

GUIDANCE ON TARGETED EVALUATION OF IT ACADEMY PROGRAM ICT SCIENCE SUPPORT MEASURE

ESTONIAN RESEARCH COUNCIL, 2023



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1. INTRODUCTION

1.1. General provisions

- 1.1.1. Pursuant to the Organisation of Research and Development Act §20² the Ministry of Education and Research has the right to organise targeted evaluations for preparing field development plans that guide research and development or other research policy decisions and measures, or for assessing and analysing the impact and implementation thereof.
- 1.1.2. The purpose of targeted evaluation is to provide researchers, positively evaluated research and development institutions, research funding organisations, research and development and higher education policy makers and society with expert information.

1.2. Purpose of the Guidance

- 1.2.1. This document sets out the framework and administrative arrangements for targeted evaluation of IT Academy program ICT science support measure (hereinafter 'the evaluation').
- 1.2.2. This guidance specifies the requirements and criteria that will apply for submissions by institutions participating in the evaluation, as well as the requirements for assessment for the Expert Panel (hereinafter 'the Panel') and the Steering Committee (hereinafter 'the Committee').
- 1.2.3. The evaluation period covers the years 2018-2022.
- 1.2.4. Pursuant to the Minister's Directive No. 1.1-2/22/348, targeted evaluation is carried out at Tallinn University of Technology, University of Tartu and Tallinn University in the field of natural sciences and engineering, in the subfields of computer science, and information and communication technology.
- 1.2.5. Based on the directive of the Minister, the Estonian Research Council (hereinafter ETAG) organises the targeted evaluation.

2. FRAMEWORK

2.1. Targeted evaluation of IT academy program ICT science support measure

- 2.1.1. Based on the Minister's Directive No. 1.1-2/22/348, targeted evaluation concerns the field of natural sciences and technology of the Estonian Science Information System, the subfields of computer science and information and communication technology.
- 2.1.2. Based on the Minister's Directive No. 1.1-2/22/348, targeted evaluation concerns the volume, level, sustainability and impact, including the impact on higher education, of Estonian computer science, information and communication technology research and development and knowledge transfer, compared to the internationally recognised level, and the evaluation of the effectiveness and impact of the use of the ICT science support measure of the IT Academy.
- 2.1.3. The evaluation focuses on seven priority areas of the ICT research measure of the IT Academy program and other ICT. The priority areas are the following: artificial intelligence and machine learning; data science and big data; robot-human collaboration and Internet

of Things in industrial processes; software reliability; Internet of Smart Things; security and reliability of hardware and systems; digital transformation and lifelong learning.

2.2. General principles of the evaluation procedure

- 2.2.1. Targeted evaluation is a process of peer review.
- 2.2.2. The Panel will consistently apply standards of evaluation based on the outcomes specified in the Minister's Directive No. 1.1-2/22/348 and rules of procedure specified in this document issued by ETAG for performing peer review of the ICT science support measure of the IT Academy program as part of the targeted evaluation.
- 2.2.3. The Panel is bases their assessment on two documents and the information gained during the visit to institutions evaluated. The first document is the field overview, and it gives background information. It is compiled and provided to the Panel by ETAG prior to conducting the evaluation. The overview considers the ICT research and development activities in Estonia as a whole, including an overview of ICT research and development activities outside the institutions mentioned in section 1.2.4 of this document. The second document is the Self-Analysis Report by the three institutions participating in the evaluation.
- 2.2.4. Specific requirements of Self-Analysis Report form are listed in Annex A.
- 2.2.5. All information provided by institutions in the Self- Analysis Report must be justifiable and verifiable.
- 2.2.6. The field overview concentrates on the following questions:
 - What directions of ICT research and development are advanced in Estonia and to what extent do the selected directions overlap with the country's strategic priorities and global development trends?
 - What is the volume of funding for ICT research and development, and the main types of funding sources (including external funds, private sector financing)? How is the funding distributed between research areas?
 - What are the other main resources of the ICT R&D areas of the institutions (incl. number of employees, doctoral students, involved foreign researchers, infrastructure, and other indicators) and outputs (incl. publications, intellectual property, contracts with the private and public sector, and other indicators)?
 - How does ICT research and development support higher education?
- 2.2.7. The Panel shall assess all research output on a fair and equal basis and shall compare the Self-Analysis Report submitted by the institutions evaluated to the internationally recognised level as well as the results of the (virtual) visit and the information presented in the field overview.

