Eesti Teadusagentuur
Estonian Research Council

ESTONIAN RESEARCH COUNCIL
SCIENCE COMMUNICATION ACTIVITIES

*STEM – Science, Technology, Engineering, Mathematics

** Activities for international audience

Science communication is increasingly important, both in Estonia and worldwide. A scientific worldview gives an opportunity to better navigate in our rapidly changing society.

Science communication has two major target groups: society in general, and the young, who are preparing for their career choices. Based on these two target groups, the goals of science communication are slightly different.

1. It is vital to widely share information to the young about possible career choices in science, technology, engineering and mathematics (STEM). While not every child will become a scientist or an engineer, they should all be able to deal with these fields at their own level. This creates an opportunity for them to develop interests and a greater ability to make conscious choices for further studies.

2. Regarding society, the aim is to improve the general understanding of the activities of researchers and engineers, and the importance of the results about their work in our everyday lives – this involves the activities of researchers in Estonia, as well as what is happening in the wider world.

3. It is important to disseminate the scientific worldview to everyone; to develop an evidence-based mentality and the systematic thinking that is the prerequisite of these two, in order to better cope in our society of information and technology, to make conscious evidence-based decisions and demand the same also from our political decision-makers.

We at the Estonian Research Council are connected with all three goals described above. For this we cooperate and involve a variety of partners and support the science communicators. Our target group based activities are listed in the adjacent figure in the left and you can read more about it in the following pages.

Our activities are financed from the Estonian state budget and from the European Regional Development Fund programmes TeaMe+ and Research in Estonia.

Terje Tuisk
Head of the Department of Science Communication

TeaMe+ activities

TeaMe+ is a programme for popularizing STEM, financed by the European Regional Development Fund, with a total budget of 3.2 million euros for the period of 2015–2020. The objective of TeaMe+ programme is to create a positive social background for studying and working in STEM fields and to influence the interests of young people.

The main activities of the programme for the period of 2015–2020 are as follows:

- Support of extracurricular science education, inquiry based learning and development of STEM-related literacy
- Introduction of career options in STEM fields
- Development of cooperation in STEM fields between schools and companies
- Promoting an open dialogue between researchers and the society
- Introduction of science in the mass media and the development of science journalism

Frida Laigu – winner of the sixth season of "Rocket 69"
PHOTO: ÜLO JOSING

TeaMe+ is funding TV programmes on science such as the "Centre of Excellence of Curiosity" ("Uudishimu tippkeskus") and "Rocket69" ("Rakett69"), the Young Scientists' Festival, science communication conferences, the miks.ee summer school for science communicators, the creation of example curriculums for extracurricular science education and the science stage at the Opinion Festival (Arvamusfestival).

TeaMe+ is a follow-up to the programme TeaMe, which took place from 2009–2015, and led to the public broadcasting of two science programmes – three seasons of the TV programmes At the Top of the "Pyramid" ("Püramiidi tipus") aimed at the general public and five seasons of the adventurous science game show "Rocket69" ("Rakett69") for the youth. The European Broadcasting Union selected the latter programme as the best educational programme of 2012. In addition to this, study materials for eight optional STEM courses were prepared for secondary education schools. A study of science communication activities in Estonia was also prepared within the framework of the programme, and the results of the study were used to plan the activities of TeaMe+.

Additional information: **Margit Meiesaar**
Email margit.meiesaar@etag.ee, tel. +372 730 0339, mobile +372 5564 9214
www.etag.ee/teame

TeaMe+ Euroopa Liit Euroopa Regionaalarengu Fond Eesti tuleviku heaks

Table of contents

Research and Technology Pact

The objective of the Research and Technology Pact is coordinating and enhancing the activities of various parties in ensuring that young people want to learn and later also work in the field of research, technology and engineering. The activities of the Pact are being implemented in cooperation between the state, local governments and industry, education and the third sector.

The objectives of the Research and Technology Pact are the following:

- To raise the general public's awareness of the importance of STEM in the development of the society and economy
- To engage different parties and resources in supporting developments in the area and promoting STEM skills
- To create a full overview of different parties' activities in raising interest in STEM, introducing career opportunities and supporting job-seeking
- To coordinate parties' activities and synergy in order to ensure sustainable development in the domain, which would guarantee the achievement of the objectives of national strategies in both the short- and long-term perspectives.

The cooperation network offers support and new information concerning the planning and implementation of the activities, enables information exchange with other partners of the Pact, the opportunity to participate in the network meetings, and to share best practices and experiences. Every new member is required to draw up an action plan, where the activities for achieving the objectives of the Pact are defined; activities will be implemented based on the member's budgetary possibilities.

The Estonian Research Council coordinates the Pact's network.

Additional information: **Signe Ambre**
Email signe.ambre@etag.ee,
tel. +372 731 7356, mobile +372 5884 8398,
http://www.etag.ee/en/cooperation/research-and-technology-pact/

Involvement of External Partners in Education

School-Industry Cooperation

New technologies and automation have significantly changed the nature of work in recent years. New occupations have been created, and these changes will escalate with the growth of technological development. Different professions deal with databases, systems and Internet environments. The analysis of large datasets, their integration and processing, as well as the capacity for making conclusions, are undoubtedly important skills for the future.

The lack of connection between real life and education has been considered to be a weakness for educational systems across all of Europe –students do not have adequate information to make informed choices regarding their further education after graduating from primary or secondary school, so that it would link their interests and abilities with society's needs.

The Science Communication Department of the Estonian Research Council is developing a strand of considerable importance to both the Estonian and the European context – connecting business knowhow and practices with education. The willingness and motivation of the young people to acquire higher education in the STEM field must already have a solid foundation by primary and secondary school. The involvement of industry helps to associate the material being taught with the real life. This makes theory more easily understandable, helps to popularize STEM and introduces different career choices to the young.

We help schools and enterprises to find each other and plan their activities – by setting concrete goals for the school year that will be reached together. Cooperation may involve giving subject lessons, on the spot visits to enterprises, or together creating a subject course or tasks for students in order to enrich study. It is important that both the enterprise and the school have an interest, managerial support and people who are responsible for the cooperation.

