

Impact of VTT 2017

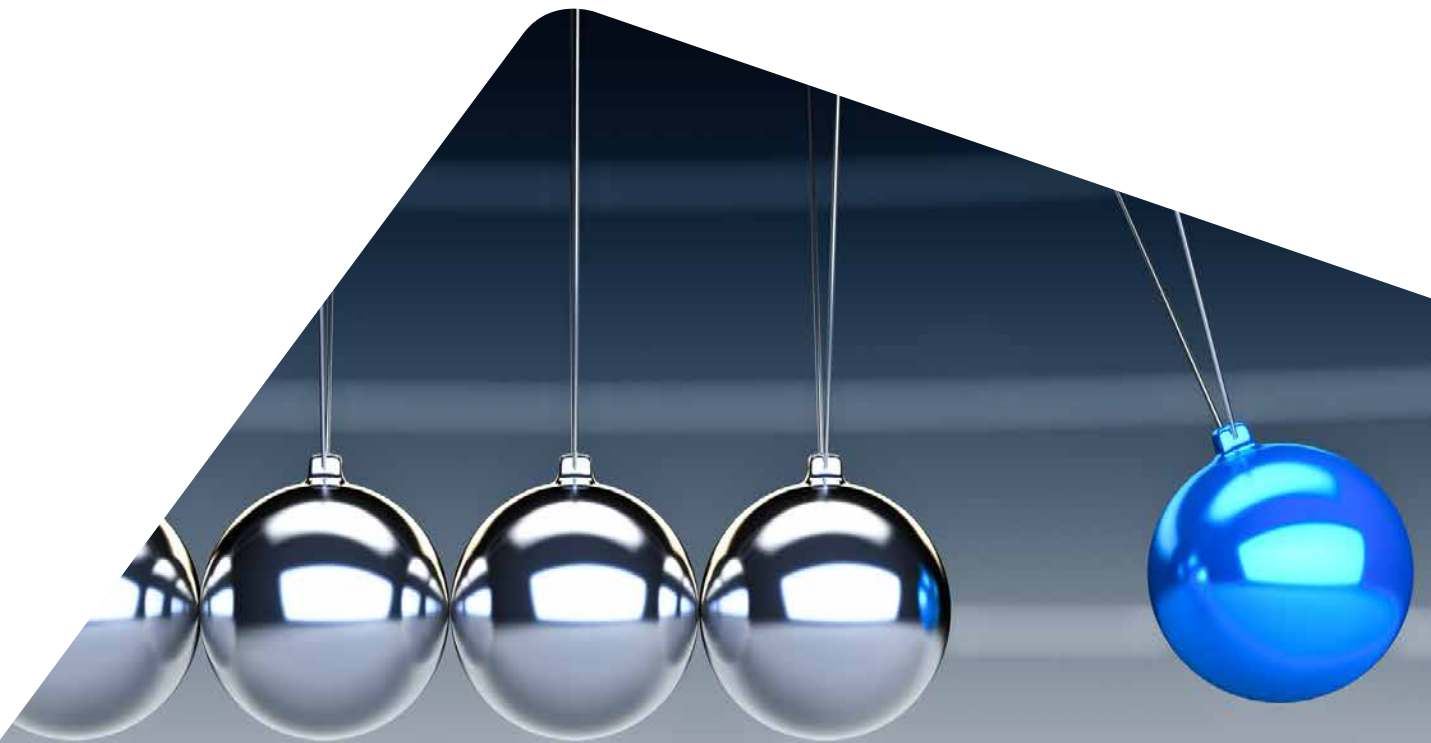


Table of contents

Impact evaluation	3
VTT creates growth	4
IPR protection and commercialisation	5
Publications	6
Research environments	8
Domestic and international cooperation	9
Examples of research results 2017	13

Impact evaluation

The impact of research has a key position in VTT's new strategy. As part of the implementation of the strategy in 2017, VTT developed its organisational evaluation culture and created an evaluation model corresponding to the strategy. The evaluation model includes new key performance indicators (KPI), whose purpose is to make VTT's impact and excellence visible at the level of the whole organisation.

According to the evaluation model, VTT's impact can be boiled down to four dimensions: benefit to society, benefit to customers, excellence of operations and balanced finances. Each target dimension is represented by three indicator baskets in the model. Figure 1 presents VTT's new evaluation model in a concise fashion.

According to the evaluation model, the key objective guiding our operations is social impact. To this end, we will create conditions for the sustainable growth of society and the renewal of Finland's industries by developing new products, services and technologies in cooperation with our partners. These products, services and technologies will support the creation of new markets and renewal of Finland's industries and secure social well-being and sustainable development.

Long-term social impact is built on customer impact. To ensure this, we help our customers succeed and grow by developing their competencies, contributing to the achievement of their targets and assisting them with international networking. We also make active efforts to create new customer relationships and partnership networks.

The impact generated by VTT in society and for its customers is based on the excellence of our operations. We are an agile, pioneering organisation that promotes innovation through high-quality scientific and applied research. These goals are supported through continuous learning and development of VTT's organisation and through excellent leadership.

The excellence and impact of operations require VTT's finances to be in balance. In this regard, our objective is to ensure long-term financial equilibrium by managing our turnover, productivity and order books, along with the efficient use of resources.