3. Guidance to the evaluated institutions

- 3.1. The deadline for submission of the Self-Assessment Report is **13 June 2023**.
- 3.2. The Report is submitted through the platform of the Estonian Science Information System (ETIS).
- 3.3. After the completion of targeted evaluation, the evaluated institutions provide ETAG feedback on the process of evaluation.

4. Guidance to the Panel

In order for the Panel to carry out the evaluation:

- 4.1.1. TalTech, UT and TU submit through the Estonian Research Information System (ETIS) the institution's Self-Analysis Report;
- 4.1.2. ETAG compiles and presents an overview of the field of ICT.
- 4.2. All Panel members must confirm the "Conflict of Interest and Confidentiality Declaration" in the Estonian Research Information System prior to undertaking the work. Members of the Panel shall be unbiased and have no conflict of interest for the past 5 years with the institution being evaluated. Panel members will not disclose to third parties any information and data obtained from the evaluation even after the evaluation has ended.
- 4.3. The Panel may, pursuant to its decision, use (virtual) meetings or other formats as a form of work. The chairperson, or in the absence of the chairperson the vice chairperson, has the right to include to the Panel meetings scientific experts in the field of ICT who have a say and can provide the Panel with necessary information. The Panel aims to avoid conflicts of interest when choosing experts.
- 4.4. The tasks of a Panel member are the following:
 - 4.4.1. to review the information referred to in clause 2.2.3;
 - 4.4.2. to participate in the Panel meetings and visit (virtually) the institutions being evaluated;
 - 4.4.3. to participate in the formulation of assessments and offer suggestions in the evaluation report;
 - 4.4.4. to carry out other tasks related to peer review according to the Panel's internal agreement.
- 4.5. The chairperson and vice-chairperson are elected by and among the members of the Panel.
- 4.6. The Panel is led by a chairperson, in their absence by a vice-chairperson.
- 4.7. The tasks of the Panel's chairperson are the following:
 - 4.7.1. to coordinate the visit (the schedule is drafted by ETAG, evaluated institutions will receive at least ten working days' notice);
 - 4.7.2. to lead Panel meetings;
 - 4.7.3. to appoint the division of labour of Panel members;
 - 4.7.4. to lead the Panel during the visit;
 - 4.7.5. to provide justifications of assessments, suggestions and the evaluation proposal;
 - 4.7.6. to compile and approve the evaluation report.
- 4.8. Panel members familiarise themselves with the documents related to targeted evaluation (Self-Analysis Reports of evaluated institutions and field overview) prior to the visit.
- 4.9. The Panel has the right to:
 - 4.9.1. request additional materials from TalTech, UT, TU, ETAG and the Committee that are important in order to achieve the objectives of the evaluation;
 - 4.9.2. visit (either virtually or in person) TalTech, UT and TU to obtain additional information necessary for the evaluation;
 - 4.9.3. request, prior the visit to TalTech, UT and TU, ETAG to gather questions and comments about the Self-Assessment Report and data that the Panel would like to inquire about during the visit, list of additional materials the Panel requires and a list of persons of interest with whom the Panel would like to meet during the visit and request that these to be forwarded to the institutions evaluated;
- 4.10. During the visit the Panel:
 - 4.10.1. listens to the self-introduction of TalTech, UT and TU;
 - 4.10.2. inspects the infrastructure of TalTech, UT and TU;
 - 4.10.3. conducts interviews with the staff of TalTech, Ut and TU and other persons the Panel considers having information relevant to the evaluation.
- 4.11. During the visit the Panel is accompanied by an observer from ETAG.