Additional information: **Signe Ambre**
Email signe.ambre@etag.ee,
tel. +372 731 7356, mobile +372 5884 8398

miks?ee

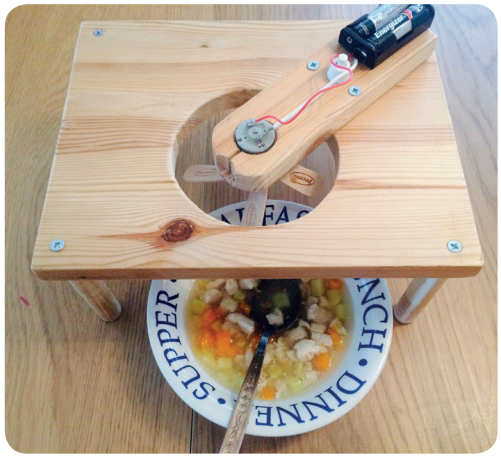
MIKS.EE – PORTAL ABOUT NATURAL SCIENCES, TECHNOLOGY AND ENGINEERING

The aim of miks.ee portal is to increase young people's interest in the STEM fields and related careers. The portal introduces career options to young people, both in industry and the world of science, through inspiring stories about the profession. In addition to career stories, there is also useful information, articles and STEM-related materials for teachers, science communicators and parents. The portal has a section for the activities of partners of the Research and Technology Pact as well as for the cooperation between schools and industry – representatives of local governments and corporate employees will also find examples of best practices there.

Additional information: **Kaili Kaseorg-Cremona**
Email kaili.kaseorg@etag.ee, tel. +372 731 7354,
mobile +372 5805 0869
www.miks.ee

Estonian National Contest for Young Inventors

Inventing is easy! It is important to notice what surrounds us, and to try to improve it.



Aleksander Urbala's invention 'Sass's porridge cooler' that won the first prize in the younger age group in 2016.
PHOTO: HEIKI URBALA

Objective

The aim of the National Contest of Young Inventors is to notice and find solutions to problems that surround them, to encourage children to think about things that do not exist yet, introduce the young to the exciting world of inventions and innovation and to acknowledge young people with outstanding ideas as well as their supervisors and schools.

The competition has been taking place since 2008, and students have submitted more than 6000 thousand ideas, some of which have been implemented and many of which are undoubtedly worthy of immediate implementation.

Participation

Submitted ideas do not have to be complex, but should be novel and provide a solution to a specific problem. The ideas of the older age group must also be realistically feasible.

Entries will be judged in three age groups of upper secondary level: Grades 1-4, Grades 5-9, Grades 10-12 (including vocational students of the relevant age).

DEADLINE FOR SUBMISSION OF CONTEST WORKS IS THE OCTOBER 15.

Prizes

The contest's prize fund is 25 950 euros – best entrants, their supervisors, and the best school will be awarded. In addition to monetary prizes, passes to the international competition are also given: the best will have the opportunity to participate in the world's largest pre-college science fair, Intel ISEF in the United States. The best entrants of the medium level will receive an invitation to the Young Inventors' Winter Camp.

Special prizes are provided by the U.S. Embassy in Estonia, Royal Danish Embassy, the World Intellectual Property Organization WIPO together with the Estonian Patent Office, several ministries, research centres, companies.

From the most fascinated ideas submitted to the contest a poster exhibition "Inventing a Better Life" is created, which can be ordered to and displayed in schools, clubs and youth centres all over Estonia.

Support for Inventing as a method for Problem-based Learning

Young Inventors' Winter School

The best young inventors selected from the national competition for Grades 4–9 are awarded with the invitation to the Young Inventors' Winter School. The aim of the winter school is to allow young inventors to explore together with professional designers, engineers, product developers, entrepreneurs and researchers, how new ideas are born and how they are put into practice, and also to contemplate, which skills are necessary within a team to ensure the success of a product. In the previous science camps, the young inventors have looked for solutions to develop urban spaces, and they have developed exciting tools for facing the challenges in space and on hiking trips. The main supportive subjects for creating new products have been zoology and plant physiology, material science, urban geography, engineering science, and food technology.

Training of teachers supports the young inventors' contest

Inventing process can be used as a method for problem-based learning. The training for teachers provides an overview of inventing as a process through the eyes of designers and engineers – finding a problem, defining the target group, generating an idea to solve the problem, and implementing the idea. The concepts of product development, prototypes, intellectual property and patents are explained and the patent databases are presented. In addition, the history of invention is reviewed. Training includes both theoretical part and practical assignments.

Additional information: **Margit Lehis**
margit.lehis@etag.ee,
tel. +372 730 0335 and +372 520 3270
http://www.etag.ee/en/activities/contests/estonian-national-contest-of-young-inventors/

How does a vacuum sealer work? Winter school participants visiting the micro-dairy of the Estonian University of Life Sciences
PHOTO: MARGIT LEHIS

Estonian National Contest for Young Scientists

Objective

The contest is created to give a competitive output for upper secondary students' research projects, and to motivate and inspire them towards a more scientific approach when carrying out research. Participation in the contest is a good opportunity to challenge oneself, to gain new knowledge and skills, and meet other like-minded students of the same age from Estonia, Europe and all around the world. The contest has been held since 2002 in cooperation with the Ministry of Education and Research.

Kristjan Kongas at the European Union Contest in Brussels in 2016
PHOTO: KAILI KASEORG-CREMONA

Participation

All upper secondary students can participate in the contest. There are no restrictions for the subject area or the project field. The projects must have been completed during studying at primary or secondary school level.

ENTRY DEADLINE OF THE CONTEST IS THE FEBRUARY 20.

Prizes

The participants compete for 11 400 euros in prizes. In addition to monetary prizes and a variety of special awards provided by different ministries, companies and other organisations, the best young scientists get also the opportunity to participate in several international science events, to represent Estonia at the European Union Contest for Young Scientists (for 2017, the European Union Contest is held in Tallinn) and the world's largest international science fair, Intel ISEF, in the United States. International contests often open up new and even more exciting opportunities for the young to enter the world of science. The final round of the contest and award ceremony are the main events of the Young Scientists' Festival.

