



## Estonia's national artificial intelligence strategy 2019-2021

July 2019

In May 2019, an expert group led by Ministry of Economic Affairs and Communications (MKM) and Government Office presented proposals on advancing the take-up of artificial intelligence (AI) in Estonia aka for Estonia's national AI strategy (hereinafter: strategy)<sup>1</sup>.

This current strategy has been prepared based on these proposals, as a plan on how to implement the expert group's recommendations. It was adopted at Cabinet meeting on 25 July 2019.

The strategy is a sum of actions that Estonian government will take to advance the take-up of AI in both private and public sector, to increase the relevant skills and research and development (R&D) base as well as to develop the legal environment. This strategy is also Estonian national AI strategy in the European Union's coordinated AI action plan context, synchronised with and supporting relevant EU-level activities.

A steering group led by MKM and consisting of representatives of government agencies and key stakeholders will coordinate and monitor the implementation of this strategy, including discuss and plan for additional actions upon need. Once a year, an overview of implementation of the strategy will be presented to e-Estonia Council (the governmental committee overseeing digital society development).

The budget allocation of action items in the strategy represents existing funding for activities, not potential needs. In future years, the strategy implementation overview will also include in retrospect any additional funds directed to support of AI activities under existing funding mechanisms, if such contribution depends on applications and cannot be determined in advance (e.g. funding measure is not targeted directly at AI activities but the latter are potentially eligible). **According to the current strategy and based on existing knowledge, Estonian government will invest at least 10M euros in 2019-2021 to implementation of AI strategy in its different directions.**

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<sup>1</sup> See the report of expert group at <https://www.kratid.ee/in-english>

Expert group proposals and existing measures	Action item	Responsible agency <sup>2</sup>	Deadline	Budget <sup>3</sup>
<b>1. ADVANCING THE UPTAKE OF AI IN PUBLIC SECTOR IN ESTONIA</b>				
<i>Existing measures and activities:</i>				
1.1. Organising events for government agencies to introduce ideas and existing AI solutions and to identify use-cases	- Carrying out events together with different government agencies	MKM	Ongoing activity	---
1.2. Facilitating development and preparation of AI projects by agencies	- Brainstorming sessions for generating and mapping AI application possibilities - Project development advice - Matchmaking (e.g. with potential private sector or other partners) - Advice on funding opportunities	MKM	Ongoing activity	---
1.3. R&D project under RITA programme <sup>4</sup> to finance research on implementation of automatic AI-based decision-making support in Estonian state institutions	- Consortium partner has been selected in July 2019 - Project initiated in September 2019	MKM / HTM	- Project initiated in September 2019 - End of the project December 2021	Budget for 2019-2021 is 805 260 €
1.4. Developing data governance	- Supervising data stewards in agencies - Development of data governance tools - Development of legal space (upon need)	STAT / MKM	Ongoing activity	---
1.5. Consent management pilot project	- Carrying out a pilot project	MKM	- By June 2020 a pilot project to be carried out	Depending on the pilot project outcome
1.6. Develop principles for responsible use of data	- Drafting a proposal for responsible use of data (principles)	JM	- December 2019 submission to Cabinet meeting	---
1.7. Increasing the availability of open data	- Continuing the development open data portal - Project to support both the open data demand and publishing	MKM	Ongoing activity	---

<sup>2</sup> Abbreviations: EAS – Enterprise Estonia, HITSA – Information Technology Foundation for Education, HTM – Ministry of Education and Research, JM – Ministry of Justice, MKM – Ministry of Economic Affairs and Communications, STAT – Statistics Estonia

<sup>3</sup> '---' marks action item which will not need additional or targeted budget, or it is not possible to distinguish such costs from rest of activity's budget