4.12. Introduction of the members of the Panel and invited research experts is included in Annex 3.a and 3.b.

4.13. Assessment

4.13.1. There are two units of assessment. The first is ICT research in the institution (three units are the institutions evaluated: UT, TalTech and TU) and the second is the research area in the priority fields of the IT Academy program (seven units - priority fields: artificial intelligence and machine learning; data science and big data; robot-human collaboration and Internet of Things in industrial processes; software reliability; Internet of Smart Things; security and reliability of hardware and systems; digital transformation and lifelong learning).

4.13.2. The Panel shall, by unit of assessment, analyse the volume, level, sustainability and impact of research, including the impact on higher education, of Estonian computer science, information and communication technology research and development and knowledge transfer, compared to the internationally recognised level.

4.13.3. As a result of the analysis specified in clause 2.2.3. of this document, the Panel shall compile a peer review report. The report shall provide an evaluation maximum of 2 pages per unit of assessment. This means 6 pages in total concerning the first unit of assessment (ICT research in the institution, 2 pages for each institution evaluated) and 14 pages in total for the second unit of assessment (7 priority fields of the IT Academy program, 2 pages for each priority field). In the report, the Panel shall use the following criteria and indicators (indicators are meant to be supportive, not mandatory):

Scientific impact

Criterion	Indicator
1. Scientific impact	a. the number of peer reviewed publications (per researcher) in the field;
	b. the number of publicly available (Open Access) publications;
	c. list of patents and licences obtained during the evaluation period.

Sustainability and potential

Criterion	Indicator
2. Sustainability and potential	a. The composition of R&D employees (number and distribution by position, including researchers with a doctoral degree and without Estonian citizenship);
	b. number of doctoral students and graduates;
	c. volume and structure of R&D revenues (by source: grants and business contracts).

Societal importance of research

Criterion	Indicator
3. Societal importance of research	a. participation in international professional associations and networks;

	b. participation in national R&D decision-making/expert bodies;
	c. trainings, consultations offered to society and collaboration with the community.

4.14. The Panel is in quorum if at the Panel meeting at least two-thirds of its members are present, including the chairperson or in the absence of chairperson the vice chairperson. If there is no quorum, the chairperson, or in the absence of the chairperson the vice chairperson, shall arrange a further meeting at the earliest opportunity.

4.15. Peer review report

- 4.15.1. The Panel has to reach a consensus and compile the peer review report based on it.
- 4.15.2. After reviewing the material specified in clauses 4.1.1. and 4.1.2 of this document and the additional visit to the institutions, when the Panel has completed its work, the chairperson, or in the absence of the chairperson, the vice-chairperson renders the peer review report to ETAG by **15 November 2023** for review. ETAG checks compliance of the report to the assessment criteria and guidance specified in clauses 4.13.1.-3., 2.1.2, 2.1.3, 2.2.2, 2.2.7, and 4.16. ETAG has the right to send the report back to the Panel for revision.
- 4.15.3. The Panel's peer review report is after fact checking approved by the Steering Committee. The Steering Committee has the right to send the report back to the Panel for revision.
- 4.15.4. If the Panel's peer review report meets the requirements, ETAG sends the report to institutions for fact checking.
- 4.15.5. The Panel provides ETAG feedback on the process of evaluation after completion of its work.

4.16. Grading

- 4.16.1. The peer review report is a qualitative assessment, no numerical grades are provided.
- 4.16.2. The peer review report focuses in the assessment on two aspects in all units of assessment: the positive aspects and strengths, and areas needing improvement. Besides the evaluation, the Panel offers suggestions for further development.