One KPI has been selected to represent each indicator basket, giving 12 KPIs for the entire organisation. The improvement of our impact requires the organisation-wide implementation of management and learning practices that support the evaluation model. Different indicators are given different weightings in different parts of the organisation. In other words, the targets for each part of the organisation are set in line with VTT-level targets. The KPIs used at each level of operations will be specified over the course of 2018.



VTT creates growth

Share of survey respondents who felt that this benefit was generated in their VTT project:

88%

reported that their **knowledge base and expertise improved**

69%

believed that a VTT project **contributed positively towards the opening up of new business opportunities**

68%

told that the project **contributed positively to identifying new opportunities**

66%

told that their VTT project **speeded up or otherwise improved research and development work**

58%

reported that their **competitiveness improved**

51%

thought that their VTT project **promoted international networking**

45%

said that the VTT project **promoted their marketing**

40%

confirmed that **a new or improved process was created**

26%

reported that **a whole new technology was adopted**

14%

reported that **a new business concept or a new earnings model was created**

Source: VTT customer survey 2017, Feelback Group (international customers)

IPR protection and commercialisation

IPR commercialisation progressed well in 2017. We received EUR 3.0 million in IPR revenue from the licensing and sales of intellectual property rights and software. IPR income broke the previous record for the fourth year running and grew by 8% from 2016 (EUR 2.8 million).

As in the previous year, the most significant licence income was obtained from process simulation software, health technology and optics and spectroscopy. Approximately 46% of IPR revenue was obtained from software licensing (2016: 47%).

In 2017, we received 237 invention disclosures (2016: 229). A total of 45 priority patent applications were filed in 2017 (2016: 52), of which 41 were filed with the Finnish Patent and Registration Office.

At the end of 2017, VTT held 364 inventions protected by patents or patent applications (2016: 365). The total number of patents and patent applications was over 1,300.

The total value of VTT's IPR investments was EUR 1.7 million (2016: EUR 1.9 million).



Patent families*

364

Patents or patent applications

1,324

751 patents granted,
573 pending patent applications**

Received invention disclosures

237

45 priority patent
applications*

IPR investments*

1.7 M€

IPR revenue*

3 M€

*Parent company



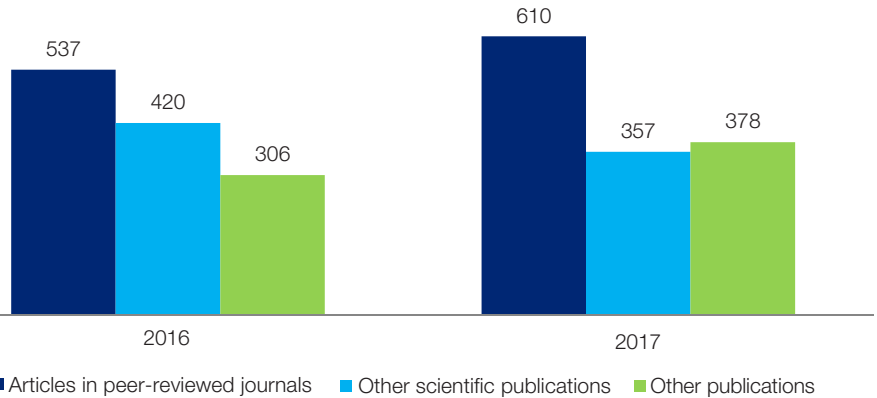
Food economy 4.0

VTT's vision of an era of smart consumer-centric food production

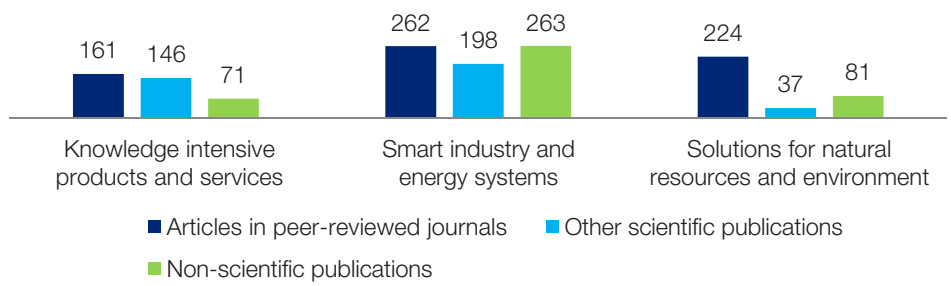
Publications

VTT employees publish research results in foreign and domestic science journals, in professional periodicals and publication series, as books, conference presentations or patents, and in the VTT publication series.

Publications 2016 - 2017*



Publications by business areas 2017*



* Parent company

Publications*

1,345

International scientific articles*

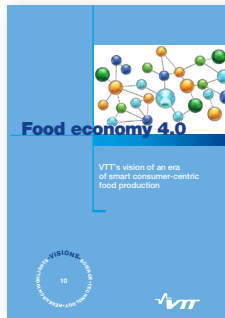
610

61

in VTT's own publication series*

*Parent company

Examples of publications in VTT series 2017



Food economy 4.0

VTT's vision of an era of smart consumer-centric food production

Kaisa Poutanen, Emilia Nordlund, Jaakko Paasi, Kaisa Vehmas & Maria Åkerman

VTT Visions 10



Barents 2050 – Impacts, opportunities, and risks of climate change and climate change mitigation

Tommi Ekholm, Tomi J. Lindroos, Laura Sokka, Kati Koponen & Tiina Koljonen

VTT Technology 316



Quality in open data based digital service ecosystem

Dissertation
Anne Immonen

VTT Science 159



Towards a new era in manufacturing

Final report of VTT's For Industry spearhead programme

Jaakko Paasi (Ed.)