International success of Estonian young scientists

Margus Niitsoo (Tallinn Secondary School of Science, 2005), Anna Maria Punab (Hugo Treffner Gymnasium, 2012) and Katariina Kisand (Hugo Treffner Gymnasium, 2015) won the main prizes and Liina Saar (Saaremaa Co-educational Gymnasium, 2002), Hillar Liiv (Saaremaa Co-educational Gymnasium, 2007) and Kristina Aare (Narva Humanitarian Gymnasium, 2009) won the special prizes at the European Union Contest. In 2013 all three participating students received special prizes: Martin Talvik (Tallinn Secondary School of Science), Kristiina Resik (Tallinn Secondary School of Science) and Mari Liis Pedak (Tallinn Secondary School of Science). The following years have been successful for special prices too: in 2014 Tatjana Punger (Narva Pähklimäe Gymnasium), in 2015 Katariina Kisand (Hugo Treffner Gymnasium) and in 2016 Kristjan Kongas (Tallinn Secondary School of Science).

In the Unites States, Victor Alari (Gustav Adolf Gymnasium, 2007) and Maria Orb (Jõgeva Co-educational Gymnasium, 2008) received the special award of inventors and innovators. In 2009, Riinu Ots (Hugo Treffner Gymnasium) won second prize in the environment category and also two special awards – participation in the contest for Young Scientists in China and in addition an asteroid was named after her.

Most of the students who participated in the national contest have continued in the same research area through university, and many of them are already researchers with doctoral degrees. Margus Niitsoo, who won the third prize at the European Contest for Young Scientists in 2005, is now member of the jury of the same contest.

Additional information: **Kaili Kaseorg-Cremona**
Email kaili.kaseorg@etag.ee,
tel. +372 731 7354, mobile +372 5805 0869
http://www.etag.ee/en/activities/contests/national-contest-of-young-scientists/

Intel ISEF Youth Science Fair in the United States in 2016. Teacher Tanel Liira and students Rein Leetma and Priit Norak attended
PHOTO: MARGIT LEHIS

Young Scientists' Festival

Young Scientists' Festival in April is a major event with the focus on young people and science.

Young Scientists' Festival includes the final judging round of the National Contest for Young Scientists with poster presentations, the Award Ceremony of the Contest, Elementary School Science Projects and a huge amount of other interesting activities related to young people and science.

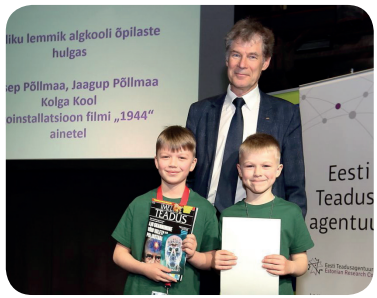
Who is welcome to visit the Young Scientists' Festival?

- Students at upper secondary level and vocational schools, teachers who are involved in research projects at school, class teachers
- Students and supervisors from extracurricular STEM clubs
- Families, friends and acquaintances of students
- Researchers and stuff from universities and other organisations and companies
- Everybody who is interested in STEM-related activities

Why should you come?

- Students who are working on or planning a research project either in primary or secondary school, will get a good overview of the research subjects, contents, methods used, and the possibilities of drawing conclusions and presenting results
- Teachers who supervise research projects get an overview of the methodology used in the submitted contest papers, the choice and level of the projects
- When studying the projects of elementary school students it becomes clear that research activities are possible even from the very first years at school
- For younger students, the intense and interesting festival programme offers contacts with various fields of STEM and enriches their learning with the extra-curricular environment
- It is possible to get acquainted with different activities of science communicators, which target young people to raise their interest to STEM

Additional information: **Margit Lehis**
Email margit.lehis@etag.ee
tel. +372 730 0335, mobile +372 520 3270
http://www.etag.ee/en/activities/science-communication/young-scientists-festival/



Moments from the Young Scientists' Festival in 2016
PHOTOS: MARTIN DREMLJUGA, ERIK PEINAR AND OLEV MIHKELMAA

Young Scientists' Association and Young Scientists' Scholarship

Young Scientists' Association

The aim of the Young Scientists' Association is to help young people find a path to research. In order to do this, we bring together science-driven students and researchers, who are ready to give to young people advice in their field of study and help them to prepare their research project. This is a chance to learn about fascinating field of science under the supervision of active researchers and top professionals. It also provides an opportunity to learn about the career options that are opened up when starting studies in the chosen field.

WE OFFER SUPPORT FOR FINDING A SUPERVISOR FROM THE RESEARCH INSTITUTIONS ALL YEAR ROUND, ALSO OUTSIDE THE SCHOLARSHIP CALL.

Young Scientists' Scholarship

The aim of the Young Scientists' Scholarship is to offer science-driven young people an opportunity to cooperate with researchers. The call is open once a year. Science-minded upper secondary school students from Grades 8–11 are welcome to apply. Students can participate individually or teams of 3. In order to participate in the call, the students have to present the research field that interests them and add the motivation letter. There are no restrictions for choosing the field. The chosen applicants will be appointed a supervisor from a university or research institution.

The scholarship covers the following:

- Transport costs to meet the supervisor
- Material costs necessary for conducting research
- Small salary for supervisor

We have offered scholarships for young scientists since 2011. During this period, over 40 fascinating projects have been completed with the support of the scholarship, starting from drafting a comprehensive manual for using the ray tracing method and photon mapping when creating a computer graphics application up to researching the effects of light and temperature in rooting cherry trees. Students have successfully defended their research projects in school, participated in the Estonian National Contest for Young Scientists and received several awards.

Additional information: **Sirli Taniloo**
Email sirli.taniloo@etag.ee,
tel. +372 731 7347, mobile +372 526 0562

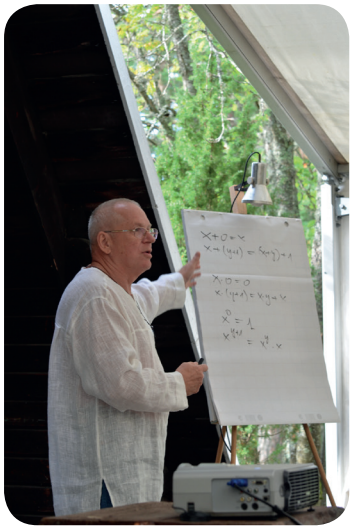
Moods in Viitna in 2015
PHOTO: AAVO KAINE

Summer School of Young Scientists' Association (Viitna Camp)

Each year in August, a fascinating programme brings science-minded upper secondary students from all over Estonia to Viitna. This is the Young Scientists' Association's summer school, where young people have an opportunity during three days to think and discuss on scientific-philosophical topics. The aim of the summer school is to introduce different research areas and to give the young inspiration for the future. Every year, a topic of research is introduced and being opened from the viewpoint of different fields – beauty, death, faith, truth and falsehood, etc.

