CHIST-ERA Call 2016 Pre-announcement

The CHIST-ERA Call 2016, to be published in October 2016, will target research in the following topics:

- Lifelong Learning for Intelligent Systems (LLIS)
- Visual Analytics for Decision-Making under Uncertainty (VADMU)

The details of the research targeted in the call have been defined by the research community during the CHIST-ERA Conference 2016, an event that was open to all interested researchers.

The present Call 2016 Pre-announcement gives an overview of the research themes that have emerged during the conference (see the following pages).

Anticipated Call deadline: 17th of January 2017

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 participating countries. Additional partners from other countries may be part of a consortium if they can secure their own funding. The list of countries and funding organisations which have shown preliminary interest in participating in the Call 2016 is provided below.

Country	Funding organisation	Participation per Call topic	
		LLIS	VADMU
Austria	FWF	Yes	Yes
Belgium	FNRS	Yes	Yes
France	ANR	Yes	Yes
Ireland	IRC	Yes	Yes
Latvia	VIAA	Yes	no
Poland	NCN	Yes	Yes
Romania	UEFISCDI	Yes	Yes
Spain	MINECO	Yes	Yes
Switzerland	SNSF	Yes	Yes
Turkey	TÜBITAK	Yes	Yes

Please note that this pre-announcement is for information purposes only. It does not create any obligation for the CHIST-ERA consortium nor for any of the participating funding organisations. The official call announcement, to be published later, shall prevail. The contact point of your funding organisation remains at your disposal for any further information (see Consortium).

1st **Topic:** Lifelong Learning for Intelligent Systems

Intelligent systems are becoming pervasive in our daily life. However, they still lack the capability to learn from users or their environment and improve themselves without intervention from their initial developers. Such a capability of incremental autonomous learning, or lifelong learning, is a key to the development of truly autonomous intelligent systems.

Developing such capabilities requires a suitable organization to evaluate models and techniques in a quantitative and comparable way. Such an organization has been instrumental in driving the progress leading to the intelligent systems we know today, but has to be adapted to the case of lifelong learning. New protocols are needed, whereby the autonomous learning phase is included in the test phase, the scope of the potential improvements targeted in this phase is agreed upon beforehand, and the metric might not only be about the final performance but also about the amount of information needed to reach it. Simulating the system environment might also be needed in the case of interactive learning. These new protocols can thus be a subject of research themselves.

Developing lifelong learning capabilities also raises fundamental questions such as how to avoid system regression when adapting to a new environment, how to efficiently learn through interaction, and how to work with initially unknown goals. Addressing such questions is expected to require a multidisciplinary approach, combining various techniques such as machine learning and knowledge representation, and bringing together expertise from various domains such as multimedia (speech, language, image or video) information processing and developmental robotics, among others.

Target Outcomes

Projects should aim at developing systems which offer state-of-the-art performance on a known task and are able to autonomously learn from further inputs in order to further improve on the same task or on an extended one. The use cases, scenarios and data used to train and test the systems should be real or realistic. Proposals should precisely describe the foreseen evaluation protocols and the means to implement them. They should also precisely describe the models and techniques to be explored. Key challenges are expected to be:

- Actively exploring the environment, possibly being guided by autonomously defined new goals, and identifying the important information using the current knowledge of the system;
- Incorporating new information to update past knowledge while avoiding system regression;
- Limiting the need to return to the initial training data;
- Taking into account the interplay of user feedback and the system output.

Expected Impact

In addition to the criteria set above, proposals should explain how they will contribute to the following objectives:

- Build and strengthen an interdisciplinary research community that crosses traditional boundaries between research disciplines;
- Support the development of objective benchmarks and evaluation strategies for lifelong learning;
- Build momentum and enable reproducibility beyond the project consortia.
- Make intelligent systems more usable;
- Reduce the cost of data management and limit or remove the need for users to provide data to developers;
- Enhance the value-chain of actors, including third parties able to adapt systems for categories of end users, and create new market opportunities;
- Better address security, ethical or legal issues with the behavior of intelligent systems and enhance trust in such systems.

2nd **Topic:** Visual Analytics for Decision-Making under Uncertainty

One central challenge of big data analytics is to understand their reliability, scope, and accuracy, and to communicate them to users in an intuitive manner. New visual analytic tools and approaches are needed to support trusted and efficient decision making under uncertainty. These are expected to require uncertainty analysis of ensemble data, sensitivity analysis of input-output models, and supported decision making that will allow expert users to understand the reliability and conflicts inherent in the analysis and the associated risks involved in subsequent decision making. They should provide new visual and multimodal interfaces to support user interaction with data. This is a multidisciplinary challenge that stretches across computational and related sciences. There is a need for research on real-world applications, with an integrated approach to modelling, visualization and user interaction, and which demonstrates measurable improvements in performance for users.

Target Outcomes

Projects should enable the creation of tools, demonstrable methodologies and assistive technologies for visual data analytics, in order to help organizations and institutions to rapidly recognize disruptive propositions and opportunities. Such tools and methods should be designed with full consideration of the user and application. Proposals are expected to include a cross-disciplinary skill base to ensure usability and efficacy.

Key challenges and opportunities are expected to be:

- Multidisciplinary modelling approaches which integrate visual, numerical and domain-specific methods to better meet user needs;
- Visualizing and interpreting large data sets and communicating their context, value, reliability, scope, accuracy and uncertainty in an intuitive manner;
- Creating multimodal user interfaces to support user interaction with data;
- Measuring the performance of such tools in real or realistic user environments, using representative data and user testing.

This call is expected to bring together expertise from across the research community in a variety of fields, including Applied Mathematics, Statistics, Modelling and Simulation, Uncertainty Analysis, Information Retrieval, Data Analysis, Data Science, Data Visualization, Visual Design, Human-Computer Interaction, Cognitive and Behavioral Science, Computer Vision, and Image Processing, among others.

Expected Impact

In addition to the criteria set above, proposals should explain how they will contribute to the following objectives:

- Build and strengthen an interdisciplinary research community that crosses traditional boundaries between research disciplines;
- Enhance informed decision making under uncertainty in industrial, policy or other realistic environments;
- Improve representation of uncertainty in large data sets;
- Increase trust and confidence in modelling and data analysis.