<sup>4</sup> See <https://www.etag.ee/en/funding/programmes/rita/>

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<i>Additional activities and measures:</i>				
1.8. Introducing the topic within the senior management trainings offered by the Government Office	- Inputs to new training courses and sessions	MKM	Ongoing activity	---
1.9. Launching and arranging meetings of a public sector data science and AI thematic network, where public sector institutions share experiences and concerns and discuss common goals and initiatives	- The first network meeting took place in June 2019 - Coordination activities / organising meetings at least quarterly	MKM	Ongoing activity	---
1.10. Developing and providing training on "Why is data science necessary?" for managers and chief specialists in public sector institutions (will include AI topics).	- Developing the concept of training module/session	MKM	- September 2019 (aim is to start with the training in the first quarter of 2020)	Depending on the concept
1.11. Creating and publishing guidance materials for launching and evaluating AI projects as well as for generating ideas (including responsible development and sustainable management of AI solutions, methodology for impact assessment, etc)	- Developing road map for materials to be created and published - Publishing materials according to road map	MKM	- Prepare a road map by September 2019 - According to road map	---
1.12. Ordering an online course to raise public awareness of AI	- Preparations to commission the online course - Launching the course	MKM	- Launch no later than April 2020	2020-21: up to 300k euros
1.13. Disseminating success stories and role models, creating a website displaying the live or ongoing AI projects with short descriptions and contacts – continued from current kratid.ee website	- Continuing the development and upkeep of kratid.ee website	MKM	Ongoing activity	---
1.14. Organizing the spread of knowledge and exchange of experience - to introduce the possibilities and examples of AI in different networks and formats	- Inputs to agendas of meetings - Making presentations at meetings	MKM	Ongoing activity	---
1.15. Creating Chief Data Officer positions, at least at ministerial level	- Preparations to apply for funding from state budget strategy	MKM	- February 2020 budget proposal submitted for state budget strategy	Depending on state budget strategy decisions

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1.16. Conducting practical training sessions on procurement/commissioning for AI projects and disseminating good practices. Considering the development of guidelines.	<ul style="list-style-type: none"> <li>- Developing the guidelines</li> <li>- Developing a trainings program</li> <li>- Starting with trainings</li> </ul>	MKM	<ul style="list-style-type: none"> <li>- September 2019</li> <li>- September 2019</li> <li>- Depending on the concept</li> </ul>	Depending on the concept
1.17. Ensuring flexible and sufficient funding opportunities for pilot projects within funding measures for digital government development (including after current EU Structural Funds period), including for AI projects that have a higher than average failure rate possibility	<ul style="list-style-type: none"> <li>- Funding opportunities exist for 2019/2020 within Structural Funds measures - government agencies can apply for funding on an ongoing basis</li> <li>- Preparing new funding measures for 2021+ period</li> </ul>	MKM	<ul style="list-style-type: none"> <li>- Ongoing work</li> <li>- November 2020</li> </ul>	Total budget of AI projects will depend on funding applications (est. total at least 500k euros for 2019-2020)
1.18. Upon evaluation of funding applications for IT development, considering the possibility of awarding additional credits to projects, which are strategically important (including, for example, focussed on uptake of AI). This would stimulate prioritisation of relevant development projects among and alongside other IT works.	<ul style="list-style-type: none"> <li>- Review of evaluation criteria</li> </ul>	MKM	<ul style="list-style-type: none"> <li>- November 2019</li> </ul>	---
1.19. Ordering and making available and reusable AI core components - the core components can be further "trained" by the subsequent institutions on the basis of their data and needs, and thus reused in their field without duplicating development	<ul style="list-style-type: none"> <li>- Preparing road map on core component development</li> <li>- Carry out the development of core components in collaboration with other government agencies, according to the roadmap</li> </ul>	MKM	<ul style="list-style-type: none"> <li>- September 2019</li> <li>- According to roadmap</li> </ul>	Will be carried out under the current funding instruments – exact budget will depend on the applications and projects
1.20. Creating technological sandboxes for testing and developing public sector AI applications, to accelerate their deployment	<ul style="list-style-type: none"> <li>- Preparing the sandbox concept and relevant action plan</li> </ul>	MKM	<ul style="list-style-type: none"> <li>- February 2020</li> </ul>	Depending on the action plan
1.21. Considering joint procurements to make the resource of development partners available to public authorities that	<ul style="list-style-type: none"> <li>- Legal analysis on possibilities for joint procurements</li> </ul>	MKM	<ul style="list-style-type: none"> <li>- November 2019</li> </ul>	---

