Call for Experiment Proposals

- Date of publication: March 16th, 2010
- Deadline: April 30th, 2010, at 17:00 (Brussels time).

1 Background Information

This call for experiment proposals is related to the EU-funded Seventh Framework Programme (FP7) project ECHORD (European Clearing House for Open Robotics Development, Grant Agreement Number 231143).

In the context of ECHORD, small-scale projects, so-called "experiments", will be conducted, which will use state-of-the art robotic equipment. Depending on the experiments the equipment providers can either just sell the robotic equipment to an experiment or be part of the experiment's consortium.

To outline the scope of the research work three *scenarios* have been defined that represent the expected use of state-of-the-art robot technologies in the near future: the *human robot co-worker* scenario, the *hyper-flexible cells* scenario and the *cognitive factory* scenario (see Section 1.2 and the Annex 1 for a detailed description of the scenarios). Furthermore, four *research foci* have been identified, which are the reference points for the expected scientific progress of experiments (see Section 1.3 and the Annex 1 for detailed description).

This call for experiment proposals targets the second scenario, *hyper-flexible cells*. However, proposals focused on the other two scenarios may be submitted. The research community, enterprises and robot manufacturers are asked to submit experiment proposals. Additional information is given in the *Guide for Applicants* (Annex 1).

A list of suitable equipment offered by manufacturers, along with terms and conditions of providing this equipment, is available on the ECHORD web site (http://www.echord.info). Although experiment consortia are strongly encouraged to use equipment specified in the list, other equipment might be used if the need for it is justified in the experiment proposal. These proposals for experiments will be evaluated by independent experts from science and industry, ranked by an expert panel and then approved by the European Commission.

This call is open from March 16th, 2010 until April 30th 2010 (17:00 Brussels time) and the experiments are planned to start two months after the call has been closed.

1.1 Scenarios and research foci

Three *scenarios* for likely future robot use have been defined to outline the scope of the research work to be performed in the experiments. These scenarios make it possible for all stakeholders to get a clear picture if and how their proposed work and envisaged results can be embedded into a coherent vision of robotic applications. Thus, they describe the application context from an exterior view. The individual scenarios are described in Section 1.2

To break down the application-driven scenarios four research foci have been identified. The research foci guide the research work. They were chosen to provide a complete coverage of the relevant aspects of all the scenarios. The research foci are described in Section 1.3.

1.2 Scenarios

The set of research topics and subjects in the field of robotics is virtually unlimited. Thus, ECHORD uses a clear thematic research orientation which is reflected in **scenarios**. Three scenarios have been identified which are both scientifically challenging and commercially relevant. The scenarios build on each other.

The **first scenario** of ECHORD is the **human-robot co-worker**. In this scenario, the traditional idea of a robot performing pre-programmed action will change drastically, in that a robot co-worker interacts with a human towards achieving a common goal.

The **second scenario** is the **hyper-flexible cells** scenario. This scenario is aimed at fostering the adoption of robotics technology in small or medium enterprises (SMEs), where relatively small production volumes do not justify the high cost of investments related to the adoption of robotic systems, and highly specialized craftsmen-like tasks are often too cumbersome to be programmed and performed by state-of-the-art industrial robots. Hence, the main issues to be addressed are the adoption of highly dexterous and cooperative robots performing specialized tasks, as well as the hardware and software integration of the robots with the other devices present in the workcell.

The **third scenario** is the **cognitive factory**. This scenario will embrace both the first and the second scenario and take the classical concept of the flexible manufacturing systems to a new level. Cognitive factories will, to a large extent, configure themselves and be fault-tolerant. They will contain autonomous robots jointly participating in the production process with their human counterparts.

1.3 Research foci

Within the scenarios, different research foci have been identified. The research foci are reference points for the expected scientific progress of experiment proposals. They bring together mechanical design and controller technology from manufacturers with the knowledge and experience in sensing, cognition and control of the research community.

The **first research** focus is on **human-robot interfacing and safety**. Here, the main goal of the experiments is to show that safe human-robot cooperation is possible, taking all kinds of sensor failures and inconsistencies into account.

The **second research** focus is on **robot hands and complex manipulation**. Here, the experiments will have to show the improvement of laboratory setups towards practical usability as well as promising breakthroughs in the areas of sensors and sensor-guided manipulation.

The **third research focus** is on **mobile manipulators and cooperation**. Here, mobile manipulators will have to solve concrete problems in dynamically changing environments with moving obstacles and interaction with humans.