Students from all over Estonia are welcome to Viitna Camp.

Additional information: **Kaili Kaseorg-Cremona**
Email kaili.kaseorg@etag.ee
Tel. +372 731 7354, mobile +372 5805 0869
http://www.etag.ee/en/activities/science-communication/21476-2/



Peeter Lorents in Viitna in 2016
PHOTO: VAL RAJASAAR

„Rocket69“

„Rocket69“ is an educational scientific entertaining TV contest for young people to show that STEM can be fun and I can do it, while offering excitement, viewing pleasure and new information to the audience. “Rocket69” was awarded by EBU as the best educational TV show in Europe in 2012. The name of the show comes from the fact that on 1969 the first man stepped on the Moon.

Each season consists of 16 episodes. All students starting from age 15 can apply for the show (until university students from 1st or 2nd year of studies). During the casting 15 contestants are chosen and the casting process makes up the 1st episode of the show.

The show

- During 2nd-9th episode contestants in teams solve assignments and in the end 1 contestant drops out after final duel. All assignments demand from contestants' creativity, theoretical scientific knowledge and ability to use their knowledge in practice.
- From the 10th episode the contestants have to compete individually until there is only 2 left.
- In the Grand Finale 2 finalists have to solve complex assignment that will show all their abilities. There is 1 personal winner who wins the 10 000€ scholarship to support his/her studies

The Judging panel consists of following people: host of the show – young scientist and 3 main judges, scientists who appear in most of the episodes. Guest judges who participate in special episodes when either the topic of the assignments or the location of the shooting demand additional expertize.

Production team consists of 2 teams: TV production team and Science Team. Science Editor and its team consist of scientists who design the assignments and materials needed for solving them. Both teams together choose the assignments, to have both the scientific content and the visual attractiveness joined in the action.

All assignments and solutions are explained with voice-over and by graphical illustrations and also commented by judges. In addition the **Science Editor creates online editorials for each assignment** that can be used as science teaching material at school. The show is supported by cross-media approach – radio, newspapers, web, Facebook and other social media channels.

Episodes from the Show. PHOTO „ROCKET69“

The format of the programme has been developed in the framework of the TeaMe programme of the Estonian Research Council with co-financing from the European Social Fund, European Regional Fund and the Estonian state.

See the introduction video online: https://vimeo.com/200244842

Owner of format rights and licence are Estonian Research Council and Vesilind OÜ.

Additional information:
Additional information: **Margit Meiesaar**
Email margit.meiesaar@etag.ee,
tel. +372 730 0339, mobile +372 5564 9214 and
Riho Västrik,
riho.vastrik@vesilind.ee

Estonian National Contest for University Students

Objective

The aim of the contest is to promote research among university students, and to acknowledge students who have achieved outstanding results. The National Contest for University Students has been held in Estonia since 1991. The contest is organised in cooperation with the Ministry of Education and Research and the Estonian Academy of Sciences. Nearly 5000 research papers have been submitted to the contest since 2005 as the Estonian Research Council has been running the contest.

Participation

The contest is open to all university students studying in Estonia (including international students who have completed their research paper during their studies at an Estonian University) and students with Estonian citizenship studying abroad. The research paper that is submitted to the contest must be completed during the calendar year of the competition or during the calendar year preceding this.

Papers can be submitted on three levels:

1. Research papers of students from applied higher education or undergraduate (Bachelor) studies
2. Research papers of students from graduate (Master) studies
3. Research papers of students from postgraduate (Doctoral) studies

And in four areas:

1. Bio- and environmental sciences
2. Social sciences and culture
3. Health studies
4. Natural sciences and technology.

ENTRY DEADLINE FOR THE CONTEST IS THE SEPTEMBER 15.

Prizes

The contests' prize fund is 67 477 euros. In total participants compete for 59 awards: two main prizes irrespective of the field or level, and awards for the best of each area and level. In addition special prizes by the President of the Estonian Academy of Sciences are awarded.

Additional information: **Sirli Taniloo**
Email sirli.taniloo@etag.ee
Tel. 372 731 7347, mobile 372 526 0562
http://www.etag.ee/en/activities/contests/the-national-student-research-competition/

Heili Einasto, who won the third prize in the 2016 contest, and her supervisor professor Kristel Pappel.
PHOTO: ERIK PEINAR

National Contest for Educational Research

Objective

The aim of the long-established (running from 1990) Contest for Educational Research is to value research in the field of educational sciences, encourage publication of results, acknowledge educational researchers and bring the research results closer to teachers and other practitioners.

Participation

The contest accepts entries in the following categories:

- Research papers published in Estonian (submitted biennially)
- Research papers published in a foreign language (submitted biennially)
- Published/approved doctoral theses (Heino Liimets Award) (submitted biennially)
- Master's theses
- Popular science papers (submitted biennially)
- Didactic-methodological papers and textbooks (general, vocational and higher education textbooks, complemented by methodological guidance materials and teacher books);

ENTRY DEADLINE OF THE CONTEST IS THE 1ST OF MARCH

Prizes

The contest's prize fund for the recognition of best authors is 8100 euros.

Conference on Educational Sciences

The contest results are announced at the spring Conference on Educational Sciences, where the topics of education and school life are discussed by teachers, heads of schools, university students, educational researchers and education officials. So far, the results of the evaluation of the educational sciences, eminence of educational sciences in the society, school management, and contact points between the traditional and innovative in education have been discussed at the conferences. The conference, held alternately in the Tartu and Tallinn Universities, and the National Contest for Educational Research, are organized by the Estonian Research Council together with the Estonian Academic Association of Pedagogy.

Award recipients of the National Contest for Educational Research acknowledged in the framework of the Conference on Educational Sciences
PHOTO: PIRET EHRENPREIS

Reviews of studies in social and educational sciences

The field of social and educational sciences has produced a great number of significant studies of practical output in Estonia, which can be considered and applied in many areas of life. It is important to promptly present the research results and reach users, in order that the science-based society could develop and function. This is why we have gathered the reviews of research on social and educational research on our website, where they are accessible for all interested parties. The collection can be found at: www.etag.ee/kasvatusuuringud.

