SANTAKOS SLĖNIS

ASSOCIATION

FOR SCIENCE STUDIES BUSINESS

TABLE OF CONTENTS

SANTAKOS SLĖNIS

SANTAKA VALLEY ASSOCIATION: A SPACE FOR CONNECTIONS

A non-profit, research, experimental development and innovation-oriented company

Unites the leaders in science, technology, studies and business in the Kaunas region

Integrates member ideas and activities born in the science and business valley Santaka in Kaunas

Santaka Valley (Santakos slėnis) is an integrated centre of studies, business and innovation and one of the largest centres of this type in Lithuania, which concentrates on advanced scientific potential and equipment based on modern technologies that open up opportunities for conducting research and developing new products necessary for business.

The Association brings together initiatives carried out by:

- Kaunas University of Technology
- Lithuanian University of Health Sciences
- Vytautas Magnus University
- Lithuanian Energy Institute
- Hospital of Lithuanian University of Health Sciences Kauno klinikos
- Kaunas Science and Technology Park
- Concern Achema Group

WHAT IS THE REASON BEHIND OUR WORK?

Objectives of the Santaka Valley Association:

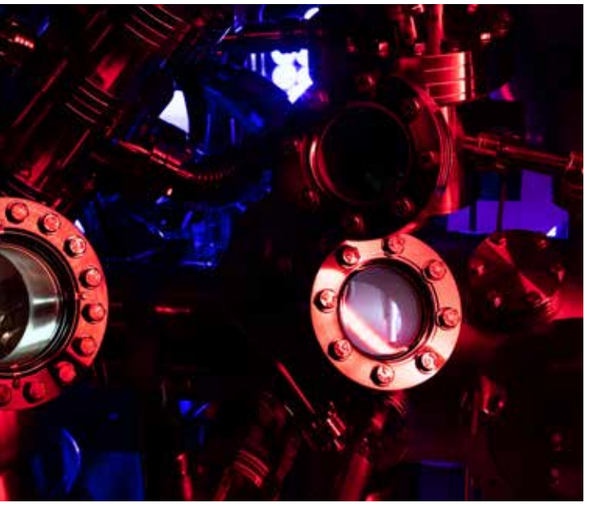
- High-quality research services for business
- Development of interdisciplinary research
- Coordination of technology and innovation development and commercialisation processes
- Help in creating and developing companies and attracting new investments

ACTION LINE: THE STRATEGY OF ADVANCED SPECIALISATION

Santaka Valley Association focuses on research, experimental development and innovation (R&D&I) priorities to increase the opportunities for European countries and their business sectors to enter global value chains, export their products and thus contribute to economic growth.

Like other European countries, Lithuania has defined the priorities considering existing or potential competitive advantages and developing a strategy of state support for research and innovation.

The members of the Association, individually and (or) in collaboration, manage multiple projects, which meet the objectives of the Lithuanian and the European Union programmes.



The professionals from different fields united by the members of the Association have interests, competencies and experience related to:

- Energy and a sustainable environment
- Health technologies and biotechnologies
- Agro-innovation and food technology
- New production processes, materials and technologies
- Smart, non-polluting, connected transport
- Information and communication technologies
- Includes a creative society

The Association's specific areas of interest:

Health technologies

Nuclear research

New materials and energy

Creative industries

Industrial technology

Information and communication technologies

ASSOCIATION IN NUMBERS

The total value of R&D work and services carried out by Association members in 2021 — **8.94** mln. eur — **Value**

All projects in Lithuania, funded by the EU Joint Research and Innovation Programme Horizon 2020, were carried out by the members of the Association — **51%** — **Leadership**

The number of knowledge-intensive companies working within Association members — **110** — **Knowledge**

Start-ups were created since 2012, to which the members of the Association contributed — **170** — **Incentive**

Students studied at the universities that are members of the Association — **24 500** — **New generation**

More information:
https://www.santakosslenis.lt/en/

MEMBERS OF THE ASSOCIATION

KAUNAS UNIVERSITY OF TECHNOLOGY

Kaunas University of Technology (KTU) originates from the University of Lithuania, founded in 1922. KTU is one of the largest technical universities in the Baltics, a leading research and studies University in Lithuania.

KTU provides a wide range of studies and research and closely cooperates with business, contributing to the country's vitality, sustainable economic, social and cultural, knowledge-based development.

The University's community today can be proud of:

- Competitive study programme portfolio and modern process of studies
- Motivated students and highly competent lecturers
- Research and experimental development that corresponds to societal needs
- Transfer of technology and innovation to business and society
- Modern infrastructure adapted to studies and highest-level research
- Loyal community members working together and who are united in pursuit of goals

PRIORITIES OF KAUNAS UNIVERSITY OF TECHNOLOGY

DEVELOPMENT OF INTERNATIONAL RELATIONS

ECIU University – development of the European university
Attracting international personnel and students
Development of an international brand, promotion of visibility at the international level
Cooperation with international academic and research institutions

SCIENCE BASED STUDIES	**QUALITY OF STUDIES** Improvement of study programmes and teaching process Professional development of academic personnel Modernisation of study environment	**QUALITY FOR STUDENTS AND CUSTOMERS**
EFFECTIVE SOLUTIONS FOR SCIENCE AND INNOVATION	**RESEARCH AND INNOVATION BREAKTHROUGH** Improvement of research results Development of R&D ecosystem Strengthening of international project portfolio	**SUSTAINABLE DECISIONS FOR THE BENEFIT OF THE COUNTRY**
SYSTEMIC ORGANISATION MANAGEMENT	**ORGANISATIONAL SUSTAINABILITY** Development of human resources Ensuring effective communication Modernisation of infrastructure	**UNIVERSITY FOR EACH OTHER**

KTU conducts international-standard studies and research in engineering, technologies, physical and social sciences, humanities and arts. The University has 9 faculties, 9 research centres and 8 institutes.