The **fourth research** focus is on **networked robots**. Here, two areas are to be considered. One is the area of networked industrial robots, where the expectation is to use demonstrators that can only be built in collaboration between industry and academia, with industry providing controller architecture and academia contributing knowledge in advanced real-time networking technologies as well as service-oriented architectures. The second area concerns more loosely coupled systems, where experiments with mobile robots are expected that establish new showcases, e.g., in the field of robotic search and rescue applications, new applications of robots in urban areas, and robot systems for monitoring tasks.

The intended relation between scenarios and research foci is given in the following non-exhaustive table:

Scenario **Research focus**	**Scenario 1: Human-robot Co-worker**	**Scenario 2: Hyper-flexible cells**	**Scenario 3: Cognitive factory**
Human-robot interfacing and safety	X		
Robot hands and complex manipulation	X	X	
Mobile manipulators and cooperation.	X	X	X
Networked robots		X	X

1.4 Activities and reimbursement

The activities to be carried out in the context of an experiment may only include Research and Technological Development activities (RTD), aimed at a significant advance beyond the established state of the art. Other types of activities (e.g.,

Demonstration, Management) are not eligible for funding. The costs of the certificates on the financial statements, if needed, are eligible.

Reimbursement will be based on eligible costs as defined in Article II.14 of the FP7 model grant agreement.[1] Direct and indirect costs are to be indentified in accordance with Article II.15 of the FP7 model grant agreement. Maximum reimbursement rates of eligible costs for Research and Technological Development (RTD) are, in accordance with Article II.16(1) of the FP7 model grant agreement, 50% or 75%, where the 75% rate applies to participants that are nonprofit public bodies, secondary and higher education establishments, research organisations and small and medium-sized enterprises (SMEs). [2] More information about reimbursement will be provided by ECHORD.

For equipment purchase and maintenance in the experiments, the maximum reimbursement is capped at 100% of the acquisition and maintenance cost. Depreciation rules may apply, proposers are asked to check this issue with their organisation.

Although consortia are strongly encouraged to use equipment specified in the list made available by ECHORD on its web site, other equipment might be used if the need for it is justified in the experiment proposal.

2 Form and content of a proposal

2.1 General information

This call for experiments opens on March 16th, 2010 and will close on April 30th, 2010 at 17:00 (Brussels time). Call deadlines are absolutely firm and will be strictly enforced. The proposal must meet the following requirements:

- It has to be submitted electronically by the given deadline. The details of electronic submission are available on the ECHORD web site www.echord.info.
- The content of the proposal relates to one or more of the ECHORD Scenarios described in the current text.
- The proposal must be submitted by legal entities established in one of the member states of the EU or in an associated country. For a list of associated countries, see ftp://ftp.cordis.europa.eu/pub/fp7/docs/third_country_agreements_en.pdf.

[1] ftp://ftp.cordis.europa.eu/pub/fp7/docs/fp7-ga-annex2-v3_en.pdf

[2] For a definition of SMEs see http://ec.europa.eu/enterprise/enterprise_policy/sme_definition/index_en.htm

- The proposal must comply with the Template for ECHORD Experiment Proposals (Annex 2 to this call text), available on the ECHORD website.

For a given proposal, the Experiment Coordinator acts as the single point of contact between the experiment partners and ECHORD. The coordinator of the experiment is generally responsible for the overall planning of the experiment and for building up the experiment consortium that will do the work.

The size, scope and internal organisation of experiments can vary depending on the scenario and on the research focus, but the experiments should be compact, lean and efficient. An experiment proposal can be submitted by a single partner. Proposers are to keep the number of partners small (1 to 3). The funding of an experiment is expected to be around €300,000, and experiments are expected to last between 12 to 18 months. The indicative budget for the second call is €5.5 million.

2.2 Coaching and pre-proposals

The ECHORD Service Centre will coach the earlier stages of proposal development with the evaluation of pre-proposals.

Pre-proposals can be submitted until two weeks before the call closes (**April 16th 2010)** for the present call. They should not be longer than two pages and only describe the experiment idea and its context. A member of the staff of the ECHORD Service Centre will respond to pre-proposers within one week. The response will be limited to clarifying whether they fit into the ECHORD call's scope (innovation, compatibility with call).

2.3 Equipment list

A list of equipment offered by manufacturers to the research community, along with the terms and conditions of providing this equipment, is available on the ECHORD web site (http://www.echord.info). Although experiment consortia are strongly encouraged to use equipment specified in the list, other equipment might be used if the need for it is justified in the experiment proposal.