Additional information: **Sirli Taniloo**
sirli.taniloo@etag.ee, tel. +372 731 7347, mobile +372 526 0562
http://www.etag.ee/en/activities/contests/national-contest-of-educational-research/

Extracurricular Science Education

Extracurricular science education refers to extracurricular education in the field of STEM that includes non-formal educational activities in all forms, i.e. long-term, systematic, supervised, and based on free will, with the purpose of generating interest in a certain field or gaining in-depth knowledge and skills in the chosen sphere of interest.

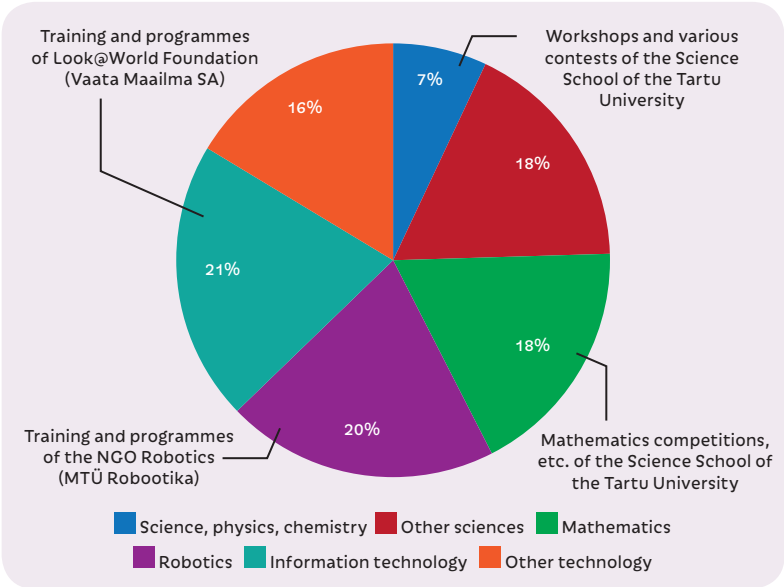
Why is it important to support the development of extracurricular science education?

Diversification of extracurricular education is one of the state's priorities. To reveal the current situation, the Estonian Research Council carried out the mapping of extracurricular activities in schools in 2015. In 2016, the Ministry of Education and Research conducted a study on providers of extracurricular education and activities and youth workers in local governments, and one of the inputs of which was the mapping we did.

We outlined two important aspects:

1. Need for increasing the percentage of extracurricular STEM education

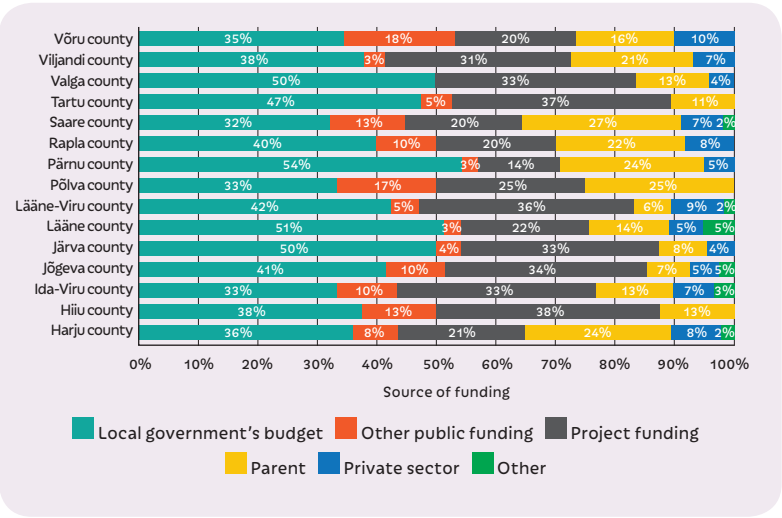
In 2015, 6.4% of the curriculums of extracurricular schools were related to science and technology (or the STEM subjects). Only 3% of the students of extracurricular schools, study according to these curriculums. However, there are more STEM extracurricular clubs (or extracurricular science clubs) in general education schools than in extracurricular schools; 15% of all the extracurricular clubs are extracurricular science clubs. Robotics clubs are especially popular in schools, thanks to several types of external grants. The following graph illustrates the sectorial distribution within sciences and technology and extracurricular activities that support these areas.



Extracurricular science and technology clubs in schools in 2015 and supporting activities

2. Funding sources for extracurricular education

The three main sources of funding extracurricular education are local government budgets, project funding, or participation fees paid by parents. Organizations that offer extracurricular activities are generally funded from local governments – in the range of 32–54%, while project-based funding is in the range of 14–38% and the rest comes from other sources. As can be seen from the graph, this varies greatly from county to county, but the share of project-based funding is very high and it is difficult to build sustainable activities on this. Therefore, the role of local governments in ensuring the diversity of extracurricular activities is very important.



Distribution of extracurricular education funding. (Source: study of TÜ RAKE 'Providers of extracurricular education and activities and youth workers in local governments')

The Research Council supports the development of extracurricular science education in several ways:

1. We support the development of curriculums for both new and experienced supervisors to increase the share of extracurricular STEM activities.
2. There are significantly fewer extracurricular STEM activities than activities on other extracurricular areas, primarily due to the shortage of supervisors and teachers. We organize a variety of training courses and cooperate with teachers of extracurricular STEM clubs in the development of training programmes in order to involve new players in the field.
3. To develop the pedagogy and quality of extracurricular STEM education, target group-based methodological materials are created that help the supervisors and teachers to diversify activities, promoting their students' skills, knowledge and attitudes.
4. We cooperate with the Association of Estonian Extracurricular STEM Education, which aims to consolidate and develop natural and legal persons, who offer extracurricular STEM education and activities in Estonia, and to represent and defend their interests. More detailed information (in Estonian) concerning membership and activities can be found at: www.teadushuvi.ee
5. We have issued a book "Developing extracurricular STEM education. Learning from experience" in cooperation with our Finnish partners. This covers the topics from organization and pedagogy of extracurricular science education, and also contains the thoughts and experiences of individuals from the field of extracurricular STEM education in Estonia and Finland. The book is intended for both, those who are still planning to provide inspiring educating extracurricular activities for children, as well those who are already actively involved. The preparation of the book was part of the Finnish-Estonian cooperation project 'The Development of Principles of Quality Extracurricular Education on the Basis of Finnish and Estonian Extracurricular Education Systems'. The online version (in Estonian) of the book is available at www.etag.ee/teadusharidus.