KTU is the founder of two integrated centres of research, studies and business: Santaka and Nemunas valleys. KTU National Innovation and Entrepreneurship Centre (NIEC) is a link between science and business, ensuring the protection and commercialisation of the University research products.

More information:
https://en.ktu.edu/

LITHUANIAN UNIVERSITY
OF HEALTH SCIENCES

LITHUANIAN UNIVERSITY OF HEALTH SCIENCES

Lithuanian University of Health Sciences (LSMU) is a new appearance in Lithuanian higher education, after merging Kaunas University of Medicine (KMU) and the Lithuanian Veterinary Academy (LVA) in 2010. LSMU is one of the best and the largest institutions of higher education for biomedical sciences in Lithuania. Not only does it seek to foster and pass onto future generations the classical values of healthcare professions and the intellectual and professional behaviour but it is also open to both scientific and practical innovations, discussions and opinions. The university seeks to create, accumulate, systematise and spread scientific knowledge and the newest achievements in studies and science, teach and develop a creative, honest, initiative-showing, educated, independent and enterprising personality, foster democracy and welfare, develop a healthy and educated society.

LSMU is unique because it has successfully integrated three main areas of activity: studies, research and clinical work.

- **From** Molecular Mechanisms
- **Via** Preclinical Trials
- **Via** Clinical Trials
- **Till** Population Level

The University community had grown to 28,128 members by the end of 2020. Nearly 8,000 were students from various study programmes. LSMU is one of the most international universities in Lithuania. In 2020, LSMU received the largest number of international students in the University's history, with 344 students from 46 countries.

In 2014, the LSMU Centre for the Advanced Pharmaceutical and Health Technologies was opened as part of the integrated science, studies and business centre (valley) Santaka, which carries out basic and applied research, business and public sector orders.

Spin-Offs	Filed Patents	Trademarks	Research and development projects (ongoing)
3	66	9	70+

More information:
https://lsmuni.lt/en/

VYTAUTAS
MAGNUS
UNIVERSITY
MCMXXII

VYTAUTAS MAGNUS UNIVERSITY

Ranked at the TOP 3 per cent universities in the world (QS World University Rankings), Vytautas Magnus University (VMU) is one of the most comprehensive higher education institutions in Lithuania, boasting an exciting history, nurturing and continuing deep-rooted traditions, playing a leading role in not just Lithuanian, but also the entire Baltic and European intellectual and cultural sphere.

The idea of Artes Liberales unites the academic community of VMU, i.e. the classical university of liberal arts. Warm, honest interaction and liberal humanist spirit always follow and provide strength to the community. The University combines deep-rooted traditions of classical university with an innovative approach towards organising studies, scientific research and academic community life.

In 2019, Aleksandras Stulginskis University and the Lithuanian University of Educational Sciences were integrated into Vytautas Magnus University. After the merger, VMU became the most comprehensive university in the country, further strengthening its scientific and interdisciplinary potential.

The synergy of different competencies allows the mobilisation of researchers working in non-related fields, such as the humanities and technology sectors, in line with best Western practices. To address the most pressing societal challenges, often arising at the crossroads of disciplines,studies and research are carried out comprehensively, combining interdisciplinary knowledge and resources in bioeconomy, biotechnology, artificial intelligence, agro-innovation, technology law, climate change, sustainable development, etc.

More information:
https://www.vdu.lt/en/

LITHUANIAN ENERGY INSTITUTE

Lithuanian Energy Institute (LEI) is an internationally recognised energy-related research, development and innovation (R&D&I) competence centre. The institute actively conducts national and international research in technology and social sciences, implements doctoral studies and conducts the research necessary for business. LEI also provides metrology services, maintains national standards, and develops new products and technologies. LEI was established in 1956, when on 1 October, the LSSR Academy of Sciences Institute of Physics-Technology was reorganised into separate institutes of Physics and Mathematics, Civil Engineering and Architecture, Energy and Electrical Engineering. On 1 January 1967, the Institute of Energy and Electrical Engineering was reorganised into the LSSR Academy of Sciences Institute of Physical-Technical Problems (IPTP). After Lithuania regained its independence in 1992, the institute became the Lithuanian Energy Institute.

220+	employees
130+	scientists
35+	PhD students
10	scientific laboratories
10+ eur mln.	value of R&D equipment
8+ eur mln.	annual income
60+	R&D contracts per year

LITHUANIAN ENERGY INSTITUTE'S STRATEGIC OBJECTIVES:

- Develop international-level competencies in the fields of technological and social sciences; conduct long-term fundamental and applied R&D of international stature that are required for sustainable development of Lithuania's energy system and other areas of Lithuania's economy as well as for their integration into the European energy systems and the European research space;
- In collaboration with business, governmental and public entities, transfer scientific knowledge and innovation to processes and installations that are beneficial technically and commercially to ensure advances in energy technologies, sustainable development of energy systems, security and reliability of energy supply, efficient use of energy resources, environmental protection and mitigation of climate change;
- Promote scientific knowledge in society, contribute to the development of the innovation- and knowedge-based economy of Lithuania;
- Initiate and actively participate in projects of national and international programmes, broaden cooperation with academic institutions and scientists in both Lithuania and abroad;
- Perform functions of the designated organisation in accordance with the Republic of Lithuania Law on Metrology;
- Train, jointly with universities, scientists with the highest level of competencies in the fields of economics, energy, and environmental protection; attract PhD students and develop studies their carrier.