VTT Technology 288



Model of circular business ecosystem for textiles

Paula Fontell & Pirjo Heikkilä

VTT Technology 313



Actigraphy in evaluation and follow up of physical functioning of older adults

Dissertation
Juho Merilähti

VTT Science 167



Opportunities of big data analytics in supply market intelligence to reinforce supply management

Salla Paajanen & Anna Aminoff

VTT Technology 308



FinnFusion Yearbook 2016

Markus Airila (Ed.)

VTT Science 157



Flexible pigment-cellulose nanofibril composites for printed electronics applications

Dissertation
Katriina Torvinen

VTT Science 162

All publications: www.vttresearch.com/publications

R&D infrastructure

VTT's unique R&D infrastructure enables the development chain from basic research and process development up to prototyping and pilot manufacturing. Our research facilities are an essential part of the Finnish research infrastructure.

Examples of our R&D infrastructure



Bioruukki

The largest bioeconomy pilot and research facility in the Nordic countries.



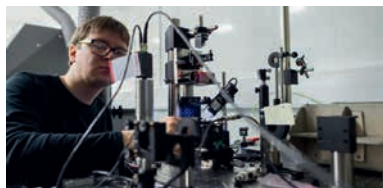
Biotechnology and food research piloting environment

offers unique facilities for the development and customisation of bio and food industry technologies.



Micronova

World-class cleanroom facility, fully equipped for the fabrication of silicon, glass and thin film-based microsystems.



VTT MIKES Metrology

is the National Metrology Institute of Finland and performs high-level metrological research and develops measuring applications in partnership with industry.



Engine and vehicle laboratory

enables research on passenger cars as well as heavy-duty vehicles up to 60 metric tons to develop energy efficiency, emissions reduction and use of 2nd generation biofuels.



PrintoCent

World's first pilot factory for printed intelligence industrialisation.



ROViR

Remote Operations and Virtual Reality Centre for the development of remote operations and virtual reality technology in industry.



A pilot-scale research environment for fibre processes

enables the development of novel products and supports the renewal of the pulp and paper industry.



Centre for Nuclear Safety

for nuclear technology safety research.

Domestic and international cooperation

VTT engages in research cooperation with three main objectives: to increase innovation-driven investment in Finland, reshape industrial and commercial business activities and create value added and jobs in Finland. Domestic and international cooperation gives VTT a prospect to promote solutions to grand challenges of the society. Availability of publicly funded research and innovation programmes is indispensable for VTT to be able to collaborate effectively with industry, academia and other key stakeholders in innovation ecosystems. From VTT's perspective, ideal operational environment can be achieved by alignment of innovation policies at national and EU level.



Domestic cooperation

When collaborating with various stakeholders in Finland (companies, universities, research institutes, funding agencies, associations, ministries, municipalities and regional governments) VTT is contributing to open dialogue and formation of joint vision in the society. VTT welcomes the national foresight activities taking place in Finland, aiming at shared understanding, not only at national level but also in the global context.

VTT in the Academy of Finland's Centres of Excellence	VTT's national development platforms
<ul style="list-style-type: none">• CoE in Atomic Layer Deposition (ALD) (2012 - 2017)• CoE in Low Temperature Quantum Phenomena and Devices (2012 - 2017)• CoE in Molecular Engineering of Biosynthetic Hybrid Materials (2014 - 2019)• CoE in Quantum Technology (2018 - 2025)	<ul style="list-style-type: none">• Bioruukki – Research and pilot environment for the bioeconomy• SMACC – Smart Machines and Manufacturing Competence Centre• PrintoCent – Innovation centre for printed electronics• 5G test network• Micronova – Cleanroom for silicon-based micro systems• MIKES – National metrological institute• VTT Centre for Nuclear Safety

VTT is part of the Team Finland Network providing businesses with a smooth service for internationalisation. In addition to project collaboration with industry and academia, VTT also participates in the Finnish Centres of Excellence funded by Academy of Finland. VTT works in close collaboration with industry and highlights the renewal of industrial value chains and sustainable competitiveness in Finland and Europe. To achieve these objectives, VTT is making a major contribution to the development activities of regional innovation ecosystems and networking between local centres of expertise. VTT's national partnerships include joint research and technology infrastructures, extensively networked at European level, such as Bioruukki, SMACC, Printo-Cent, 5G Test Network Finland, Micronova, MIKES and VTT Centre for Nuclear Safety.

European cooperation

VTT is linked well to innovation initiatives at EU level. EU's Research and Innovation Programme Horizon 2020 (2013-2020) is important for implementation of the EU 2020 Strategy, addressing employment, research and innovation, climate action, energy, education and prevention of poverty. VTT's EU activities also mean that Finnish companies and other stakeholders get access to European networks and industrial value chains. Broad networks, positive visibility and constructive contribution in EU projects can have a significant springboard when taking forward Finnish innovation. EU project funding is highly competitive and VTT needs to understand the big picture: active follow-up of EU research and innovation policy, proactive participation in new collaboration and partnership structures and continuous long-term collaboration with various stakeholders. VTT's EU project portfolio contains numerous programmes and funding instruments, calling for profound competence in funding rules and legal arrangements.