2.4 Proposal Form

Proposals must comply with a standardised template available on the ECHORD website upon opening of the call to allow their easy conversion into a Description of Work in the event of proposal selection.

2.5 Evaluation process

2.5.1 General

On receipt by ECHORD, proposals are registered and acknowledged and their contents entered into a database to support the evaluation process. Eligibility criteria

for each proposal are also checked by ECHORD before the evaluation begins. Proposals which do not fulfil these criteria will not be included in the evaluation.

A proposal will only be considered eligible if it meets all of the following criteria:

- It is received before the deadline given in the call text.
- It is complete, i.e., the following have been provided:
    - a filled-in template
    - filled-in web form
- The proposal must be submitted by legal entities established in one of the member states of the EU or in an associated country.
- The content of the proposal addresses the ECHORD Scenarios and Research Foci described above.

2.5.2 Evaluation by independent experts

The evaluation of proposals is carried out by independent experts whose appointment will be approved by the European Commission. Each proposal will be evaluated by two experts (evaluators) who are independent of ECHORD and the proposers and have no conflicts of interest. They will maintain strict confidentiality with respect to the whole evaluation process. Experts perform evaluations in their private capacity, not as representatives of their employer, their country or any other entity.

2.5.3 Evaluation Criteria

The evaluation of experiments will be based on marks given according to three basic criteria:

a) Scientific and/or technological **excellence** relevant to the scenario and research focus.

b) Quality and efficiency of the **implementation** and the management, intended to assess the efficient use of resources and the quality of the participants.

c) Potential **impact** through the development, dissemination and use of project results. As for this criterion, the following qualities serve as indicators:
    - bi-directional know-how and technology exchange between robot manufacturers and research organisations, if applicable,
    - documented degree of synchronicity between the robot manufacturers' research plans and experiment goals, if applicable,
    - commitment of the robot manufacturers to use the work in their future product program, if applicable,

- potential of the proposed work to contribute to new products/services/tools in a reasonable time frame,
- European dimension of the experiment, intended as potential impact of the experiment activities and results on European research, society and economy.

For each criterion a 0-to-5 mark will be given; the experiment will be considered in the final selection if each mark is above a threshold of 3 and the sum of the three marks is not less than 10. Half points can be used.

2.6 Selection

A panel meeting will take place, where a ranking of the proposals is established and where the scores of the proposals are calibrated. The appointment of the evaluation panel will be approved by the European Commission.

The initial ranking of proposals will be based on the scores of the evaluations. The panel will then check the consistency of the scoring of the proposals and might increase or decrease the scores. Also, the panel will resolve cases in which proposals have equal scores. The number of ranked proposals receiving funding depends on the budget requested and available for this call for experiments. An annotated ranking of the proposals will be compiled at the end of the evaluation panel, together with evaluation summary reports. The evaluation summary reports will be sent to the proposers. The reports and evaluation panel minutes will then be forwarded to the European Commission by ECHORD. Based on this information the European Commission approves the final list of selected experiments which will receive funding.

2.7 Joining the ECHORD Consortium

Selected proposals will be converted into contractual Descriptions of Work and the budget for the experiments will be finalised during a negotiation phase. The organisations involved in selected proposals are proposed for accession to the ECHORD Grant Agreement. The accession has to be approved by the European Commission.

The Description of Work and the budget of the selected experiments will be appended to ECHORD's European Commission Grant Agreement and ECHORD's consortium agreement.

After the selection strict deadlines will be set by ECHORD for compliance with the obligations related to the accession procedure:

- For the submission of the finalized Description of Work and the budget
- For compliance with the administrative requirements of the European Commission.

2.8 Experiment implementation

The experiments will receive a payment from the ECHORD coordinator at the beginning of the experiment to cover their equipment costs. Labour and other costs will be paid according to ECHORD's reporting periods in accordance with the provisions of the Grant Agreement.

Experiments will have a specific (small) set of deliverables including regular short reports, which will be evaluated against the terms of the experiment's description of work. In return for being lightweight in terms of preparatory paperwork, it is expected that every experiment produces a final demonstrator presenting the promised features. During the experiment, the experimenters are encouraged to produce multimedia material (video and pictures) showing their progress.

There will be a mid-term and final review of the experiments. These reviews will be managed by ECHORD, which appoints at least two experts for reviews. These appointments are approved by the European Commission. The review reports will include a recommendation (continue, continue with modifications, discontinue), the European Commission will take a final decision about the continuation of the experiment after consulting ECHORD.

3 Annexes

Annex 1: Guide for Applicants – ECHORD Experiments

Annex 2: Template for ECHORD Experiment Proposals