

## Evaluation report

Evaluated point	Grade	Comments
Scientific impact of research	Good	<p>Tallinn University is the largest humanities and social sciences university in Estonia, and divided into 6 Schools. Natural Sciences is associated with one, the School of Natural Sciences and Health, and a research institute, the Institute of Ecology. The institute of Ecology carries out some high impact research e.g. climate change effects, coastal system ecology, and is supported by grant funding as well as industrial support.</p> <p>The Digital Technologies group has significant grant funding in diverse project areas with educational impact in areas such as digital learning, and data mining, and input into the development of national curricula for schools.</p> <p>Other areas of research with impact are found in chemical, microbiological and physical areas such as isolation of novel bioactive compounds from plants, algae and fungi for use in gels, cosmetics, food and wound-healing applications; molecular analysis of microbial communities and biodiversity in soil to understand changes in response to environmental factors and pollution; mathematical modelling of ecosystem evolution. In any of the discussed areas, researchers are pursuing well-defined research interests. The overall impression is that research activities tend to be shorter-term and smaller in scale. The research groups have a good infrastructure and the built environment is attractive. However groups in some of the covered areas appear to struggle to develop and maintain activity of critical mass. The output of the research is published in known international journals, but only in some cases at the top of the field. The research groups train PhD students but it appears that only few of the groups provide junior research positions to complement the state stipend funding. The consequence is that students take on work that is not related to their research, compromising their focus on doctoral studies.</p>
Sustainability and potential of research	Good	<p>The researchers in natural sciences are mainly grouped in the school of Natural Sciences and Health. They benefit from a very nice building, where it is certainly very pleasant to work. There was a complete restructuring of research two years ago. It is too early to see the consequences of such a change. With this reorganization, the university and the faculty aim to emphasize interdisciplinarity. In its large majority, the academic staff, which the committee has encountered, seemed to agree that more interdisciplinarity is beneficial. While interdisciplinary research certainly has potential, there also needs to be a vision for how the research should evolve, and this is not clearly evident yet.</p>

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		<p>While areas such as Digital Technologies are well set up to develop interdisciplinary activity for instance in human-computer interactions, it is not clear how fundamental disciplines, such as mathematics and physics, will develop in the new structure. It is not clear how their potential for developing new interactions is supported, and their attractiveness among students might suffer in an environment that focuses on interdisciplinarity, which might impact a wider range of projects in the long-term. The University has created larger units, and brought natural science research groups together in a School. However, the research groups fend for themselves without any overarching strategy or support. The ecology research group appears to sustain its activity well through collaborations and contracts of environmental relevance. Research around digital humanities also appears to have growing momentum, amongst others building new capacity in interactive design education. Sustainability of research is almost entirely dependent on the obtaining of research grants and other support. Although laboratories were well-equipped, it was clear some are underused because of the shortage of research personnel or students. Although interdisciplinarity is seen to provide new opportunities for research development, there were few concrete examples and the School contains diverse areas of research which lack obvious areas of interaction. There is a shortage of postdoctoral researchers, reflective of a low number of large research grant programmes, which also influences the supervision and training of graduate students.</p>
Societal importance of research	Very good	<p>Several areas of research are of societal importance. The Institute of Ecology includes research on climate change effects on coastal systems, including coastal erosion, which has clear implications for coastal communities. Aspects of research in the Institute of Ecology contribute to public awareness of ecological and environmental problems and their possible solutions. Research carried out by Digital Technologies contributes to the development of national school curricula. Other research also has potential societal importance in relation to environmental or health issues. Members of this school have been involved in the development and implementation of national strategies in ICT.</p>
Scientific basis in the field is sufficient to conduct doctoral studies. (This question should be answered only if:		<p>Yes, the level is sufficient and leads to good PhD theses. The evaluation committee has seen separately around 10 PhD students and has had a positive impression. Students have good conditions for research, with weekly seminars that they attend, good library and experimental material. Each of them attends at least one conference or summer school per year. They have no difficulty to have these</p>

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<p>a) institution being evaluated is conducting doctoral studies and; b) The field being evaluated is proposed to grant positive evaluation. If these conditions are met then: a) If the level of scientific basis is sufficient for conducting doctoral studies in every structural unit being evaluated, then the answer should be „yes“; b) If the scientific basis is not sufficient in some structural units, then those units should be listed.)</p>		<p>financed. They like what they do. Some are foreign students, and these share the same satisfaction. A negative point is that most of them have to do some other work in order to complement the state funding. They may work in their laboratory, but on other projects. Teaching hours that have been given in another university may not be validated.</p>