4.17. Guidance to the Committee

- 4.18. The Committee is guided in their final evaluation by the contents of the Self-Assessment Report presented by the institutions evaluated, the field overview and the peer review report of the Panel.
- 4.19. The final report by the Committee focuses on the following questions:
 - 4.19.1. To what extent has the ICT research measure of the IT Academy achieved its goals? What is the change in the level and sustainability of selected research directions?
 - 4.19.2. To what extent are the selected research directions aligned with the national priorities, global development trends, business sector and societal needs identified in the overview of the field? To what extent do research directions need to be changed or supplemented in the light of this?
 - 4.19.3. Whether and to what extent has a significant developmental leap taken place with the help of ICT research measure in selected research areas (compared to the rest of the advances in IT research and development activities)?
 - 4.19.4. To what extent has the support measure promoted cooperation between institutions, how much does duplication occur?

- 4.19.5. How are the priority research areas of the ICT support measure related to higher education? To what extent and how do researchers (including involved foreign researchers and external researchers hired using the means of the measure) participate in teaching?
- 4.19.6. What has been the measure's contribution to doctoral studies? How has the measure affected admission and graduation of doctoral students? What are the main outputs of knowledge transfer of the ICT science support measure and how is support for knowledge transfer organised in institutions?
- 4.19.7. To what extent have foreign researchers and external researchers hired using the means of the measure been involved in the institutions, what kind of support do the institutions provide to integrate them into the higher education and research landscape of Estonia?
- 4.19.8. How relevant has been the management, implementation and financing model of the measure to achieve the intended goals?
- 4.19.9. What are the recommendations for follow-up activities of the ICT research support measure? (launching new topics, changing procedures and/or conditions, starting cooperation mechanisms etc.)?
- 4.20. The structure of the final report is outlined in Annex 2.
- 4.21. When the Committee has completed its work, the chairperson, or in the absence of the chairperson, the vice-chairperson renders the final report to ETAG by **19 December 2023**.
- 4.22. The institutions evaluated have the right to express their opinion about the final report before the Committee has approved it.
- 4.23. Lastly, the approved final report is sent to the Ministry of Research and Education together with the opinions of the evaluated institutions.
- 4.24. After the completion of the targeted evaluation, ETAG organises a public event to present the outcomes of evaluation and facilitate discussion. The chairperson, or in the absence of the chairperson another appointed member of the Committee, gives a presentation on behalf of the Committee regarding the targeted evaluation.
- 4.25. The Committee provides ETAG feedback on the process of evaluation after completion of its work.

Annex 1. Self-Assessment Report form for targeted evaluation in 2023

GENERAL INFORMATION	
A description of the institution's ICT research and development activities including future prospects (max 2,000 characters with spaces)	
Period of targeted evaluation	2018-2022
Institution's contact person (name, position, phone number, e-mail)	

INSTITUTION	
Description of institution's contribution (both financial and non-financial) to support priority research directions, including future directions (free-form text up to 2,000 characters with spaces)	
Short analysis about the institution's support to knowledge transfer, including collaborative research strategy covering the years 2018-22 (free-form text up to 2,000 characters with spaces)	
A list of foreign researchers and external researchers hired using the means of the measure during the evaluation period 2018-22 and a description of how they were involved (e.g., through a grant). Researchers hired during the evaluation period 2018-2022 (employment contract with the university), distinguishing researchers hired from outside Estonia (including Estonian researchers who were at the time working outside Estonia) and from other institutions in Estonia.	
Institution's assessment of the impact of the ICT science support measure. To what extent has the ICT research measure of the IT Academy achieved its goals? What is the change in the level and sustainability of selected research directions? (free-form text up to 2,000 characters with spaces)	

<p>Institution's assessment to what extent are the selected research directions aligned with the national priorities, global development trends, business sector and societal needs identified in the overview of the field? To what extent do research directions need to be changed or supplemented in the light of this? (free-form text up to 2,000 characters with spaces)</p>	
<p>Institution's assessment whether and to what extent has a significant developmental leap taken place with the help of ICT research measure in selected research areas (compared to the rest of the advances in IT research and development activities) during the evaluation period 2018-22? (free-form text up to 2,000 characters with spaces)</p>	
<p>Institution's assessment to what extent has the support measure promoted cooperation between institutions during the evaluation period 2018-22? (free-form text up to 2,000 characters with spaces)</p>	
<p>Institution's assessment to what extent have foreign researchers and external researchers hired using the means of the measure been provided support by the institution to integrate them into the higher education and research landscape of Estonia during the evaluation period 2018-22? (free-form text up to 2,000 characters with spaces)</p>	
<p>Institution's assessment what has been the measure's contribution to doctoral studies? How has the measure affected admission and graduation of doctoral students during the evaluation period 2018-22? (free-form text up to 2,000 characters with spaces)</p>	
<p>Institution's assessment what are the main outputs of knowledge transfer of the ICT science support measure and how is support for knowledge transfer organised in the institution during the evaluation period 2018-22? (free-form text up to 2,000 characters with spaces)</p>	

