RESEARCH, DEVELOPMENT AND INNOVATION PROGRAMME ICT 2023: Computation, Machine Learning and Artificial Intelligence

Research, development and innovation programme ICT 2023

The research, development and innovation programme ICT 2023 is jointly coordinated and funded by the Academy of Finland and Tekes, the Finnish Funding Agency for Innovation. The aim of the programme is to further improve Finland's scientific expertise in computer science and to promote the extensive application of ICT. The programme is based on the report *21 Paths to a Frictionless Finland* by the ICT 2015 Working Group. At least 10 million euros of the Academy's budget authority for 2017 will be used to implement the ICT 2023 programme.

Computation, Machine Learning and Artificial Intelligence

Artificial intelligence (AI) is over 60 years old scientific discipline whose significance is again becoming more prominent. The field of AI emerged not long after the invention of the digital computer. Its general objective, at least in certain areas of application, is to replace human decision-making with decision-making based on computing. Interest in AI has waned at times, when the high expectations that have been set for it have not been immediately met. Digitalisation and the utilisation of big data have effectively revived that interest. In recent years, learning and autonomous systems have become increasingly common in both research and practical applications.

Machine learning is a key ingredient of AI with numerous applications in fields such as biology, medicine, materials science, forest sciences, economics, decision support, data mining, robotics and telecommunications. Designing intelligent systems requires a multidisciplinary approach and the combination of computation theory and control, decision and telecommunications theoretical results. Cyber-physical systems are an important example of this progression. Risk analysis is also required, since intelligent systems must be robust and fail-safe, and because they throw up a host of ethical concerns.

This thematic call will provide funding to projects conducting basic research and seeking new initiatives for next-generation AI. Examples of research topics:

- analytics and mathematical statistical and prediction models as well as related computing associated with machine learning and AI
- autonomous networks and autonomous computing
- distributed intelligence (e.g. swarm intelligence)
- rapidly converging, novel solutions that utilise different approaches
- dynamic resource management
- development and innovative validation of novel machine learning methods
- interactive and privacy-preserving machine learning
- situation-aware and comprehensive AI, integrative AI and artificial general intelligence, and scalable AI systems
- modelling cognitive functions and humanoid AI
- theoretical opportunities and limitations of AI
- robust AI.

How applications are reviewed

In reviewing applications and making funding decisions, in addition to the Academy of Finland's general review criteria for research programmes (see Review criteria on the Academy's website), particular attention will be paid to the following issues:

- international engagement

- attracting top-level young, talented researchers from abroad to Finland or hiring researchers who have recently come to Finland to work on the project
- research visits by Finnish researchers to leading-edge foreign universities and research institutes
- business collaboration
  - cooperation between universities, research institutes and business companies
  - problem-setting in research
  - application potential of results
- intersectoral mobility of leading-edge researchers
  - mobility from universities to business companies
  - mobility from business companies to universities
- use of universities' and research institutes' own resources to carry out research
  - use of resources of the site of research and the partners
  - level of commitment and funding contribution by the site of research.

The applications will be reviewed by an international panel of experts. The reviewers will use the Academy's review form for programmes.

The threshold rating for Item 1.1 (Project's relevance to the programme) is 4 on the scale from 1 to 6. If an application fails to meet this requirement, the review will be discontinued and the applicant will only receive feedback on Item 1.1.

If an application does not receive at least rating 4 for Item 1.2 (Scientific quality and innovativeness of research plan), the review will be discontinued and the applicant will receive feedback only on Items 1.1 and 1.2.

This call is a single-stage call. The non-negotiable deadline for applications is 26 April 2017 at 16.15. Applicants may be invited for interviews during the review process.

The funding is granted for two years. As a rule, the funding period will start on 1 January 2018.

Consortium applications

If the applicant is a consortium, see detailed guidelines on our website under Guidelines for consortium application. Please note that consortium PIs can submit the consortium application only after all consortium subprojects have completed their applications. The non-negotiable call deadline also applies to consortia. Consortium compositions cannot be changed after the deadline has expired. If the project involves business collaboration, see the detailed guidelines below.

Business collaboration

If the project involves business collaboration, that collaboration must be clearly indicated in the research plan. In addition, your application must also include a collaboration plan as a separate appendix.

Collaboration plan (no more than three pages):

- List all project parties.
- Describe the collaboration as well as the management and research duties included in the project.
- Describe the mechanisms by which the project will integrate all participating organisations and individual researchers.
- Describe, if relevant, the implementation of intersectoral researcher exchange.
- Define each PI's required input to the project, and justify why each party's expertise is necessary to achieve the project's objectives.

- Describe the complementary roles of the parties involved, and explain which research results can be jointly utilised by the participating companies.
- Describe the application potential of the results.
- Make sure that the collaboration plan's length and details are proportional to the size of the project. The plan should be extensive enough to ensure that the project parties will work together as one whole.

The potential business collaboration is entered on the application form under *Project collaborators*. In the Academy's online services, enter as consortium parties only parties that are applying for funding from the Academy.

Programme coordination

The PIs of the projects are required to

- assume responsibility for and report on the scientific progress of the project and on the use of the funds in accordance with the Academy's instructions
- see to that the whole research team attends all meetings, seminars and workshops organised by the programme coordination, and facilitate cooperation and exchange of information between the research teams within the programme
- take part in producing reviews, syntheses and information material around the programme, and actively disseminate information about the programme's progress and results on public and scientific forums.