More information:
https://www.lei.lt/en/

HOSPITAL OF LITHUANIAN
UNIVERSITY OF HEALTH SCIENCES
KAUNO
KLINIKOS

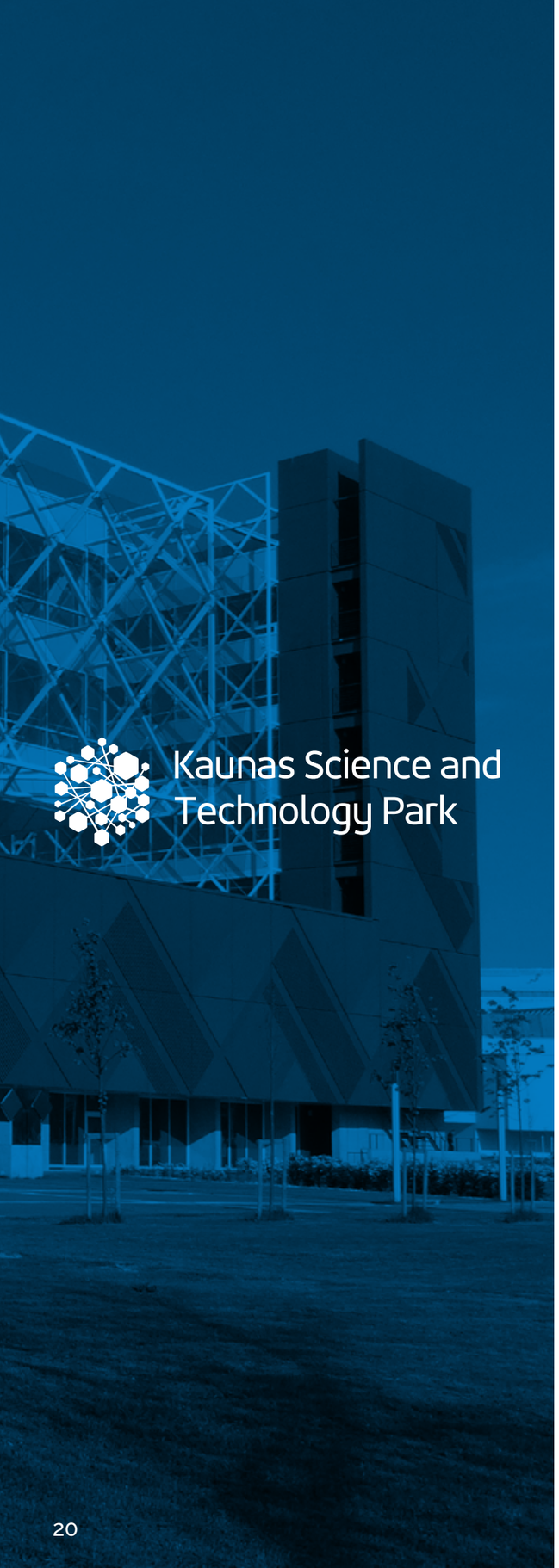
HOSPITAL OF LITHUANIAN UNIVERSITY OF HEALTH SCIENCES KAUNO KLINIKOS

Hospital of Lithuanian University of Health Sciences Kauno klinikos is the largest, highest-level multi-profile personal healthcare and treatment institution in Lithuania, equipped with modern technologies and diagnostic equipment.

Established in 1940, the hospital has grown into one of the most prominent and modern hospitals in the country. The most dangerous diseases are successfully diagnosed and treated here, and extremely complex operations and special examinations are performed. Clinical practice is combined with science and studies at the university hospital.

Kauno klinikos has 4 affiliated hospitals, 7 centres and 39 clinical departments. In 2020, the hospital had 7 315 employees: 2 187 medical doctors (944 resident doctors) and 2379 nursing specialists. The number of employees with a degree is growing. In 2021, Kauno klinikos had 531 employees with degree, including 518 medical doctors and 13 specialists in other fields.

More information:
https://www.kaunoklinikos.lt/home/



KAUNAS SCIENCE AND TECHNOLOGY PARK

Kaunas Science and Technology Park (Kaunas STP) builds an innovative community and fosters an innovation culture, helps start-ups and already growing tech companies to increase transnational competitiveness, consults companies on business development issues, provides innovation support services.

At present, it hosts over 110 companies operating in IT, engineering, health technologies, social innovation, future energy, and sustainable chemistry.

As a member of integrated science, studies and business centre Santaka Valley, Kaunas STP stimulates science and business collaboration. Kaunas STP is also involved in the Kaunas University of Technology (KTU), Vytautas Magnus University (VMU) scientific knowledge transfer, and is a partner of international projects that promote entrepreneurship.

Meet some of the innovation community members:

Albametricsis is a medical engineering solutions company founded in 2014. In 2017 the team started the BrachyDOSE product, a cancer treatment quality assurance system for prostate, cervical, lung, and breast cancer. The system measures the precise radiation doses to the patient's organs during the treatment and provides real-time data to the doctor.

