CHIST-ERA Call 2018 Pre-announcement

The CHIST-ERA Call 2018, to be published in October 2018, will target research in the following topics:

- Analog Computing for Artificial Intelligence (ACAI)
- Smart Distribution of Computing in Dynamic Networks (SDCDN)

The details of the research targeted in the call have been defined by the research community during the CHIST-ERA Conference 2018, an event that was open to all interested researchers.

The present Call 2018 Pre-announcement gives an overview of the research themes that have emerged during the conference (see the following pages).

Anticipated Call deadline: 15th of January 2019

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 2018 is provided below.

Country	Funding Organisation	ACAI	SDCDN
AT	FWF	**Yes**	**No**
BE	FNRS	**Yes**	**Yes**
BG	BNSF	**Yes**	**Yes**
CA	FRQNT	**Yes**	**Yes**
CH	SNSF	**Yes**	**Yes**
CZ	TACR	**Yes**	**Yes**
EE	ETAg	**Yes**	**Yes**
ES	AEI	**Yes**	**Yes**
ES	IDEA	**Yes**	**Yes**
FI	AKA	**Yes**	**Yes**
FR	ANR	**Yes**	**Yes**
GR	GSRT	**Yes**	**Yes**
IE	IRC	**Yes**	**Yes**
LT	LMT	**Yes**	**Yes**
PL	NCN	**Yes**	**Yes**
RO	UEFISCDI	**Yes**	**Yes**
SK	SAS	**Yes**	**Yes**
TR	TÜBITAK	**Yes**	**Yes**
UK	EPSRC	**No**	**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: 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:

- Adaptability and ease of programming
- Energy consumption performance
- 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
- 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:

- Improving user experience in dynamic network scenarios and integration of user experience evaluation
- Development of distribution strategies which improve application performance
- Intelligent data storage, processing and movement
- Creating context aware functionality
- Transparency of operation
- Identification of application classes which are particularly suitable for realization on such platforms
- Performance benchmarking
- 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