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launch AI projects, without the need for excessive additional public procurement on their own	- Depending on the analysis, planning additional steps			
1.22. Considering the development and offering of shared IT infrastructure to make data processing and other infrastructure available to public authorities for more cost-effective, larger-scale and faster development. This can be done, for example, on the basis of the national cloud and / or the Estonian computing center.	- Analysis on common requirements and development road map	MKM	- February 2021	---
1.23. Making it a condition of funding for IT development projects that AI uptake should be planned as ongoing development, not a one-off project	- Review of the evaluation criteria	MKM	- November 2019	---
1.24. Making technical requirements for sustainability a condition for funding the development of AI solutions. Guidelines could be developed and conditions set by MKM.	- Preparing new requirements for 2021+ funding measures.	MKM	- November 2020	---
1.25. In co-operation between STAT and MKM, launching deep dive workshops on data governance, which will help the agencies to compile a data catalogue, organize metadata and obtain an initial assessment of data quality, along with receiving proposals for development.	- Developing the concept and plan for workshops	MKM / STAT	- January 2020	Depending on the concept
1.26. Creating a support measure for financing the conduct of data audits in state agencies.	- Preparations to apply for funding from state budget strategy	MKM	- February 2020 budget proposal submitted for state budget strategy	Depending on state budget strategy decisions
1.27. One of the conditions for financing development should become the requirement of "AI eligibility" for each new IT development: in the information system created or updated as a result of the development, the data must be created in	- Crafting out new requirements - Introducing the new requirements for 2021+ funding measures	MKM	- March 2020 - November 2020	---

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such a way that it can be applied in future AI projects. There is also a need for appropriate information and guidance materials.				
1.28. Evaluating and improving the quality of data, upgrading the semantic interoperability framework so that it would meet today's and future needs - including, in particular, those of AI development	- Upgrading the semantic interoperability framework	MKM	- December 2020	---
1.29. Monitoring EU initiatives aimed at development of a common data infrastructure and common data platforms, to engage with useful initiatives early on and to join them upon suitability - it would open up broader access to datasets for different Estonian stakeholders.	- Participation in the EU coordinated AI action plan high-level group work - Participation in information sharing for EU level initiatives	MKM	Ongoing activity	---
1.30. Developing the #BürokrattAI concept for interoperability of public sector AI solutions as well as shared AI interface for citizens for use of public services	- Developing the concept - Conducting the pilot project	MKM	- December 2019 - September 2020	Depending on the concept
<b>2. ADVANCING THE UPTAKE OF AI IN PRIVATE SECTOR IN ESTONIA</b>				
<i>Existing measures and activities:</i>				
2.1. Existing funding measures to support creation of AI-based products and solutions <sup>5</sup> : - Innovation vouchers - Development vouchers - Product development grants	- Introducing to companies the existing funding opportunities within current measures - Expanding the current funding measures to make AI uptake and development eligible (e.g. for Norway grants)	EAS / MKM	- Ongoing activity  - January 2020: update of funding criteria upon need	The total budget of AI projects will depend on applications
2.2. The technology competence centre programme of EAS is a support measure aimed at motivating companies to create innovative products and cooperate with research institutions.	One of the competence centres under the programme specialises in machine learning and data science, incl. creating AI solutions (STACC).	EAS	Ongoing activity	2019-21: Up to 3M euros