The start-up iDenfy was established in 2017. The primary product is a remote ID verification service that allows over 200 foreign and Lithuanian companies to manage money laundering (AML), comply with Know Your Customer (KYC) rules and

How BrachyDOSE works

Radiation measuring devices are placed before the cancer treatment procedure

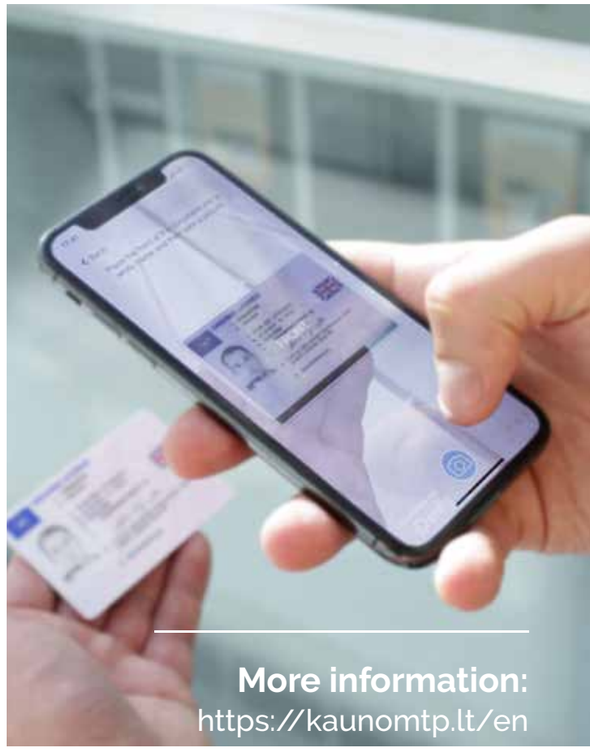
The planning system receives real-time radiation measurement data

The treatment plan is improved, errors and damage to healthy organs are avoided

maintain electronic identification (eID) requirements. The company's primary goal is to reduce online fraud, making business operations smoother and more profitable. The iDenfy team has over 30 talented young people from Lithuania, India and Sweden. Many employees are studying or have already graduated from the Kaunas University of Technology (KTU).
UAB Vilimed specialises in the development, certification, and commercialisation of innovative medical devices. At the moment, the primary product is the VILIM Ball – a handheld therapeutic device for hand tremor reduction. The product is certified and manufactured in series. The list of distributors in the European and Asian markets is expanding. Besides existing products, the company plans to bring software for monitoring and diagnosing neurological diseases to the market in 2022. The company was founded in 2014 and today has a team of 12 people.

UAB Softneta specialises in medical imaging and communication solutions to improve healthcare quality. Founded in 2007, the company has experience developing medical devices for processing, visualising and transmitting diagnostic medical data. The products are unique and designed to help healthcare professionals make daily decisions, integrating all medical data into a unified and fast-paced network.

UAB Energy Advice is a technology and consulting company focused on energy-intensive industries, creating digital tools and providing consulting services to increase efficiency and sustainability. The company's strength is the ability to understand engineering systems, processes, analyse data and turn it into IT solutions that help to understand and control energy consumption and production process. The company was founded in 2013 and today has a team of 13 people.



More information:
https://kaunomtp.lt/en

KONCERNAS
ACHEMOS GRUPĖ

CONCERN ACHEMA GROUP

Concern Achema Group is one of the largest national capital business groups in the country, exploiting the traditional potential of Lithuanian industry to create added value for shareholders, partners, employees and the entire national economy.

Concern has over 40 companies operating in Lithuania, Latvia, Estonia, Poland, Germany, France, Belgium, Sweden, the Czech Republic and Croatia. They work in fertilizer production, agribusiness, handling and logistics, energy, gas production and trade, as well as developing other businesses.

The production by the group's companies is exported to almost 30 countries from Europe to New Zealand.

Founded in 2001, the Concern Achema Group is one of Lithuania's largest employers. Its companies employ about 4,300 employees.

More information:
https://www.achemosgrupe.lt/en

POTENTIAL OF THE ASSOCIATION: INNOVATIONS, PROJECTS AND SERVICES

KTU: A WIDE RANGE OF SERVICES, COHESION WITH INDUSTRY

Kaunas University of Technology (KTU) has been cooperating closely with the business sector in different fields for many years. To achieve continuous synergies between the science and business sectors in a dynamic innovation ecosystem, KTU effectively implements technology transfer, intellectual property management, young business development processes coordinated by KTU National Innovation and Entrepreneurship Centre (NIEC). NIEC unites and integrates activities of science and business valleys Santaka and Nemunas, creates conditions for high-quality research services to businesses, makes interaction processes between science and business more effective.

KTU employs over 1,400 high-level international researchers in natural sciences, technology, medicine and health sciences, social sciences and humanities. KTU stands out for its wide range of services open to anyone who wants to build the future together.

To make things easier, KTU NIEC offers an information system APCIS that includes over 1,200 services provided by KTU researchers and can be used by business entities, public organisations and university researchers.

Services provided by researchers can be requested on a one-stop-shop basis by submitting a query to technology transfer specialists. Upon request, specialists refer researchers of the required field and act as mediators in finding the optimal service or research solution.

In cooperation with KTU, Lithuanian and foreign businesses can conduct research, experimental development, innovation (R&D&I) projects and create new products. Research services also provide with opportunities to Lithuanian and foreign organisations to take part in joint science projects and provide joint R&D&I services.

APCIS system provides services offered by: KTU Institute of Environmental Engineering, Institute of Architecture and Construction, Biomedical Engineering Institute, Faculty of Chemical Technology, School of Economics and Business, Faculty of Electrical and Electronics Engineering, Faculty of Mathematics and Natural Sciences, Faculty of Mechanical Engineering and Design, Institute of Mechatronics, Professor Kazimieras Baršauskas Ultrasound Research Institute, Faculty of Civil Engineering and Architecture, Faculty of Social Sciences, Arts and Humanities, Panevėžys Faculty of Technologies and Business.

