

CHIST-ERA Call 2014 Pre-announcement

The CHIST-ERA Call 2014 will be published in October and will target research in the following topics:

- Resilient Trustworthy Cyber-Physical Systems (RTCPS)
- Human Language Understanding: Grounding Language Learning (HLU)

The details of the research targeted in the call have been defined by the research community during the [CHIST-ERA Conference 2014](#) event, an event that was open to all interested researchers.

The Call 2014 Pre-announcement document gives an overview of the research themes that have emerged during the conference (see pages 2 to 4).

Researchers are encouraged to start discussing possible projects with prospective partners. The call will require that projects are submitted by international consortia with partners in at least three of the following countries (additional partners from other countries may be part of a consortium if they can secure their own funding):

- Austria (topics to be confirmed)
- Belgium (FNRS & FWO)
- Canada (Québec)
- France
- Ireland
- Latvia
- Poland
- Romania
- Spain
- Sweden
- Switzerland
- Turkey
- United Kingdom (RTCPS topic only)

Please note that this pre-announcement is for information purposes only and does not create any obligation for the CHIST-ERA consortium nor for any of the participating funding agencies. No further information will be given until the call is published.

Ist Topic: Resilient Trustworthy Cyber-Physical Systems

Cyber-physical systems (CPS) refer to novel hardware and software compositions creating smart, autonomously acting devices, enabling efficient end-to-end workflows and new forms of user-machine interaction. In manifold emerging application domains such as health care, traffic management or energy supply, CPS carry a high potential for creating new markets and solutions to societal hazards, but impose highest requirements to quality in terms of resilience, safety, security and privacy. However, the heterogeneous, evolving and distributed nature of CPS bears major challenges to continuously assure these quality requirements employing state of the art methods and technologies. Foundational research efforts are needed to achieve a predictable quality level in an efficient, traceable and measurable way, coping efficiently with external and internal changes, supporting necessary transitions between mechanical, electrical and software engineering, as well as integrating management, design and deployment aspects.

Target Outcomes

Research proposals submitted to this call must contribute to advancing the state of the art in one or more of the four research themes described below. In all cases, research proposals must identify a well defined use case and a clear plan for quantitatively measuring performance, including if necessary collection of data representative of the use case. In particular, the performance measurement should take into account the actual or estimated probability and impact assessment of unwanted events and states (such as vulnerabilities, incorrect system behaviour or trustworthiness of service providers, etc.) for the use case, such as in risk-based testing.

- **Information Confidentiality**

This theme includes the design and development of novel methods tailored to specific cyber-physical systems to prevent and/or assess information leakage and enhance information integrity. It also includes development of innovative physical layer security methods for improved privacy and security.

- **Security**

This theme includes risk-based security analysis and testing and the design and development of novel security-aware methods tailored to specific cyber-physical systems. It also includes the understanding, modelling and managing of access protection and distributed data, and the reconciliation of security and safety requirements.

- **Change Management**

This topic includes new methods tailored to specific cyber-physical systems for the prediction and detection of changes, including response under attack. It also includes methods to cope with changes, systems-aware components and adaptability of the system to different requirements.

- **Human Factors**

This topic includes modelling human interaction with cyber-physical systems, understanding of human factors in decision making, and understanding human needs and requirements within the system.

Expected Impact

In addition to the criteria set out above, proposals submitted to this call are expected to contribute to one or more of the following objectives:

- Build and strengthen an interdisciplinary community of researchers working across the different domains of cyber-physical systems (e.g. academic and/or industrial researchers in software, electrical, mechanical engineering, formal methods).
- Create new methods for specific emerging application domains (e.g. smart health care devices, smart grids, car-to-x communication) with a concrete use case and concept for scientific empirical evaluation.
- Create new technologies, methods and prototypes that address a business-related perspective (e.g. costs or compliance).

2nd Topic: Human Language Understanding: Grounding Language Learning

Having a machine understand language like a human being is a long-held goal of Artificial Intelligence. However, even though the domain of automatic language processing has made steady progress over the last decades and some applications are out on the market, the machine is still far from reaching human performance. A fundamental difficulty is how to model high-level, semantic and pragmatic knowledge in a robust fashion. To overcome this difficulty, the machine learning approach which has proved very successful to train linguistic models from linguistic data should be extended to learn more general knowledge models from much more varied, multimodal data, in a more interactive setting, possibly granting important roles to the situational context of the words and to the internal state of the system. The goal is to ground language learning in the perceptual, emotional and sensorimotor experience of the system. This requires a highly multidisciplinary approach, combining the field of human language processing, along with its associated skills in corpus creation and objective evaluation, with related fields approaching human language research from a different perspective such as developmental robotics or cognitive neuroscience.

Target Outcomes

Any research proposal submitted to this call must identify a human language processing task for which the following two conditions apply:

1. progress can be expected from using new types of data in addition to those traditionally used in the domain of human language processing, and
2. progress can be measured experimentally, with possibly innovative but in any case well defined metrics and protocols.

The proposal must describe how it targets such progress. It should in particular provide information on the tools, techniques, models, methods and approaches it plans to develop. It must also include clear plans for acquiring and annotating data as needed and for allowing others to replicate the experiments conducted in the project, possibly through simultaneous joint experiment campaigns.

The main target outcome of a project is expected to be a new multidisciplinary approach leading to measurable progress beyond the state of the art on an identified human language processing task. Besides, making data created in the framework of the project widely available can also be an important outcome.

Expected Impact

In addition to the criteria set above, proposals submitted to this call are expected to contribute to one or more of the following objectives:

- Build and strengthen an interdisciplinary community of researchers sharing similar goals in the domain of artificial intelligence.
- Advance the state of the art in human language processing and provide means and data for large experiments in human language development research.
- Create much more flexible and robust human language processing technologies.
- Ease adoption of these technologies by making them more adaptive to the users.