VTT's key European research alliances	VTT in PPP initiatives (H2020 programme)
<ul style="list-style-type: none"> • EARTO - Eurooppalaisten tutkimusorganisaatioiden edunvalvontajärjestö • EERA - Eurooppalainen energiatutkimusallianssi • EIT Digital - Euroopan teknologia- ja innovaatioinstituutti • EIT Raw Materials - Euroopan teknologia- ja innovaatioinstituutti • EIT4Food - Euroopan teknologia- ja innovaatioinstituutti • NUGENIA - Eurooppalaisen ydinvoimateollisuuden ja tutkimuslaitosten tutkimusyhteisö 	<p>Contractual PPPs</p> <ul style="list-style-type: none"> • Photonics • 5G • Big Data • Cyber Security • Robotics • FoF (Factory of the Future) • SPIRE (Sustainable Process Industry and Resource Efficiency) • EeB (Energy Efficient Building) <p>Joint Technology Initiatives/Joint Undertakings</p> <ul style="list-style-type: none"> • Electronic Components and Systems ECSEL • Biobased Industries BBI • Fuel Cells and Hydrogen FCH

VTT is active in several initiatives, such as ETPs (European Technology Platforms), and PPPs (Public Private Partnerships). VTT is also involved in three Knowledge and Innovation Communities (KICs) of the European Institute of Innovation and Technology (EIT Digital, EIT RawMaterials, EIT4Food) as well as in EERA, European Energy Research Alliance which is the crucial research network for implementing EU Member States' SET-Plan (Strategic Energy Technology Plan).

EU project collaborations are carried out by consortia, i.e. projects have several partners from several member States. VTT is known for excellent support services for project management. In spite of extreme competition, VTT has maintained its position as a major player

in Europe and Finland's largest recipient of EU research funding 17% of all H2020 funding to Finland is received by VTT (Commission statistics 10/2017). 25% of H2020 funding to Finland in collaborative projects is received by VTT. In FP7, VTT share was 22,5% of all FP7 funding to Finland.

Over the past years VTT has actively contributed to assessments and priority-setting processes for European research and innovation policies and programmes. This has been on the grounds of the national mandate of VTT and VTT's long-term capability to act in various research networks and innovation communities. Participation in EARTO (European Association of Research and Technology Organisations) has given VTT a strong

position in policy dialogue with European Institutions, examining issues in a broad, innovation policy context across traditional administrative boundaries.

H2020 has links with regional and industrial policies and related programmes (smart specialisation strategies, investment programme, defence research programme). Understanding multitude of policy sectors as well as legal/financial framework are sine qua non in this complex environment. Especially in view of the next MFF and Framework Programme, VTT is carefully following the development. Preconditions for VTT to stay competitive in the EU funding landscape are challenged with national resources decreasing for applied research. It is important that there are no cuts in the FP9 budget and that relative share for mono-beneficiary funding would not grow at the expense of collaborative funding. VTT's participation in EU research an innovation collaboration is founded on solid ecosystem approach, fostering continuous interaction between research communities and companies. From VTT's perspective, ideal operational environment can be achieved by alignment of innovation policies at national and EU level. In future, public programmes should be planned in such a way that SMEs benefitting from those programmes have a smooth access to the competences hosted by research and technology organisations.

VTT in the world

In a globalised world, developing solid knowledge base requires world-class players and broad-minded collaboration across disciplines. We believe that a brighter future is created through science-based innovations, and responsible research and innovation. VTT's public mandate and broad technology portfolio have created the basis for participation in international cooperation and our broad networks means our partners get access to the best knowledge worldwide.

Through the Team Finland network VTT also engages in information exchange with diplomatic and foreign services, takes part in official government and trade missions, and gives expert support to the work of Intergovernmental Panel on Climate Change IPCC, inter alia.

VTT's EU-level networks and research partnerships in Finland have given VTT a strong position. While VTT's international public research activities mostly involve European cooperation, VTT is partner in projects sponsored by the EU in third countries. There is continuous dialogue between VTT and research organisations in third countries and VTT carries out contract work for customers in selected global innovation environments.



IMPACT



Examples of research results 2017



Climate action – Clean energy for the future

Close to 200 countries have committed to the Paris climate agreement aiming to keep global warming below 2 °C. Rapid transformation of all the sectors that are emitting greenhouse gases is needed. Finland has also set ambitious targets to increase the use of renewable energy to over 50% of the final energy consumption by 2030.

Billions of mechanical devices, buildings, vehicles and industrial processes need to be changed, retrofitted or renovated to improve energy efficiency and to decrease emissions. The emergence of integrated consumers and producers, called prosumers, will recreate energy markets.

Innovations for producing low-carbon energy from versatile sources are required more urgently than ever.

VTT fosters novel technologies and digitalisation as opportunities to support a systemic energy transformation.

#ClimateActionVTT





The climate change plan points the way to a sustainable, low-carbon society

The impact evaluation of the medium-term climate change policy plan (KAISU) required by the Climate Change Act reviewed the impact of the climate change policy on Finland's greenhouse gas emissions, energy system, economy, environment and health. KAISU clarifies and complements the actions for reducing greenhouse gas emissions in the non-ETS or effort sharing sector, specified in the Energy and Climate Strategy published in 2016.

Based on the impact evaluations in KAISU, the greatest potential for reducing greenhouse gas emissions lies in the transport sector but, on the other hand, the reduction of transport emissions and the ensuing costs and environmental impact also involves the greatest uncertainties. Additional emission reductions can be achieved in particular by reduc-

ing the use of mineral oils for heating buildings and in machinery fuel. Even though the emissions-reduction actions involve costs, the evaluation of economic impact shows that the measures specified in KAISU will only have a negligible impact on the growth of Finland's GNP.