Other services coordinated by KTU NIEC:

- Licensing and protection of intellectual property
- Establishment and development of new business
- Investment attraction and consulting

INVESTed is a programme that facilitates cooperation among studies, science, business and the public sector. The university successfully cooperates with Lithuanian and foreign companies, public institutions and other organisations. The KTU INVESTed programme is an operational tool that ensures cooperation between studies, science, business, and the public sector.

ESIC. KTU coordinates the European Digital Innovation Centre (ESIC) in Central and Western Lithuania. It is a one-stop-shop competence centre of 14 partners. ESIC operates in Lithuania and represents different areas of competencies and experiences. The centre will promote the use of artificial intelligence (AI), cyber security (CS) and high-performance computing (HPC) in industry, the public, health and biotechnology, ICT and FinTech sectors. The project started in 2022 (first financing phase 2022-2024), with the option of being extended until 2027.

KTU Startup Space is an open-to-the-public community of Kaunas start-ups that brings together teams looking to build creative businesses from the ground up. Both students who develop products or services and individuals who have gained expertise and knowledge in the working environment and have started their own business find a place in the incubator. Ideas are the most essential thing in the KTU Startup Space community. Founded in 2012, KTU Startup Space has cultivated over 100 start-up companies.

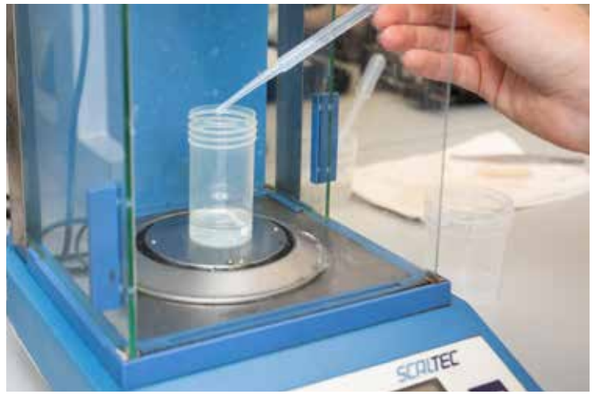
LSMU: A POWERFUL COMMUNITY OF LIFE-SCIENCE INNOVATORS

Lithuanian University of Health Sciences (LSMU) is the centre of innovation in the life-science ecosystem in Kaunas. LSMU is an active participant and partner in valleys and international projects, focusing on scientific excellence and the development to achieve the highest research results and technological development.

LSMU actively cooperates with businesses to find and develop innovative solutions and marketable services. The university is building a life-science community by organising events to develop entrepreneurial and innovation skills, incubating initiatives, and providing access to acceleration programmes, required infrastructure, and professional expertise on innovation, intellectual property, and fundraising.

EIT Health. LSMU, together with Kaunas University of Technology, has become the health innovation centre of the European Institute of Innovation and Technology in Lithuania, 2018. One of the main goals of the organisation is to invest in the most promising students, researchers, which develop products or services for the healthcare system.

Today, LSMU brings together a powerful community of life-science innovators who contribute to the demographic and ageing societal challenges. Activities and partnerships in the valley programmes are part of the contribution to challenges. The primary goal of the latter correlates with the strategic objectives of the valleys themselves: to promote science and innovation, to ensure their dissemination and access to the latest research infrastructure available to businesses and independent researchers.



Services provided by the Open Access Centre units:

1. Quality control of herbal pharmaceuticals, medicinal products and food supplements
2. Determination of therapeutically active analytical markers in herbal materials for quality control
3. Developing new and optimising existing analytical methods for legal approval
4. Quantitative and qualitative analysis of impurities in herbal materials and herbal products and phytopreparations
5. Preclinical trials of new medical substances
6. Research on joint cartilage engineering using synthetic matrices
7. Research on artificial heart valve engineering using synthetic matrices
8. Tissue preparation using immunohistochemical reactions for morphometric analysis
9. Evaluation of biomarkers expression in immunohistochemical reactions, morphometric evaluation and full analysis scale
10. Preparation of tissues for microscopic and morphometric analyses in hybridisation reactions
11. Evaluations of biomarkers expression
12. Research on pharmacological and chemical materials cytotoxicity (neurotoxicity)
13. Research of cell anti-oxidation system and its modulation with potential medical preparations and food supplements
14. Biopharmaceutical testing and evaluation of dosage forms
15. Development and stability testing of peptide and protein drug forms
16. Research of drug absorption through/into skin
17. Laboratory analysis of creams and ointments
18. Research and analysis of physical and chemical properties of polymeric materials
19. Determination and analysis of tablet solubility, hardness and friability
20. Production of extracts
21. Qualitative and quantitative analysis of drug substances
22. Pharmacokinetic research
23. Development of HPLC analytical methods for herbal material and herbal drugs
24. Analysis of biologically active compounds
25. Synthesis of biologically active compounds
26. Quantitative and qualitative evaluation of organic solvents, volatile poisonous materials, pesticides
27. Validated HPLC analysis of various samples
28. Quality analysis of various samples by HPLC methods

VMU: CLOSE INTERSECTORAL COOPERATION

Vytautas Magnus University (VMU) forms innovations of interdisciplinary, breakthrough, and sustainable solutions. Both the researchers and partners network understand the market needs. The research and experimental development focus on long-term and applicable results.

VMU has a fully functional laboratory infrastructure, expert potential, and competencies in creating international and national projects. R&D services for economic organisations are also actively supplied, as is tight cross-sectoral cooperation in response to societal requirements through research. The VMU Communication and Technology Transfer Center (VMU CTTC) was founded for the collaboration of scientific and economic entities to provide the best quality services. Also, to assist everyone interested in finding both researchers and partners, as well as to form clear proposals.

