligation to maintain the confidentiality thereof;
- c) in the public domain;
- d) independently received from a third party who is free to disclose it;
- e) is the subject of a legal requirement for disclosure.

10 Either Party may terminate this licence on 30 calendar days notice in writing.

11 UWE accepts no liability for the death of or injury to employees of or visitors from the Recipient or for damage to any property of the Recipient's except where such liability is imposed by statute.

12 Relationship of Parties

The Recipient and UWE are independent contracting parties and nothing in this Agreement shall make either Party the agent, employee or legal representative of the other for any purpose whatsoever, nor does it grant either Party any authority to assume or create any obligation on behalf of or in the name of the other.

13 Notices

- 13.1 Notices concerning the Project shall be addressed to the Recipient as at the head of this Agreement
- 13.2 Notices concerning the Project shall be addressed to UWE as follows
University of the West of England, Bristol, Frenchay Campus, Coldharbour Lane,
Bristol BS16 1QY
For the attention of the Assistant Vice-Chancellor : Finance & Commercial
Projects

14 Mediation

- 14.1 If any dispute arises out of this Agreement the Parties will attempt to settle it by negotiation.
- 14.2 If the Parties are unable to settle any dispute by negotiation within twenty one days the Parties will attempt to settle it by mediation in accordance with the Centre for Dispute Resolution (CEDR) Model Mediation Procedure.
- 14.3 To initiate a mediation a Party must give notice in writing (“ADR Notice”) to the other Party to the dispute requesting a mediation in accordance with this clause 14.
- 14.4 A Party may not serve an ADR Notice or commence court proceedings until twenty one days after it has made a written offer to the other Party to negotiate a settlement to the dispute.
- 14.5 Nothing in this clause shall prevent either Party from having recourse to a court of competent jurisdiction to resolve the dispute in question.

15 Third Party Rights

Unless expressly provided in this Agreement no term of this Agreement is enforceable pursuant to the Contracts (Rights of Third Parties) Act 1999 by any person who is not a party to it.

16 Severability

If any term of this Agreement is invalid or unenforceable under any statute, regulation, executive order or other rule of law, such term shall be deemed reformed or deleted, but only to the extent necessary to comply with such statute, regulation, ordinance, order or rules, and the remaining provisions of this Agreement shall remain in full force and effect

17 Jurisdiction

This Agreement shall be governed in all respects by English law, and subject to Clause 14 the Parties submit to the exclusive jurisdiction of the Courts of England.

Please countersign and return the second copy of this Agreement to confirm the Recipient agreement to these terms.

Yours sincerely

Brian Allen, Head of Contracts
Authorised signatory on behalf of University of the West of England, Bristol

Name:

Title:

Date:

Authorised signatory on behalf of the Recipient: [client_recipient_format1]

Attachments;

Schedule A – RIF Project Application document

Schedule B – Detail of UWE In Kind support including facilities and technical and or research support