The Sustainable Energy and Climate Policy and the Role of Renewables in Finland (KEIJU) research project analysed energy and climate policy from a broad perspective, particularly from the impact perspective. The project produced a comprehensive report of Finland's opportunities to cost-efficiently and consistently meet the energy and climate targets set for 2030 by the Government Programme, Climate Change Act and European Union.

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Making Helsinki a pioneer in intelligent energy solutions

Globally, cities produce 70% of greenhouse gas emissions. Together with its residents and companies, Helsinki is taking significant steps to make the city carbon neutral. The objective is supported by the mySMARTLife project, which involves testing an emission-free, electronic robot bus and encouraging the housing companies in Merihaka to renovate in an energy-efficient manner.

The mySMARTLife project is part of the EU's Horizon 2020 programme for testing new solutions to curb climate change in cities. The pilots implemented within the scope of the project will achieve energy savings of 10–20% and expedite the market launch of the best solutions. The solutions tested in Helsinki can be used in other cities in Finland and abroad.

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Small SMR reactors are suitable for district heat generation

VTT has studied the suitability of small modular nuclear reactors for industrial processes and district heat generation. The small modular reactor (SMR) was modelled as part of the projected district heating network of a model Finnish city in the 2030s. According to the results, the modelled reactor type could be included in the production mix of the district heating network. The ROI period was estimated at 10–20 years, depending on the realisation of costs.

In Finland, nuclear power is only used for electricity generation, but other countries use it for applications such as district heating, desalination of sea water and the generation of industrial process heat. The vapour produced by high-temperature SMR concepts could be used for applications such as the production of nitrogen. Several types of modular reactors that are significantly smaller than traditional nuclear power plants are currently under development around the world. The estimated benefits of the new small modular reactors include shorter construction times, standardised plant types and suitability for smaller systems and industrial integrations.

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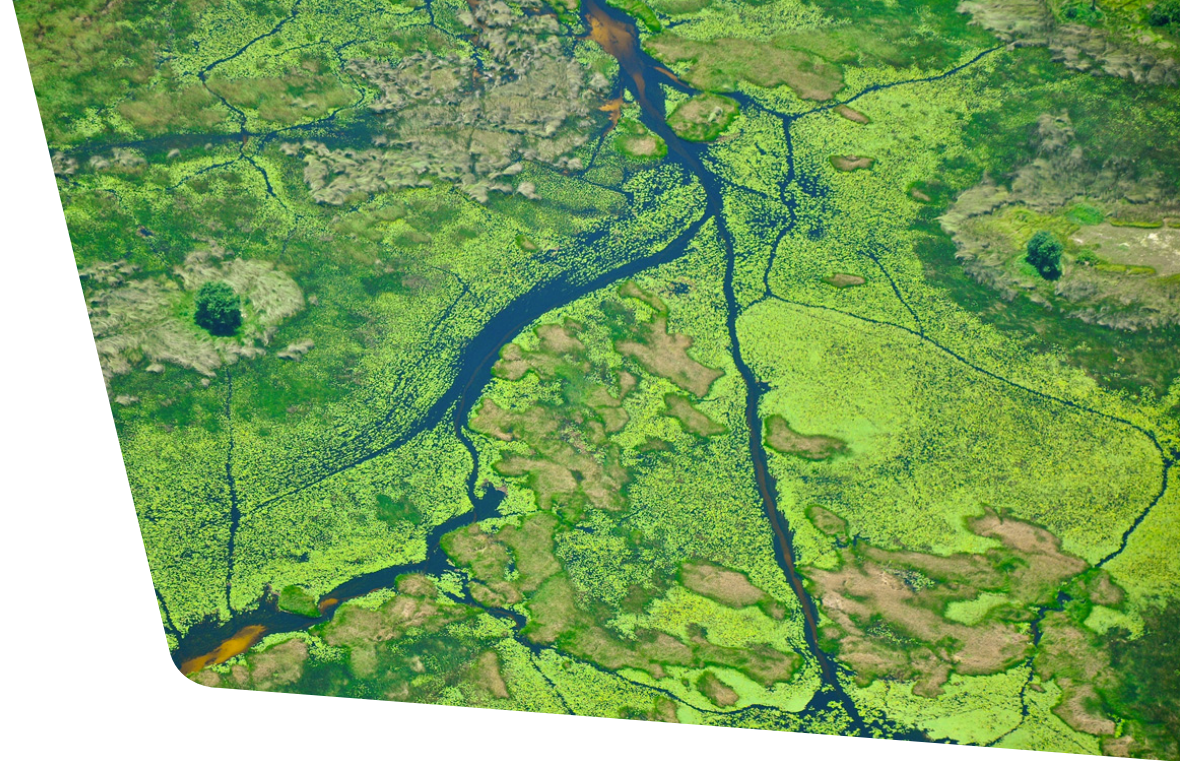
Resource sufficiency – Prosperity from resource wisdom