Institution's assessment how relevant has been the management, implementation and financing model of the measure to achieve the intended goals? (free-form text up to 2,000 characters with spaces)	
Institution's recommendations for designing the follow-up measure (launching new topics, changing procedures and/or conditions, starting cooperation mechanisms etc.) (free-form text up to 1,000 characters with spaces)	
Description of the institution's sustainability strategy in developing the field of ICT in the future. (free-form text up to 2,000 characters with spaces)	

RESEARCH GROUP	
Name of the research group	
Subfield(s) of research	
Research group data: PI (Principal Investigator)	
Members (including PhD students) – name, job title, role in the research group, education (BA, BSc, MA, MSc, PhD)	
Involved foreign researchers and Estonian researchers working outside of Estonia - name, job title, role in the research group, education (BA, BSc, MA, MSc, PhD). Researchers hired during the evaluation period 2018-2022 (employment contract with the university), distinguishing researchers hired from outside Estonia (including Estonian researchers who were at the time working outside Estonia) and from other institutions in Estonia.	
A free-form overview of the research work of the research group during the evaluation period 2018-22 (what problems are being investigated, etc.). (up to 2,000 characters with spaces per research group)	
List of articles published during the evaluation period 2018-22	Is filled by ETAG (based on information available in ETIS)

<ul style="list-style-type: none"> ▪ Number of peer reviewed publications, including all classification categories (including monographs, collections, etc.). Only those publications whose author is a member of the evaluated research group at the time of publication are considered. ▪ Number of publicly available (Open Access) publications. ▪ 10 most significant publications based on the opinion of the research group during the period of 2018-22. 	<p>10 significant publications is filled by the institution (please add links to full versions of articles)</p>
<p>List of patents or licences obtained during the evaluation period 2018-22</p>	<p>Is filled by ETAG (based on information in the Estonian Research System ETIS)</p>
<p>According to the research team, the most important scientific achievement during the evaluation period 2018-22. The selected achievement must be accomplished in the research group being evaluated, and the achievement must be identifiable as an output (article, patent, software, implementation of scientific achievement in the business sector, etc.). With links to ETIS if possible. Free-form text (max 2,000 characters with spaces).</p>	
<p>Corroborating evidence of the most important achievement (a video or any other innovative form, text or link to ETIS)</p>	
<p>List of doctoral degrees defended during the evaluation period 2018-22 (defender's name, supervisor(s), title of doctoral thesis, time of defence)</p>	<p>Is filled by ETAG</p>
<p>Title and volume of grants during the evaluation period 2018-22</p>	<p>Is filled by ETAG</p>
<p>List of collaborative contracts in the evaluation period 2018-22 starting from 500 EURO</p>	<p>Is filled by ETAG</p>
<p>Participation of members of the research group in national and international R&D decision-making and expert bodies during the evaluation period 2018-22 (list of persons and specification where they participated). Please exclude participation in editorial boards etc.</p>	
<p>Other results of knowledge transfer during the evaluation period 2018-22 (e.g., licenses)</p>	