<sup>5</sup> See <https://www.eas.ee/teenused/?lang=en>

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	Activity: direct and support STACC activities			
<i>Additional activities and measures:</i>				
2.3. Appointing an organisation to lead the development of AI field and systematically raise awareness on AI in Estonia, or establish one if necessary.	<ul style="list-style-type: none"> <li>- Preparing the concept of Estonian AI digital innovation hub (DIH)</li> <li>- Preparing the relevant funding proposal for State Budget Strategy 2021-24</li> </ul>	MKM, in collaboration with HTM	<ul style="list-style-type: none"> <li>- January 2020</li> <li>- March 2020 state budget strategy proposal</li> </ul>	Depending on state budget strategy decisions
2.4. Preserve and update kratid.ee website, where entrepreneurs could find practical information on realising AI projects	Ongoing maintenance of kratid.ee site until the organisation mentioned in 2.3 starts operation	MKM	Ongoing activity	---
2.5. Ordering an online course to raise public awareness of AI.	<ul style="list-style-type: none"> <li>- Preparations to commission the online course</li> <li>- Launching the course (sama as action 1.12)</li> </ul>	MKM	- Launch no later than April 2020	2020-21: up to 300k euros
2.6. Development and implementation of a training programme for the application of artificial intelligence aimed at business leaders and ambitious companies with a potential of introducing AI solutions	<ul style="list-style-type: none"> <li>- Creating the concept for training programme</li> <li>- Launching the training programme</li> </ul>	MKM / EAS	<ul style="list-style-type: none"> <li>- April 2020</li> <li>- Depending on the concept</li> </ul>	To be specified depending on the concept
2.7. Expanding the existing digitalisation support measures of EAS so that AI topics are added as opportunities to the good practice guidelines of the digital diagnostics measure.	<ul style="list-style-type: none"> <li>- Upgrading the guidelines</li> <li>- Training the diagnostic experts</li> </ul>	EAS / MKM	<ul style="list-style-type: none"> <li>- December 2019</li> <li>- Beginning from January 2020</li> </ul>	--- (done within the existing measures)
2.8. Launching a renewed governmental support measure for the digitalisation of companies, with a budget of 50 million euros in 2019–2021, to boost faster and more vigorous digitalisation (including by use of AI) of selected economic sectors	<ul style="list-style-type: none"> <li>- Implementation of the existing digitalisation support measure</li> <li>- Preparing new funding measures for 2021+ period</li> </ul>	EAS / MKM	<ul style="list-style-type: none"> <li>- Ongoing activity</li> <li>- November 2020</li> </ul>	The total budget of AI projects will depend on applications
2.9. Digitalisation should be supported also in companies in wholesale and retail trade, transport and storage, and construction et al. sectors.	- Preparing new funding measures for 2021+ period	MKM	- November 2020	---

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2.10. Organising an innovation competition: the government could grant up to 10 supports with a budget of approximately 100k euros to explore possibilities for creating AI based on governmental datasets	- Preparing the relevant funding proposal for State Budget Strategy 2021-24	MKM	- March 2020 state budget strategy proposal	Depending on state budget strategy decisions
2.11. Supporting the pilot projects of AI product development with up to 50,000 euros per project. Goal should be to get at least 40 pilot projects. The main objective of the measure is to gain easier access to the funding of AI product development on TRL levels 4–6	- Right now, this is eligible under development voucher and product development grant funding measures (until funding lasts) - Preparing new funding measures for 2021+ period	MKM	- Ongoing activity  - November 2020 new measures ready	The total budget of AI projects will depend on applications
2.12. Supporting the projects of AI-based product development with up to 200,000 euros per project. Goal should be to get at least 20 projects. The main objective of the measure is to gain easier access to the funding of AI product development on TRL levels 5–7.	- Right now, this is eligible under development voucher and product development grant funding measures (until funding lasts) - Preparing new funding measures for 2021+ period	MKM	- Ongoing activity  - November 2020 new measures ready	The total budget of AI projects will depend on applications
<b>3. DEVELOPING AI R&amp;D AND EDUCATION IN ESTONIA</b>				
<i>Existing measures and activities:</i>				
3.1. Funding measure to support ICT-area research, under the IT Academy programme	In 2018-2022, three relevant research groups are funded: AI and machine learning; data science and big data, robot-human cooperation	HTM	Ongoing activity (incl. annual review)	1,5M EUR annually (500k euros per research group)
3.2. Commissioning a specialised Master of Science study programme in field of Data Science, including artificial intelligence	Based on the tender and contract, University of Tartu will train at least 50 Master's students between 2020-2023	MKM	- By September 2020 curriculum should be developed and teaching should start	2020: 233k euros, then 764k euros for the period 2022-2023
<i>Additional activities and measures:</i>				
3.3. Invest significantly in the addition of ICT professionals, including by:	- Preparing the budget proposals for state budget strategy and for	HTM / HITSA	- February 2020 state budget strategy and	Depending on state budget strategy and