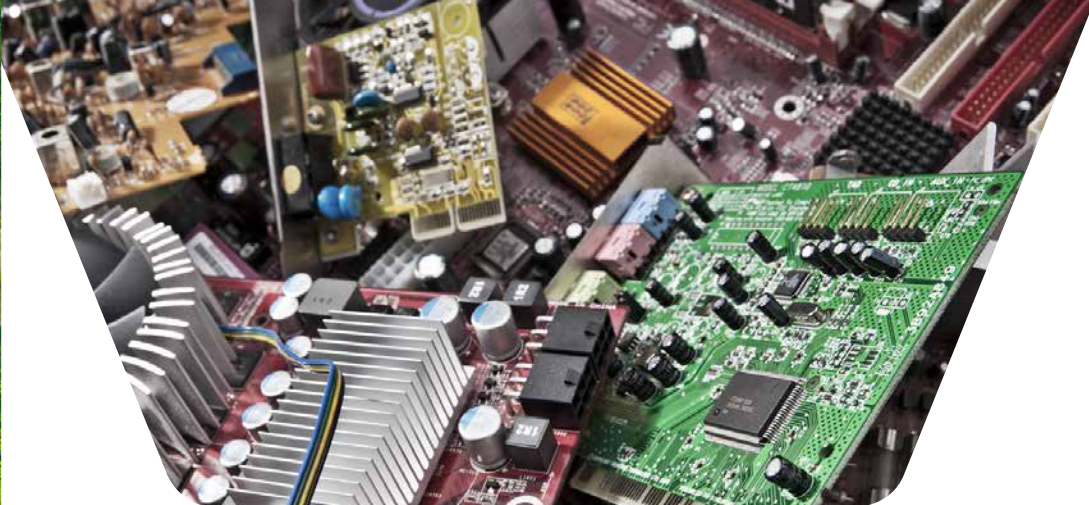
Social changes, urbanisation, increasing wealth and consumerism have led to a rapid exploitation of natural resources in excess of the capacity of the earth.

VTT recognises the need for sustainable, resource-efficient solutions, such as renewable raw materials and a circular economy. The challenges can be solved by resource wisdom. Tapping into unutilised reserves and closing the loops will open new economic potential.

Industries will benefit from renewable and unconventional raw materials, such as forest biomass CO₂. Design will enable the high performance of consumables produced according to demand. Non-conventionally produced food will help feed the growing population while conserving water and the environment.

#ResourceSufficiencyVTT





Integrated technologies to recover metal and plastic from electronic waste

VTT has developed a new electronic waste recycling concept that combines a range of technologies and reduces waste. One of the technologies included in the concept is gasification, which is used to recover not only metals and rare-earth elements from the waste but also organic components that can be used to produce energy or products, such as plastic and chemicals. VTT has brought together a group of Finnish partners to promote material-efficient production.

Vast amounts of valuable raw materials are lost through recycling and processing; As much as half of all materials can end up in landfill. Products are becoming increasingly complex, which is why traditional mechanical recycling processes are no longer enough.

Traditional recycling focuses on recovering base metals and precious metals, such as gold, leaving other valuable resources, and especially hydrocarbon-containing organic matter, unutilised.

VTT has developed a recycling concept based on integrated technologies, which can be used to increase the efficiency of material recovery and reduce the use of virgin minerals and fossil resources. In addition to the mechanical sorting of waste, the range of techniques includes gasification, which is a thermal conversion process for separating not only metals but also organic materials that can then be used to produce energy or products, such as plastic and chemicals.

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Protein produced with electricity to alleviate world hunger

A batch of single-cell protein has been produced by using electricity and carbon dioxide in a joint study by the Lappeenranta University of Technology (LUT) and VTT. Protein produced in this way can be further developed for use as food and animal feed. The method releases food production from restrictions related to the environment. The protein can be produced anywhere renewable energy, such as solar energy, is available.

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Valuable products from carbon dioxide

The utilisation of carbon dioxide could be a major driver for economic growth in Europe. A total of 43 leading industrial and research organisations have joined the CO2 Value Europe association, established on 30 November 2017, to accelerate the conversion of carbon dioxide into valuable products. VTT is one of the founding members of the association.

The mission of the CO2 Value Europe association is to develop and market sustainable industrial solutions for converting carbon dioxide into valuable products, thus decreasing carbon dioxide emissions and expanding the raw materials base.

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Fabric made from VTT's recycled fibre feels half way between cotton and viscose

The method developed at VTT involves dissolving worn and discarded cotton and using it as a raw material for new fibre. The first product models demonstrate that recycled fibre can be transformed into a yarn and pleasant fabric. Based on a carbamate dissolution process, the technology has been used to produce the first batch of recycled fibre in a pilot facility. The fabric made from the recycled fibre met the researcher's expectations: it is smooth with a subdued matt finish and drapes nicely.

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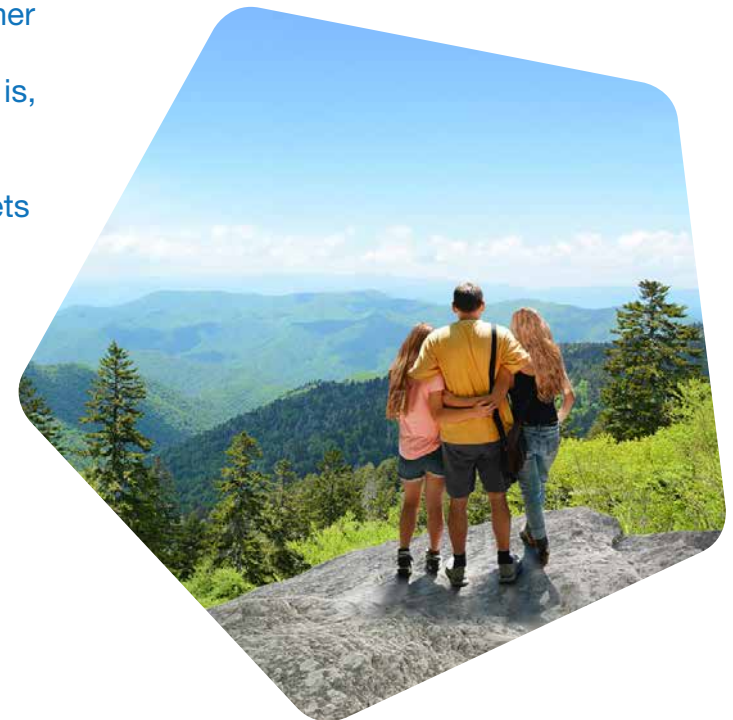
Good life – Improved quality of life, work, health and well-being