Additional information: **Katrin Saart**
Email katrin.saart@etag.ee
Tel. +372 730 0378, mobile +372 5695 5985
www.etag.ee/teadusharidus

Networking Activities for Science Communicators

Extracurricular schools and clubs and research institutions have an important role in science communication; therefore, we contribute to the networking between all science communicators and organize various events and training sessions.

Exchange of Information

- The portal miks.ee helps science communicators gain more visibility by providing them with an event calendar. In addition, articles and announcements of various events and activities are collected and displayed
- In the miks.ee monthly newsletter articles (in Estonian) on the best practices are issued; this is distributed in the network, as well as in schools. Several newsletter articles have also been issued in the public press over the years. The miks.ee newsletter can be subscribed to at: www.miks.ee/uudiskiri/
- A Facebook group has been created for science communicators. The group can be found at: www.facebook.com/groups/teadpop

The miks.ee Science Day in Tartu Kaubamaja
PHOTO: VIORICA BORDEI

Conferences of Science Communication

The objective of the Science Communication Conference is to bring together different interest groups in the field of science promotion and communication. Each year the conference is focused on one clearly defined problem – e.g. the relationship between the researchers and media, the development of extracurricular science education, factors in influencing young people's career choices in the STEM fields, reflection of science in society, etc.

Events

- Summer schools in August offer informal meeting places for science communicators, providing an exciting programme with discussions and workshops. At summer school, science communicators learn from each other's experiences and discuss topics of common interest, such as extracurricular science education, different possibilities and forms for cooperation, and much, much more.
- The miks.ee Science Days are traditionally organized twice a year: on the 1st of June and in September during the Researchers' Night's Festival Week in several major shopping centres. Science Days will be conducted with the help of science communicators from universities, museums, and research centres, as well as with the help of students. Each time, hundreds of school and kindergarten children take part in the exciting day's programme.

The miks.ee Science Day in Tartu Kaubamaja
PHOTO: MAANUS KULLAMAA

Additional information: **Kaili Kaseorg-Cremona**
Email kaili.kaseorg@etag.ee, tel. +372 731 7354, mobile +372 5805 0869,
http://www.etag.ee/en/activities/science-communication/networking-activities-for-science-communicators/

Open Call for Science Communication Projects

Objective

The aim of the Open Call for Science Communication Projects is to help to bring science closer to the general public, communicate science, research achievements and the achievements of researchers, as well as raise interest in science and the profession of a researcher and engineer. Among other aspects, we also support activities which are designed to generate interest in STEM among younger school students, to promote the use of Estonian language in research, and introduce interdisciplinary fields of research.

Participation

The call is open to any natural or legal person who communicates science in Estonia. More detailed information on the conditions and evaluation criteria is published on the website of the Estonian Research Council.

Applications can be submitted in the four following categories:

- Organization of events, science days, competitions and conferences aimed at students and general public
- Compilation of audio-visual educational materials
- Organization of exhibitions and purchasing small-scale exhibits
- Conduction of other science communication activities

THE APPLICATION DEADLINE IS ANNUALLY IN THE FIRST QUARTER

We publish relevant information on an on-going basis at
www.etag.ee/teadpop/projektikonkurss

Budget of the contest

The budget of the contest is variable, approximately 200 000€ in total yearly

Traveling Bioclass funded from the open call, and other science communicators at the miks.ee Science Day in Tartu Kaubamaja

PHOTO: VIORICA BORDEI

Additional information

In previous years, educational institutions, research centres, NGOs, among many others, have benefited from the grant. For example, in 2016, the digitization of the magazine Horisont, language technological training videos of the Estonian Language Institute, competition Science Battle (Teaduslahing) and the First Lego League programme in the kindergartens were funded. Programmes such as Travelling Bioclass (Rändav bioklass) and Cool Geography Lesson (Lahe geograafiatund) have reached schools to introduce their area. Science days and conferences are also being organized. Several museums have improved their exhibits and conducted educational programmes in the framework of the project contest.

Information on the projects that have received support can be found on the Estonian Research Councils' webpage at www.etag.ee/teadpop/rahastatudprojektid (information in Estonian)

Additional information: **Katrin Saart**
Email katrin.saart@etag.ee, tel. +372 730 0378, mobile +372 5695 5985,
http://www.etag.ee/en/activities/contests/open-call-for-science-communication-projects/

Estonian Science Communication Award

Objective

The aim of the Estonian Science Communication Award is to acknowledge and draw attention to individuals who promote science in Estonia, as well as boost the activities that introduce science and technology to the general public.

Participation

The contest is annually invited to apply by:

- Active researchers or research groups
- Representatives of printed publications
- Representatives of audio-visual media and electronic media channels
- Users of innovative methods
- Individuals or collectives

ENTRY DEADLINE: SEPTEMBER 15.

Prizes

The contest's prize fund is 21 500 euros. The prize is awarded in cooperation with the Estonian Academy of Sciences. The award is funded by the Ministry of Education and Research. All the awarded/recognized entrants of the contest have the right to use the logo 'Nationally recognized Science Communicator'.

The prizes are awarded in six categories:

- Lifetime achievement award for long-term systematic communication of science and technology (named after Tiiu Sild – a great science communicator and founder of AHHAA Science Centre)
- Science and technology communication via audio-visual and electronic media
- Science and technology communication via printed media
- Activities/series of activities communicating science and technology
- Best researcher, journalist or teacher communicating science and technology
- Best new science and technology communication initiative

Additional information: **Katrin Saart**
katrin.saart@etag.ee, tel. +372 730 0378, mobile +372 5695 5985
http://www.etag.ee/en/activities/science-communication/estonian-science-communication-award/

Science writer and journalist Tiit Kändler received the Lifetime Achievement Award of Science Communication in 2016
PHOTO: SANDER HIIRE

Peeter Lorents – the best science communicator 2016
PHOTO: SANDER HIIRE

Trainings and study materials

Number of materials to support STEM teachers and teaching:

