**Fonds de recherche
Nature et
technologies**

Québec ✚✚

CHIST-ERA Program

Summary

Competition year :	2019-2020
Deadline (notice or letter of intent) :	May 15th, 2018, 4 PM
Deadline (application) :	May 15th, 2019, 4 PM
Amount :	Maximum of CAD $100 000 per year* see details
Duration :	Maximum of 3 years, non renewable
Announcement of results :	October 2019

> ***Program rules that prevail are those of the PDF file**

CHIST-ERA is a consortium of funding organisations with programmes supporting Information and Communication Sciences and Technologies (ICST). The CHIST-ERA consortium is itself supported by the European Union's Future & Emerging Technologies scheme (FET).

CHIST-ERA promotes multidisciplinary and transnational ICST research with the potential to lead to significant breakthroughs. The funding organisations jointly support research projects selected in the framework of CHIST-ERA, in order to reinforce European capabilities in selected topics.

Content of the Call

Topic 1	Topic 2
Analog Computing for Artificial Intelligence	**Smart Distribution of Computing in Dynamic Networks**
ACAI	**SDCDN**

Indicative budget:
13M€
Proposals must be submitted by international consortia with research partners in at least 3 of the following countries: Austria, Belgium (only Wallonia-Brussels), Bulgaria, Canada (Québec), Czech Republic, Estonia, Finland, France, Greece, Ireland, Latvia, Lithuania, Luxembourg, Poland, Portugal, Romania, Spain, Slovakia, Sweden, Switzerland, The Netherlands, Turkey, United Kingdom (only topic SDCDN)
Proposals are evaluated jointly based on criteria of relevance to the topic, scientific excellence, implementation, and impact.
Each consortium partner is funded separately by a funding organisation.
Each partner must fulfil the conditions of the funding organisation they are applying to, as described in the annex. Industrial partners are eligible to be funded by some funding organisations.

Tentative Timeline

15 January 2019, 17:00 CET	Deadline for pre-proposal submission
End of March 2019	Notification of accepted pre-proposals
Mid-May 2019, 17:00 CET	Deadline for full proposal submission
October 2019	Notification of accepted proposals
1 December 2019	First possible start date for accepted projects

Research Targeted in the Call

Each year, CHIST-ERA launches a call for research proposals in two new topics of emergent scientific importance. This year's call concerns the following topics:

1. **Analog Computing for Artificial Intelligence (ACAI);**

2. **Smart Distribution of Computing in Dynamic Networks (SDCDN).**

In previous years, CHIST-ERA calls have targeted quantum computing, consciousness, knowledge extraction, low-power computing, intelligent user interfaces, smart communication networks, adaptive machines, distributed computing, trustworthy cyber-physical systems, human language understanding, security and privacy in the internet of things, terahertz communication, lifelong learning for intelligent systems, visual analytics, object recognition and manipulation by robots, and big data and process modelling for smart industry.

The **CHIST-ERA** consortium has created a common funding instrument to support international research groups that engage in long-term research in the area of ICT and ICT-based sciences. Through this instrument, funding organisations support and join the European Union's "**Future and Emerging Technologies (FET)**" agenda. By coordinating their efforts, they can support more diverse research communities, who are able to tackle the most challenging and novel research topics.

Community-defined topics

A workshop was held in Helsinki on 19-21 June 2018 to identify important research challenges within the two selected topics. The workshop brought together ICST researchers from across a range of research communities and countries. The delegates identified a number of research challenges, which have formed the scope of this call. Presentations given at the workshop are available on the CHIST-ERA website (**http://conference2018.chistera.eu/**). Attendance at the workshop is not a prerequisite for submitting an application to this call. The evaluation criterion "Relevance to the Topic" is assessed only based on the topic descriptions below. The workshop presentations can nevertheless provide background information for preparing a proposal.

Nature of research

Submitted proposals should be of a FET-like nature and contribute to the development of an international and multidisciplinary research. The transformative research done in CHIST-ERA should explore new topics with potential for significant scientific and technical impacts in the long term.

The two topics of this year's call are described below.

1st Topic: Analog Computing for Artificial Intelligence (ACAI)

Analog computing, which was initially the mainstream approach in computing, has seen its progress outpaced by the huge investments in digital computing following Moore's law during almost five decades. However, with the end of Moore's law, there is room again for more varied computer architectures including analog ones. These can enable fast, energy-efficient computing for specific applications and thus become attractive again. Furthermore, the field of Artificial Intelligence, which is progressing fast, addresses signals which are intrinsically analog (image, sound, speech, proprioception, etc...) and increasingly relies on neural

networks which naturally lend themselves to analog computing. In this context, analog computing becomes appealing for running Artificial Intelligence applications locally on personal devices, and more generally in an energy-efficient way.

Target Outcomes

Projects should lead to technology demonstrators enabling robust operation and give due consideration to performance evaluation and experiment reproducibility. Power consumption, computational capability, efficiency, reliability and adaptability are important aspects of this research domain and should be considered where relevant. Both new algorithms and adaptation of existing algorithms to new analog technologies can be addressed. Unconventional approaches can be considered where it can be demonstrated that they can lead to better artificial intelligence either generally or for specific domains of use.

Key challenges are expected to be:

- Performance benchmarking and demonstration of superior performance with respect to conventional approaches for specific applications in artificial intelligence
- The design of new, more resilient and configurable architectures
- Adaptability and ease of programming
- Energy consumption performance
- Demonstration of practicality

Expected Impact

Projects are strongly encouraged to address the following objectives in order to enhance impact:

- Strengthened interdisciplinary research community that crosses traditional boundaries between research disciplines
- Shared benchmarks and datasets for objective performance assessment and comparisons
- Increased awareness of the possibilities offered by analog computing for artificial intelligence
- Availability of enhanced low-power smart devices

2nd Topic: Smart Distribution of Computing in Dynamic Networks (SDCDN)

The proliferation of IoT solutions is driving the development of novel computing platforms that cope with the limitations of sensor/actuation devices and mobile devices, by offloading computing complexity onto the network. As a result, new computing paradigms that support diverse applications' needs have arisen including cloud, fog and edge computing. Increasingly hybrid approaches are being adopted to provide performance trade-offs between these distribution models according to changing network conditions and application requirements. This trend is foreseen to continue to grow especially in smart environments powered by post-5G networks. Processing will have to be delegated via novel intelligent coordination strategies over dynamic networks, including cloud, fog and edge elements. There is a need for ubiquitous, context-aware, robust solutions that dynamically orchestrate computing tasks among these models.

Target Outcomes

Projects should propose, design and/or implement demonstration technologies in user-centric application domains that highlight the benefits of dynamic computing in terms of security, reliability, trust, energy efficiency, computational capability and user perception.

Key challenges may include:

Performance benchmarking

Identification of application classes which are particularly suitable for realization on such platforms

Development of distribution strategies which improve application performance

Improving user experience in dynamic network scenarios and integration of user experience evaluation

Intelligent data storage, processing and movement

Creating context aware functionality

Transparency of operation

Addressing potential security issues

Expected Impact

Projects are strongly encouraged to address the following objectives in order to enhance impact:

Improved user experience and/or quality of life

Better understanding of infrastructural requirements among service providers of communication platforms

Increased awareness of capabilities and requirements of such systems among application designers

Improved energy usage from devices or systems

Reproducible, deployable technology

CHIST-ERA Website

Latest update: May 2021

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