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- hiring 8 highly qualified lecturers to cover also the need to teach AI horizontally for students from other disciplines, - increasing specialization and corresponding learning opportunities for AI in Master's level studies (the goal should be to have at least 50 Master's students specializing in AI after two years); - increasing the specialization and corresponding learning opportunities for doctoral students (the goal should be to have at least 20 doctoral students specializing in AI in two years)	funding measures under 2021+ EU Structural Funds programmes - Crafting the 2021+ strategy for IT Academy		2021+ SF funding proposals - January 2020 IT Academy strategy proposal ready	structural funds programme decisions
3.4. Supporting the development of elective courses about AI in postgraduate studies in other than ICT disciplines	Supporting the development and offering of AI courses within the IT Academy development projects' funding measure	HITSA	- September 2019 a new funding round opens - February 2020 a new funding round opens	The total budget of AI projects will depend on applications
3.5. Including the topic of AI in the digital skills curriculum in general education schools, with the aim of giving students an overview of the technologies and capabilities of AI	Upgrade of Progetiger curriculum and study materials	HITSA	No later than December 2020	---
3.6. Guaranteeing the continuation of applied research funding in the period 2019-2022, increasing relevant private sector awareness on the funding opportunities	- Right now, no additional action is necessary until the existing funding runs out - Marketing and information activities to raise companies' awareness, incl by thematic seminars etc	HTM, in collaboration with MKM	Ongoing activity	The total budget of AI projects will depend on applications
3.7. Creating organisational capacity to actively offer companies applied research partnerships, incl by monitoring of technological development and "selling" companies technological development projects, finding suitable funding means for the projects and leading the preparation of	To be solved with the following activity			

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project applications, matchmaking the companies with suitable R&D institutions, supporting in intellectual property matters.				
3.8. Launching a Digital Innovation Hub in artificial intelligence in Estonia in an accelerated way, aka before the opening of EU grants under Digital Europe Programme	- Preparing the concept of Estonian AI digital innovation hub (DIH) - Preparing the relevant funding proposal for State Budget Strategy 2021-24	MKM, in collaboration with HTM	- January 2020 - March 2020	Depending on state budget strategy decisions
3.9. Estonia should actively join EuroHPC projects to make high-performance computing capacity available to R&D institutions and companies.	- Estonia joined in June 2019 the Finnish CSC coordinated LUMI pre-exascale supercomputer consortium, which will grant access until 2025 to Europe's biggest computing resource – through Estonian Scientific Computing Infrastructure (Estonian HPC competence centre)	HTM	Ongoing activity	2021-26: total 2M euros (i.e. 333k euros annually)
<b>4. DEVELOPING LEGAL ENVIRONMENT FOR UPTAKE OF AI</b>				
<i>Additional activities and measures:</i>				
4.1. There is no need for fundamental changes to the basics of the legal system, but there are some changes in different laws to be made.	Preparing the legislation bill for enabling uptake of AI (so-called "kratt-law" package)	JM	June 2020 draft legislation submitted to parliament	--