<p>List of trainings offered (in-service, reskilling), collaboration with the community (e.g., university as a partner to bring the private sector and different parties of the state together) and consultations offered to society during the evaluation period 2018-22</p>	
<p>Research group's other R&D activities that indicate social impact and cooperation, highlighting significance outside science during the evaluation period 2018-22. Free-form text, (max 2,000 characters with spaces).</p>	
<p>How are the priority research areas of the ICT support measure related to higher education? The connection of the research personnel with teaching in higher education during the evaluation period, including foreign researchers and external researchers hired using the means of the measure (development of subjects, modules, curricula; teaching, supervision)? (up to 2,000 characters with spaces)</p> <ul style="list-style-type: none"> • List of courses/ modules based on the competence of the research group. Name the subject, including a brief description of the subject (copied from the Study Information System), level of higher education. 	
<p>Additional information. The institution may submit other documents relevant to evaluation. Providing additional information is not mandatory.</p>	

Annex 2. Structure of the final report

1. Introduction

This is the final report of the assessment Panel and the Committee of the 2023 targeted evaluation of IT Academy program ICT science support measure. The evaluation is based on directive no 1.1-2/22/348 (14 December 2022) of the Ministry of Education and Research. Information used by the Panel contains: presentations of the Estonian Research and Education system given by the Estonian Research Council; research field overview, self-assessment of the participating institutions, statistics and publications submitted by the participating institutions to the ETIS system for the present evaluation; site visits to all assessed institutions in autumn (September-November) 2023; the Panel's familiarity with the international research and research management system and the Committee's familiarity of the Estonian context.

2. Evaluation procedure

2.1. **The Expert Panel** was tasked to assess the volume, level, sustainability and impact, including the impact on higher education, of Estonian computer science, information and communication technology research and development and knowledge transfer, compared to the internationally recognised level.

2.2. **The Steering Committee** was tasked to evaluate the effectiveness and impact of the use of the ICT science support measure of the IT Academy.

3. General overview of the field

4. Assessment

4.1. Research area in the institution (priority fields)

- a) Research quality
- b) Sustainability
- c) Impact outside research

4.2. ICT research of the institution (as a whole)

- a) Research quality
- b) Sustainability
- c) Impact outside research

4.3. Positive aspects

4.4. Areas of development

4.5. Recommendations

4.6. The overall assessment answers the following questions:

1. To what extent has the ICT research measure of the IT Academy achieved its goals? What is the change in the level and sustainability of selected research directions?

2. To what extent are the selected research directions aligned with the national priorities, global development trends, business sector and societal needs identified in the overview of the field? To what extent do research directions need to be changed or supplemented in the light of this?

3. Whether and to what extent has a significant developmental leap taken place with the help of ICT research measure in selected research areas (compared to the rest of the advances in IT research and development activities)?

4. What is the institution's contribution (both financial and non-financial) to support the research directions of the support measure?
4. To what extent has the support measure promoted cooperation between institutions, how much does duplication occur?
5. How are the priority research areas of the ICT support measure related to higher education? To what extent and how do researchers (including involved foreign and external researchers hired using the means of the measure) participate in teaching?
6. What has been the measure's contribution to doctoral studies? How has the measure affected admission and graduation of doctoral students?
7. What are the main outputs of knowledge transfer of the ICT science support measure and how is support for knowledge transfer organised in institutions?
8. To what extent have foreign researchers and external researchers hired using the means of the measure been involved in the institutions, what kind of support do the institutions provide to integrate them into the higher education and research landscape of Estonia?
9. How relevant has been the management, implementation and financing model of the measure to achieve the intended goals?
10. What are the recommendations for follow-up activities of the ICT research support measure? (launching new topics, changing procedures and/or conditions, starting cooperation mechanisms etc.)?

Appendix 3. a. Expert Panel members' introduction

(name, academic title or job title, university/company name, main field of research/ professional activity, significant publications, participation in administrative and expert bodies, other relevant information)

Chairperson

Vice Chairperson

Member 1

Member 2

Member 3

Member 4

3.b. Introduction of scientific experts in the field of ICT included as external experts in the work of the Panel

(name, academic title or job title, university/company name, main field of research/ professional activity, significant publications, participation in administrative and expert bodies, other relevant information)

Expert 1

Expert 2