The VMU Communication and Technology Transfer Center aims to assure the seamless and high-quality implementation of research and experimental development orders, promote cross-sector collaboration, and develop innovative solutions. VMU CTTC is responsible for the distribution and implementation of innovations, as well as the transfer and commercialisation of technology.

- Laboratories >50
- Academic staff >736
- Researchers >451
- Institutes 18
- Clusters 48
- Projects >300
- Patents >30
- Start-ups / spin-offs >50
- Modern infrastructure

The main services of VMU CTTC:

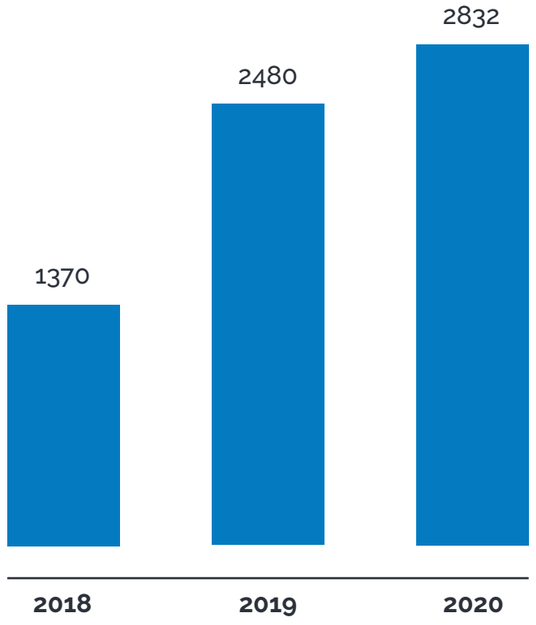
- Proposal for research and experimental development services preparation
- Technology transfer
- Project preparation
- Protection of intellectual property
- Communication and public relations
- Expert advice

At the moment, VMU has the highest number of innovations in the following categories: biotechnology, agricultural technology, digital technology, engineering technology, educational innovation.

During the 2021 period, VMU has carried out over 300 international and national research (excluding business) projects. A total of 14 Horizon 2021 projects were carried out in 2021.

The initiatives and the help for researchers at the university have a positive outcome to fulfil one of the university's aims – commercialisation of scientific production and development of R&D activities with business. The total value of R&D projects signed in 2021 and contracts with economic entities was EUR 1,95 million.

It is worth highlighting a successful VMU and business participation in the financial instrument called Experiment: 12 projects were funded for EUR 12 million. This growing number of projects shows that business finds the University as the best and long-term partner for collaborating on larger projects.

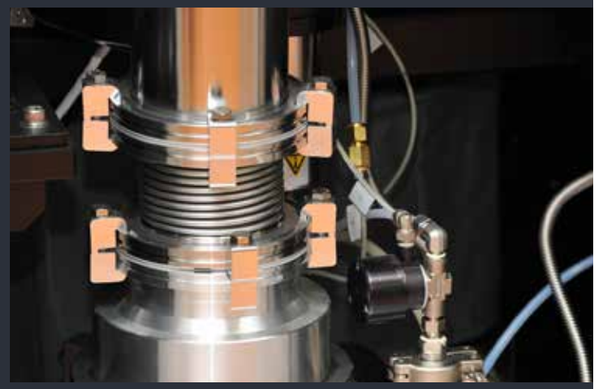


LEI: STANDARDS AND MEASUREMENTS

Lithuanian Energy Institute (LEI) complies with LST EN ISO 9001:2015 and LST EN ISO 14001:2015 standard applicable to research, development and design activities in technological, social and physical sciences.

LEI is a Designated Institute (DI) for maintenance of national standards for:

1. air (gas) speed
2. air (gas) volume and flow rate
3. water volume and flow rate
4. liquid (other than water) volume and flow rate
5. pressure



The R&D activities of the Institute are carried out by:

Center for Hydrogen Energy Technologies uses magnetron deposition, electron beam evaporation, plasma immersion and other processes related to the application of low-temperature plasma to synthesise various thin coatings of metals and their alloys, modifying the surface of materials to provide antifungal, antibacterial, antifungal agents and other properties. The Centre has developed over 10 patented products and technologies, of which the most promising for commercialisation are multinational patents for the use of the aluminium / magnesium (or their alloys) activation method to ensure efficient extraction of hydrogen and gamma-shaped alumni synthesis through plasma modified aluminium and water reaction.

The core value provided by the **Laboratory of Energy System Research** is solving scientific and practical problems performing modelling and evaluation of energy sector development, different regulatory regimes, and the environmental impact of development of energy sector and its politics. For many years, The Laboratory is a forestanding actor in preparation of the National Energy Strategy project. Researchers of the laboratory are preparing development strategies for Lithuanian energy companies as well.

Laboratory of Smart Grids and Renewable Energy conducts research on modelling of energy systems and networks as well as renewable energy technologies integration into electricity systems.

Laboratory of Combustion Processes conducts research on combustion and thermochemical processes in fuel saving, reduction of environmental emissions, thermal decontamination of materials and synthesis of alternative biofuels or biofuels.

Plasma Processing Laboratory focuses in practical application of plasma technologies, forming special purpose coatings and insulation fibres in plasma jets, neutralising hazardous waste and synthesis of hydrogen and synthetic gases in water vapor plasma.

Laboratory of Materials Research and Testing carries out research aimed at the synthesis of high-surface area materials for the production of catalysts as well as consults on the quality of manufacturing products and conducts research on the operational reliability of structural materials for energy facilities.

The research objects of the **Laboratory of Hydrology** are Lithuanian rivers and lakes, the Curonian Lagoon, and the Baltic Sea as well as extreme natural phenomena, such as storms, floods, and anthropogenic activity (energy production, navigation, and ponds) that determine the state of water bodies.