Everyday life is being affected by major global changes. Growing health care costs together with aging populations require a paradigm shift for the prevention of non-communicable diseases and a new kind of participatory health care system. The disruption of work, that is, robotisation outside of factories is making many current jobs obsolete.

The overload of the human-technology relationship, manifesting itself clearly in the gadgets we use in our work and free time, is increasing stress when it should make life easier. Urbanisation and strained infrastructures create pressures on the design of our living environment.

Finland has the ability to answer these challenges thanks to its well-educated population, high level of trust in society and large number of growth-oriented companies. VTT develops new technology, service concepts and business models for the benefit of the individual in the society of the future.

#GoodLifeVTT





Finnish mobile device for detecting arrhythmia soon available for consumers

The VTT spin-off, VitalSignum, is making a small mobile device – which detects arrhythmia by measuring the patient's ECG – available to consumers.

The device has been tested, with good results, on heart patients for three years at the University Hospital of Turku and now also within the Hospital District of Helsinki and Uusimaa. Top athletes suffering from heart problems and many other private individuals have also tested the innovation.

Effortlessly portable

This highly portable device precisely measures the patient's ECG and heart rate variability (HRV). Medical device approval will be sought next, after which the device will be suitable for preoperative and postoperative monitoring of cardiac patients at home, since the data is automatically transferred from a cell phone to nursing staff via a cloud service.

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Artificial intelligence reveals cardiac patients' risk of complications

Artificial intelligence can detect the risks posed to cardiac patients and prevent complications caused by heart disease at an early stage. The application improves patient safety, while creating savings in growing healthcare expenditure.

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New measuring improves indoor air quality while cutting energy cost by up to 50%

A healthy, comfortable and productivity-enhancing indoor climate can only be created by making sure ventilation accurately responds to the needs of the people occupying the space. Current ventilation systems, based simply on estimated average occupancy, are not capable of adapting to changes in the use of indoor spaces. For example, the air in a conference room or a classroom quickly becomes stale if more than the predetermined number of people are present – or the ventilation may work at full speed even if the room is empty, wasting energy and money.

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VTT's roadmap guides Finland into the ranks of AI winners – this is how our country will thrive

Now is the time to take stock of the situation and determine the areas in which Finland is strong and Finnish companies and society have the best opportunities for utilising the AI revolution. We must also prepare for social effects at the workplace and in the distribution of income. In its report, VTT presents a selection of proposed measures for guiding our land safely through the digital revolution and lifting us into the ranks of the winners.

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Safety and security – Resiliency in turbulent world

In our turbulent world, unexpected complex and cascading failures can lead to catastrophic effects. The trends behind opportunities are increasing the exposure of societies to natural and man-made threats. Ensuring the safety and security of people, government, companies and infrastructures in all conditions has strong implications on technological development, business continuity and resilience models. The safety and security of the society of tomorrow demands means and tools to detect, prevent and recover from incidents.

VTT envisages and develops technologies and systemic models for comprehensive safety and security. All systems should be flexible and self-adaptive with inherent safety and security features. Designing, developing and testing complex systems enables the secure use of the full potential of innovations in the digital society.

Solutions that counter threats enable trouble-free lives and business.

#SafetySecurityVTT





Photo:
Domenico
Tedone, Thales-
Alenia Space,
Italy

Augmented reality increases maintenance reliability at a space station

VTT participates in the development of new AR tools for the European Space Agency (ESA). An international project led by VTT developed a new augmented reality (AR) tool for the ESA. In the future, it is envisaged that astronauts will be able to use this tool to perform maintenance tasks and real-time equipment monitoring in the demanding conditions of space. The first practical tests carried out at ESA's European Astronaut Centre produced excellent results.

The two-year EdcAR project (Engineering data in cross platform AR) led by VTT developed a solution to the challenges involved in maintenance and the provision of work instructions, which have been an issue for more than a decade. Since maintenance and other work tasks in space are critical, they must be carried out without errors and at the right time. Preparing for these requires in-depth practising, which involves coordinating the activities of various experts. Since astronauts' time is extremely valuable, their tasks and maintenance instructions must be unambiguous.

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Finland's first 5G development environment opens to businesses

Finland's first 5G test network 5GTN expands in Oulu. 5G development environment of VTT, the University of Oulu and the Centria Polytechnic will be used especially for vertical business use. There is already a large number of Finnish companies with whom 5G technology has been developed and will be tested in several application areas.