## Summary assessment

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<p>Areas of special note as appropriate (Where necessary indicate sub-fields, assessment criteria, and/or structural units which, in the committee's opinion, were of a notably high level.)</p>		<p>Overall, the research in natural sciences is on a good level. Staff are committed and enthusiastic about their research but clearly pressured by the total reliance on obtaining external funding, and uncertainties about future changes to the grant awarding system. Researchers in Natural Sciences organize 1-2 national conferences each year which raise the profile of the institution and the research carried out. PhD students were enthusiastic about their projects, and enjoyed the opportunities to attend conferences, and visit other laboratories.</p>
<p>Areas in need of improvement as appropriate (Where necessary indicate sub-fields of the field being evaluated, assessment criteria, and/or structural units which, in the committee's opinion, revealed significant shortcomings.)</p>		<p>The natural sciences seem somewhat fragmented and in some areas, it lacks critical mass. The University has taken steps to address this with a creation of a School of Natural Sciences and Health. However, at present there seems no cohesion or joined-up thinking. Tallinn University is surrounded by other Institutions that have more strongly established natural science research. The University is promoting interdisciplinarity to distinguish itself but it is not clear how this might take shape in the natural sciences. The committee has not been presented with any clear overall vision for the future of the University's natural science agenda. It was clear, however, that the pressure to obtain grant income, the uncertainties about changes after 2020, and the sustainability of natural sciences research were negatively affecting staff. The university should be careful in recruitments in all areas of natural sciences. The choice of topics is important, even if the recruitment is not carried out with respect to a specific program. Indeed, each research group is small and it is important to choose future colleagues that are able to collaborate significantly. It may be useful to have discussions between the two universities in Tallinn for recruitment in the fundamental disciplines. Research in natural sciences is not sufficiently visible on the web. Researchers should be encouraged to have their own web page and to use the standards of their disciplinary field to inform them. This is of common use in many fields and researchers who do not do this will not be invited as frequently, for instance to be referees. For mathematicians, there is risk to have no connection with the rest of the university, and also to have very weak connections between them, even if their own research is of very good quality. This is a serious issue, particularly when their number in a department is small and cannot lead to the creation of groups of sufficient size in the different sub-domains. This</p>

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		<p>problem has to be seriously addressed for new recruits, and should be encouraged. Indeed, many fields of mathematics are now very much connected with other scientific fields. Moreover, mathematics is recognized as having a positive impact on innovation (see for instance the documentation of the European Mathematical Society). Probability and statistics, Fourier analysis in relation with image and signal processing, numerical analysis and partial differential equations in relation with mathematical modelling, are sub-domains that can be valuable for interactions. Assessment of PhD research by the granting of points (as in all the PhD awarding institutions) and the pressure to publish 3 papers has many obvious defects and this system should be changed. The requirement to have additional work to compensate for the low stipend is a universal complaint which in turn lengthens submission times for PhD theses.</p>
<p>Assessment proposal to the Minister of Education and Research</p>	<p>To grant positive evaluation</p>	<p>The development of research in natural sciences is good, with original applications linked with the specific geographical position of Estonia and its ecology, with the digital society, with medical issues, and several others. It contributes to ensure a good place for Estonia in the international scientific community. After major restructuring, it is expected that the somewhat fragmented parts of natural science will grow together forming a forceful research unit.</p>

## Feedback

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<p>Feedback for institution (This question should be answered only if the institution asked for feedback from the evaluation committee in the self-report (about up to three specific areas of R&amp;D which it finds to be currently important, e.g., related to its development plan).)</p>	<p>Research carried out in natural sciences at the University of Tallinn enters the general framework of its development plan. Interdisciplinarity is very well addressed and perhaps even slightly over-emphasized. It is hoped that activity in fundamental disciplines will ensure the necessary background for future interdisciplinary developments.</p>
<p>Suggestions for unit, institution, state etc. (As appropriate, committee can give additional feedback for the structural unit, the institution, or the State (please specify whom feedback is directed to) according to the directive assessment criteria for regular evaluation (article 7).</p>	<p>Natural Sciences is rather overshadowed by the other 5 Schools in the University and it is unclear whether it receives adequate institutional support within the current structure or represents a coherent and robust research grouping within the present structure. The Focus Areas highlighted in the institutional overview did not include any biology/life sciences, which is of some concern. The institution needs to develop a clear vision and strategy for its natural science position in the country. It is essential that the established new structures will have time to develop. There seems to be a need of postdoctoral researchers. If possible such positions should be created. New appointments should be done with great care to further the integration of natural science and to reduce fragmentation. There should be support and encouragement for research groups and researchers need to establish more visibility on the web.</p>