- Teaching materials for eight elective courses and four core courses of STEM for secondary schools. The materials are available for free as e-learning courses in the Moodle environment of the Information Technology Education Foundation at education portal www.e-koolikott.ee, section Õppevara (Study resources) of www.koolielu.ee, and links can be found at www.etag.ee/valikkursused/. Additional information: Katrin Saart, katrin.saart@etag.ee
- Materials related to extracurricular science education, the book 'Developing extracurricular science education. Learning from experience' and training materials for extracurricular science education can be found at www.etag.ee/teadusharidus/
- Career stories aimed at school students and articles and videos related to writing research papers at web portal miks.ee
- TV programmes "At the Top of the Pyramid" and "Rocket69" that can be used as extra studymaterials at primary and secondary schools. You can find the programme "At the Top of the Pyramid" at www.veebiakadeemia, while "Rocket69" programmes and web broadcasts together with the science editor's extra comments can be found at www.rakett69.ee
- Media handbook for researchers, which is helpful in every possible type of situation when communicating with media: kasiraamat.err.ee/
- Web lecture on supervising inventing as creative work 'Design as practical creativity, what it is and how it is implemented in the school programme'
- Handbook 'Let's invent together' that helps to supervise inventing process and has been drawn up on the basis of presentations held at teacher training sessions
- Poster exhibitions of works from the National Contest for Young Inventors. The exhibition can be ordered for, among others, schools, clubs and youth centres. Inspiring and encouraging examples for starting your own invention can be found from the exhibition

Links to the three latter materials can be found at
www.etag.ee/leiutajatejuhendamine

- **Webinars that support the preparation process of research projects**

In the framework of the Scientix project, two web lectures by educational technology professor Margus Pedaste were completed. The duration of the lectures is around 60 minutes and they can be found at www.etag.ee/scientix

Webinar 1: Formulation of the problem, research question and hypothesis in quantitative, qualitative, and combined research. The main differences between qualitative and quantitative research are introduced. Which of the two methods should be implemented and when to use combined research is discussed. Moreover, the concepts of problem, research question and hypothesis, their definitions, and opportunities of quality assessment are discussed.

Webinar 2: Research designs implemented in school. The basics of ethnographic research, surveys, experiment, case study and action research are introduced. Which methods are suitable in school, and what are their stages and threats in implementation is discussed.

Additional information: **Katrin Saart**
Email katrin.saart@etag.ee, tel. +372 730 0378, mobile +372 5695 5985
www.etag.ee/scientix

Trainings

Supervising inventing as creative project

The National Contest for Young Inventors is supported by training sessions for teachers, which introduce invention as a process, the possibilities for its integration into school lessons, and its application in the curriculum as compulsory creative or practical project. Invention in the classroom enables excellent usage of problem-based learning elements.

Teachers of all subjects in general education and vocational schools and group leaders are welcome to the training.

The main subject of the training is to supervise invention as creative project as a process. The aim is to increase the level of supervisors for young inventors (creative works) and to provide both theoretical and practical knowledge in invention and everything associated with it – design and creativity, engineering and development, patenting, etc.¬ The National Contest for Young Inventors is introduced and recommendations to participation are given.

Additional information: **Margit Lehis**
Email margit.lehis@etag.ee, tel. +372 730 0335, mobile +372 520 3270,

Supervision of research papers and its organization in schools

All the students at secondary level are obliged to conduct a research paper in order to graduate; this is a great opportunity for students to delve into areas of interest to them in order to understand whether this is something that could be of future interest in their further studies and career choices.

Conducting of research papers is organized by schools' own discretion but many problems in schools are similar and there the Estonian Research Council offers support to schools focussing in its activities on the research coordinators in schools. The research coordinators are responsible for the organization of research process in their schools, they develop guidance materials, gather research topics as well as concluded research papers, they consult, support and train teachers in their school in supervising students and help them to organize cooperation between themselves and the students.¬ We help the coordinators by creating a network for them, we conduct meetings to identify their training needs and, where necessary, organize networking seminars.

Additional information: **Sirli Taniloo**
Email sirli.taniloo@etag.ee, tel. +372 731 7347, mobile +372 526 0562

Training regarding the extracurricular STEM education

In order to support the supervisors of extracurricular science clubs, we organize training sessions where it is possible to perform different practical works under experienced supervisors and listen to their experiences.

There has been a training session, where the works of extracurricular science groups in classes 1–3 were introduced: testing of different human senses was shown, and a hand model and wind flag were constructed. From the subjects for the extracurricular science clubs, 4–6 class chemical tests were performed, such as electrolysis applications, chlorate flash and 'Black Snake'.

The second training session concerned conducting science weeks and camps for the first and second school level students on the subjects of geography and biology, chemistry, space technology and physics. Together, practical tasks were solved and action processes were discussed.

Training materials are available at www.etag.ee/ at the science education and the portal e-koolikott (e-school bag).

Training information is shared on our website as well as via the miks.ee newsletter.

Additional information: **Katrin Saart**
Email katrin.saart@etag.ee, tel. +372 730 0378, mobile +372 5695 5985

International Cooperation

International marketing of Estonian research

The Research Council carries out international marketing activities through the Research in Estonia (RİE) brand in the framework of Mobilitas Plus programme which is supported by the European Regional Development Fund. Marketing activities are based on the 'Estonian Research International Marketing Strategy 2016–2022'. According to the vision of the strategy, by 2022 Estonia will be internationally known as a strong research country which is open to innovation.

Objectives of Research in Estonia:

1. Estonia has a global reputation of an attractive research country that is supported by successful and constant cooperation between initiatives and organisations that aim to introduce Estonia;
2. Information on Estonian research is up-to-date and available for interested foreign parties;
3. The awareness has increased for international businesses which operate in the smart specialisation growth areas when it comes to Estonian RDI achievements and success stories of cooperation between enterprises and researchers

The activities of Research in Estonia target researchers coming from abroad, international journalists, R&D administrators, foreign delegates and public, with the most important regions being Estonia's neighbouring countries and Europe.