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VTT's autonomous cars take to public roads and start communicating with each other

Marilyn, the first automated car to be granted a road traffic testing permit in Finland, and its spouse Martti have taken things to a new level together and started exchanging information with each other and their driving environment. The automated cars developed by VTT can hear, see and sense, and Finnish intelligence hums in their brains. They are able to follow a pre-programmed route and avoid collisions with sudden obstacles without input from the driver. The cars currently require the lane markings or sides of the road to be visible. This is, however, only the first step; by 2020, the cars will be driving in more demanding conditions on roads covered in gravel and snow.

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Block chain technology for ensuring the reliability of welfare applications and services

In a Government research and study programme, VTT studied the benefits of block chain technology in improving the efficiency of social and health care services. VTT proposed the promotion of a welfare ecosystem based on block chains with a concrete pilot project. In the project, reliability and welfare funds would create the foundation for placing anticipatory health care and welfare maintenance at the centre of the social and health care service system.

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LIGHTHOUSES

Industrial renewal – Innovations empowering industry

Renewing the design, manufacturing and service businesses will create new opportunities for industries in high-cost economies. The economic growth and employment of Finland are highly dependent on the success of the export industry. It is essential for Finland's industrial sector to be one of the leading players in implementing future digital solutions and business models.

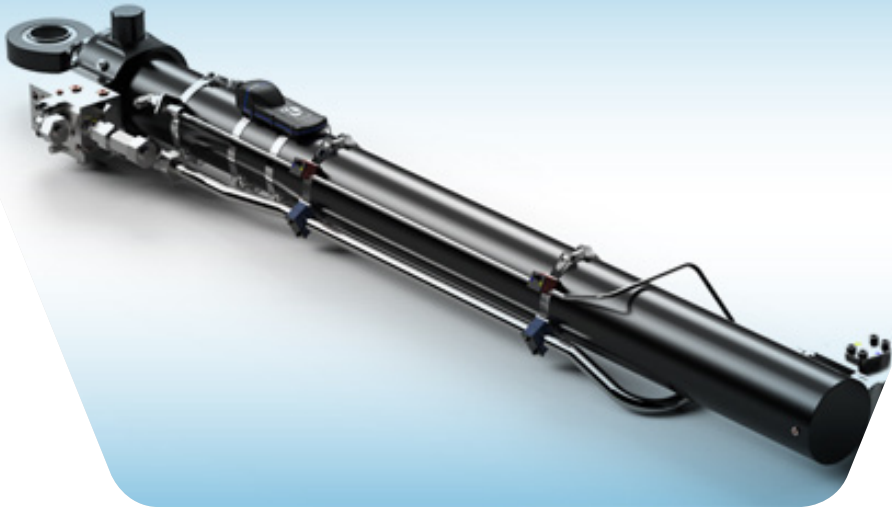
Tomorrow's smart products and services are created in new industrial ecosystems supported by a globally connected platform economy. Opportunities will emerge from collaboration, service subscriptions and use of data. The growing share of services and novel business models based on big data strengthens the competitive advantage of Finnish industries.

Robotisation, flexible automation and artificial intelligence offer opportunities for enhanced production. Smart specialisation and digitalisation supports the competitiveness of production industries. A high dependence on resources (energy, materials, water) can be overcome by applying solutions of the circular economy.

Finland, with its high innovation capabilities and skilled work force, is ready to be a frontrunner in next-generation manufacturing and service businesses.

#IndustrialRenewalVTT





Competitiveness from digitalisation: VTT and Hydroline to develop new service business from hydraulic cylinders

VTT and Hydroline Oy have joined forces to develop networked, intelligent next-generation hydraulic cylinders. The project enables a transition from a product-centric business model to a new service-based business model to boost competitiveness.

Digitalisation is propelling product development in the manufacturing industry forward at speed. This allows new product and service concepts to be developed faster and more and more profitably.

Finland's leading hydraulic cylinder manufacturer Hydroline and VTT have joined forces to turn the company's products into services. Hydraulic cylinders are used extensively in heavy machinery and industrial applications thanks to their excellent power density, reliability and user-friendliness.

The aim of the new four-year Tekes-funded project launched in the spring is to build a digital platform for the company to use in life-cycle management and in-service maintenance. Digitalisation enables new business development and shifting the focus from products to selling services.

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Digitalisation will revolutionise the textile industry: individual clothes quickly and on demand

In the near future, digitalisation will usher in significant changes in the textile, clothing and fashion industries thanks to innovations such as 3D modelling, intelligent clothing, robotics and product customisation. VTT is studying the solutions offered by new digital technologies, which will significantly accelerate the rotation speed of product ranges, shorten product development times, decrease production costs and promote sustainable choices.

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Modular drop-in fuel technology to boost bio-share of oil refineries

EU-funded project COMSYN aims to develop a production concept for competitive bio-based fuels by means of a compact gasification and synthesis process. The target reduction of the biofuel production cost is up to 35% compared to alternative routes, which translates to less than 0.80 €/l production cost for diesel. The production concept is based on the distributed primary conversion of various kind of biomass residues to intermediate liquid products at small-to-medium scale (10-50 kt/a Fischer-Tropsch products, 30–150 MW biomass) units located close to biomass resources. The Fischer-Tropsch products will be upgraded to fuels in existing central oil refineries, also bringing the benefits of economy of scale for the overall process.

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In the future, products are manufactured decentralized – towards a digital factory

VTT, Tampere University of Technology (TUT) and Tampere University of Applied Sciences (TAMK) set up a demonstration of a digital factory. In this demo, different robots located in various facilities of the organisations involved are monitored and controlled remotely from one place.

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