Laboratory of Nuclear Installation Safety cooperates with the domestic and foreign entities in conducting safety, reliability and risk assessments of industrial facilities and energy systems, nuclear power plants and fusion facilities.

Nuclear Engineering Laboratory participates in the evaluation of many aspects of nuclear power plant decommissioning and conducts research on heat and mass transfer in various systems and their components.

Laboratory of Heat-Equipment Research and Testing has status of notified body (Id. No. 1621) for conformity assessment of heating appliances that use solid fuels and type A control, as well as water and heat supply reliability.

Laboratory of Heat-Equipment Research and Testing complies with:

- LST EN ISO/IEC 17025:2018 requirements and is accredited to perform:
- tests of heating boilers, appliances burning gaseous fuels, solid biofuel, solid recovered fuel, water and thermal energy meters;
- assessment and verification of performance of space heating appliances burning solid fuel.
- LST EN ISO/IEC 17020:2012 requirements and is accredited as A type inspection body to:
- perform inspection of cooking appliances burning gas, liquids, gas and thermal energy meters, gas volume conversion devices, air velocity, moisture, pressure, temperature measuring instruments;
- carry out conformity assessment procedures for water, thermal energy meters and measuring systems for liquids other than water
- LST EN ISO/IEC 17025:2018 requirements and is accredited to perform the calibration of measuring instruments for liquids and gas flow, thermal energy, pressure, air humidity and temperature, capacity measures as well as water and gas flow standard facilities.

With the EUR 7 million investment from the EU Structural Funds, the institute modernised equipment, expanded its' services. LEI provides over 120 R&D services to business.

LSMU KAUNO KLINIKOS: FOR PERSONAL HEALTHCARE

Kauno klinikos has impressive numbers in providing personal healthcare services. During the pre-pandemic period of COVID-19 (until 2019), the Kauno klinikos and its branches were visited 1,383,037 times, provided 963,561 outpatient consultations, and performed 66,030 surgeries.

Department of Radiology. Kauno klinikos remains one of the largest interventional radiology centres, not only in Lithuania but also in all Baltic countries. During the 2020 period, 15 266 interventional procedures were performed, of which4 127 interventional radiology and 11 139 interventional cardiology procedures. Complex diagnostic radiological examinations remain large: 73 169 computed tomography, 17 104 magnetic resonance imaging, and 1 850 positron emission tomography (PET) examinations have been performed. Since 2019, Kauno klinikos Department of Neurosurgery has had the most advanced radiosurgery instrument the gamma knife (Leksell Gamma Knife Icon). During the 2020 period, 329 patients were treated at the Gamma Knife Center, 442 treatment fractions of stereotactic radiosurgery were performed.

Rare Disease Centres of Excellence. Kauno klinikos has 25 Rare Disease Centres of Excellence, which provide the highest-level complex healthcare services to patients with different rare diseases. The Rare and Undiagnosed Diseases Coordination Centre coordinates the work of these centres. Kauno klinikos specialists have a lot of experience and concerted efforts in different fields. They support patients suffering from rare complex diseases affecting several organ systems. Also, they transfer the healthcare of children (who become 18 years old) with rare diseases to adult disease specialists. Close cooperation with the European Reference Networks on Rare Diseases provides new opportunities: to diagnose and treat Lithuanian patients with rare diseases, participate in the development of international guidelines for the diagnosis and treatment of rare diseases, conduct international research with European researchers to find new treatments for rare diseases.

Organ donation. 2021 is a record year for Kauno klinikos: the 100th liver transplant was performed; in 2021 as many as 16 liver transplants were performed; 10 organ transplants were performed in less than 1 week in August. In September, the 10th non-beating heart donor in Lithuania was registered in Kauno klinikos and a special operation was performed – a patient underwent kidney transplantation from a non-beating heart donor. For the first time in Lithuania, kidney transplants were performed from a donor with COVID-19 disease.

Hematopoietic stem cell transplantation. Kauno klinikos Department of Oncology and Hematology successfully started hematopoietic stem cell transplantations in 2015. Hematopoietic stem cell transplantations were first performed in 2020. Since 2015, the clinic performed 193 haematopoietic stem cell transplantations; 150 were primary and 43 secondaries.

Robotisation. The Kauno klinikos Department of Laboratory Medicine has a robotic system for sample analysis. The new system ensures efficient sample management in the laboratory: sorting, centrifugation, and refrigeration. The laboratory receives over 1,200 samples per year. These processes are based on faster direct access of samples to modern analysers, as well as the research performance and representation of results to Kauno klinikos experts. Since 2020, Kauno klinikos performs real-time PCR assays for SARS-CoV-2 RNA. A total of 177 432 SARS-CoV-2 virus PCR assays were performed in 2020.

Clinical trials. Kauno klinikos is one of the centres for conducting clinical trials in Lithuania. In 2021, Kauno klinikos performed 131 clinical trials, completed 34 clinical trials, signed 43 preliminary agreements with pharmaceutical companies to conduct clinical trials of medicinal products in Kauno klinikos. The clinical trials were conducted in collaboration with pharmaceutical companies such as Novartis, Abbvie, Merck Sharp & Dohme, F. Hoffmann - La Roche, Sanofi-Aventis, Bayer, Dr Falk Pharma GmbH, Astra Zeneca and others.