Research in Estonia at the international EuroScience Open Forum in 2016 in Manchester introducing Estonian research
PHOTO: RESEARCH IN ESTONIA

We implement different marketing activities to reach our target group:

- We communicate information about Estonian research to our international audience on our website www.researchinestonia.eu and social media pages:
  - Facebook: www.facebook.com/www.researchinestonia.eu and
  - Twitter: twitter.com/researchestonia
- We introduce Estonian research at international fairs
- We organize Estonian R&D visits to international journalists
- We introduce Estonian research institutions to international students and other target groups
- We compile and make available informational materials that introduce Estonian research
- We contribute to presenting research-related success stories in media channels

Activities of Research in Estonia are planned and conducted in cooperation with representatives of universities, research institutions, ministries and other partners. Research in Estonia is being funded from the European Regional Development Fund.

Additional information: **Liis Livin, Reimo Rehkli**
Email research@estonia.eu
www.researchinestonia.eu

EU STEM COALITION
Science Technology Engineering Mathematics

REPRESENTATION OF ESTONIA AT THE EU STEM COALITION NETWORK

The main goal of the EU STEM Coalition is to raise awareness among governments, industry and education providers, at national and European level, about the crucial role of STEM education in our society. Its long term vision is to bridge the skills gap by having a STEM strategy in place in all EU member states. The Coalition strives to support the establishment of STEM strategies based on the 'triple helix approach', closely involving government, education and industry.

To reach this goal the Coalition has set three main objectives: 1) Strengthen existing national STEM Platforms. 2) Support the development and implementation of national STEM platforms in countries that do not have a platform in place yet. 3) Anchor the STEM platforms into European and national policy frameworks

For Estonia membership in such a network is important, because this offers an opportunity to learn the experiences of other countries in the field of the development of STEM, while many of our activities are, in the context of Europe, an innovative and valuable learning experience for other members of the network.

Additional information: **Signe Ambre**
Email signe.ambre@etag.ee tel. +372 731 7356, mobile +372 5884 8398
www.stemcoalition.eu

Estonian Research Council

The Estonian Research Council is a foundation under the Ministry of Education and Research. It was founded for the public benefit to support the implementation of the national science policy and serve as a visible partner to researchers, research establishments, entrepreneurs and the state.

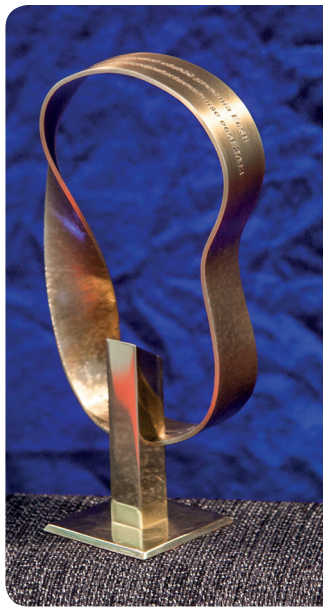
- We support researchers by offering financing opportunities for different research needs
- We represent Estonia in different international organizations, coordinate participation in partnership programmes and support international cooperation by means of counselling and funding
- We analyse science information and the impact of funding decisions, evaluate¬ the efficiency and impact of research grant usage, and the public access to science information
- We offer support to users of the Estonian Research Information System (ETIS) that contains information on research and development institutions, researchers, research projects and different research results
- We use the European Structural Funds to make Estonian Science more international, support researcher mobility, conduct research for solving social and socio-economic problems and encourage applied research in the fields of smart specialization
- We provide assistance in implementing activities that help to increase young people's interest in science, technology, engineering and mathematics.¬ We offer support and motivation for science communicators, teachers, schools and university students, and raise the general public's awareness of science and its importance to society. In collaboration with a number of our partners, we organize the National Contest for Young Inventors, the National Contest for Young Scientists, the National Research Contest for University Students, and the National Contest for Educational Research, and give out the Estonian Science Communication Award. The Young Scientists Association helps the young to find support for their interest in science and find themselves a supervisor amongst researchers (Young Scientists Scholarship) who can give them guidance on their chosen path. Many of our activities are concentrated and visible at the Young Scientists Festival held in spring.

The young science enthusiasts studying a water flea. PHOTO: VIORICA BORDEI

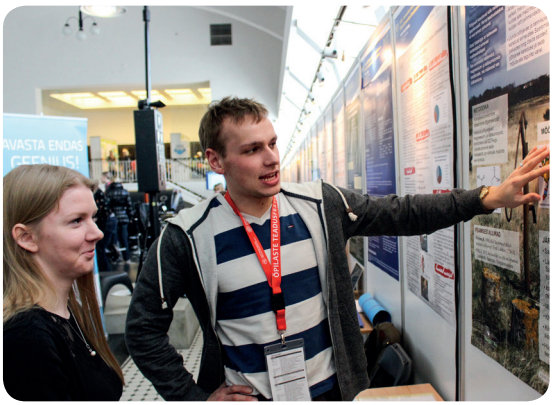
Presenting Estonian science at ESOF. PHOTO: RESEARCH IN ESTONIA

Science Communication Conference in 2016.
PHOTO: SANDER HIIRE

Best young inventors and their supervisors in 2016.
PHOTO: AAVO KAINE



When receiving the Lifetime Achievement Award for Science Communication, named after Tiiu Sild, the winner also receives sculptor Stanislav Netchvolodov's brass table sculpture, Möbius Strip.
PHOTO: TERJE LEPP.



Student Science Festival participant presenting his research. PHOTO: TERJE LEPP

Science Communication Department staff together with conference moderator Kristjan Korjus in 2014. PHOTO: TERJE LEPP

Science Communication Department of Estonian Research Council

Contacts and additional information:

teadpop@etag.ee
www.etag.ee/teadpop
www.miks.ee
www.researchinestonia.eu
newsletter www.miks.ee/uudiskiri (in Estonian)

Facebook pages and groups

- Science communicators (teaduse populariseerijad / in Estonian)
- Miks (for students / in Estonian)
- Research and Technology Pact (teadus- ja tehnoloogiapakt / in Estonian)
- Research in Estonia
- Young Scientists' Association (õpilaste teaduslik ühing / in Estonian)
- Estonian Research Council (Eesti Teadusagentuur / in Estonian)

The main cooperation partners promoting science:

- Ministry of Education and Research (also the main financial contributor)
- Estonian Academy of Sciences
- Estonian Academic Association of Pedagogy
- Estonian Public Broadcasting
- Research centres
- Universities and research institutions

Eesti Teadusagentuur
Estonian Research Council

ESTONIAN Research and Technology PACT

research estonia

ÕTÜ

miks?ee