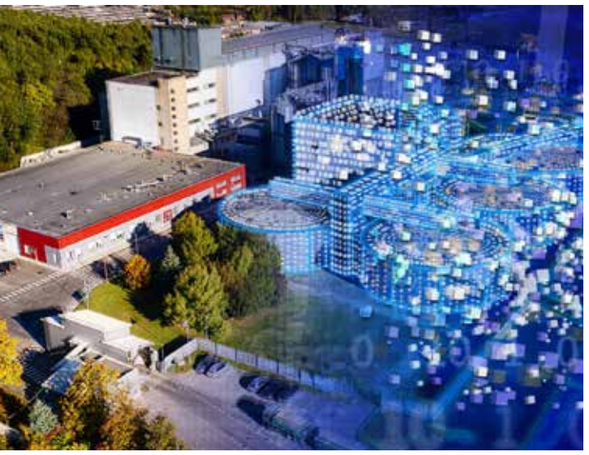
During the 2021 period, Kauno klinikos purchased medical equipment worth EUR 7,03 million: EUR 4,07 million from different investment and EU-funded programmes, and EUR 2,96 million from its funds. In 2020, Kauno klinikos carried out 22 projects worth EUR 59 million.

KAUNAS STP: AN OPEN COMMUNITY OF DEVELOPERS

Kaunas Science and Technology Park helps technology developers, scientists, and researchers to meet, network, and establish meaningful business partnerships. This often leads to new R&D projects and discover opportunities to expand their innovation portfolio. The Park also organizes targeted networking events with large corporations and R&D departments of the companies which are open to developing new technologies and products.

Our Breakfast with Innovators event connects startups with corporations that are open to collaborating. Members of the Park's innovation community are invited to meet with key people from corporations responsible for business-science collaboration and joint innovation development in HealthTech, Fintech, Smart City, Renewable Energy, and other sectors.

During our R&D events, representatives from various universities and their technology transfer units meet with startups to present their best business practices, applied research projects, and various business opportunities. They also share their experience with Kaunas STP companies.



GLOBAL INNOVATION ECOSYSTEM PLAYER

Over 100 professionals from Kaunas STP cluster "Digital Rocket LT" are providing cutting-edge ICT services for local and international customers.

We run a pre-acceleration program "Evolut 4.0" which is designed for early-stage startups to help them develop an innovative product or service, increase sales and prepare them for the investment phase:

- 60+ alumni startups
- Investments:

MedTech: LIGENCE

4,4M EUR to date

Platform: GETFIX

100K EUR to date

In 2019 Kaunas STP became a part of CERN Business Incubation Centre in Lithuania and supports the development and application of innovative ideas outside the field of high energy physics.

CONCERN ACHEMA GROUP: WIDE OPPORTUNITIES

The largest activity of Concern Achema Group is fertilizer production. The dominant company in **fertilizer production** is Achema, the largest producer of nitrogen fertilizers and other industrial chemicals in the Baltic States, founded in 1965.

Achema produced 2.47 million tons of fertilizer in 2020. The company constantly invests in efficiency and pollution reduction projects. Over the past 15 years, the fertilizer manufacturer has invested over EUR 110 million in environmental mitigation projects. Achema's greenhouse gas emissions were reduced by over 40 per cent during the mentioned period.

AB Achema is a member of the European Fertilizer Manufacturers Association called Fertilizers Europe as well as an active member of the Lithuanian Confederation of Industrialists, the Association of Lithuanian Chemical Industry Enterprise and many more.

The leader of the **agribusiness sector** is UAB Agrochema. One of the country's largest agribusiness companies, the leader in nitrogen fertilizer trade. They also trade

in grain, plant protection products, seeds, garden and horticultural goods, provide grain elevator services and have a network of retail stores in Lithuania.

AB Klaipėda Stevedoring Company (KLASCO) is active in **cargo handling and logistics services**. This company is the most versatile and one of the largest stevedoring companies in Klaipeda port. It controls over a quarter of the Klaipeda seaport services market. KLASCO handles over 18 million tons per year of different cargo.

The concern has its focus on environmental and community projects. Last year, they significantly expanded their environmental action plan to manage all expected environmental risks. Over the past two years, KLASCO has already invested over one million euros in environmental measures, handling equipment and will continue investing.

The largest company in the gas production and trade sector is UAB Gaschema. The leading manufacturer and developer of technical, welding, food, specialty gas, AZO Products and Lipalas products in Lithuania and the Baltic States, exports its products to Latvia, Estonia, Russia, Belarus, Ukraine, Poland, Finland, Sweden, Norway, and other Central European countries.

UAB Renerga represents the rapidly growing green electricity production business from renewable energy sources worldwide. The company manages the hydroelectric power plants of Pastrėvis and Kavarskas, as well as the Benaičiai, Benaičiai-1, Anykščiai wind farms. Also, an experimental small wind and solar power plants. In 2020, power plants produced over 180 GWh of electricity.

The Concern Achema Group also successfully manages other businesses: packaging, repair, engineering, design, safety, insurance, media, hotel and other services.

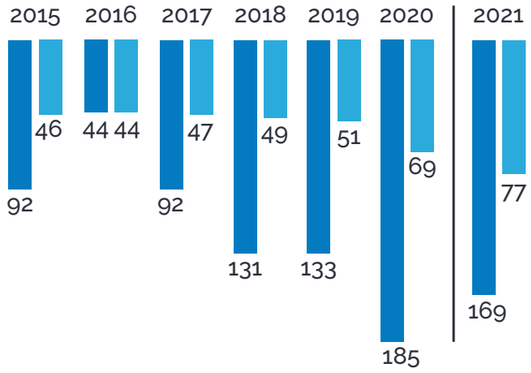
TODAY - STORIES OF SUCCESS, TOMORROW - NEW HORIZONS

KTU: NOT JUST TECHNOLOGY, BUT ALSO LEADERSHIP

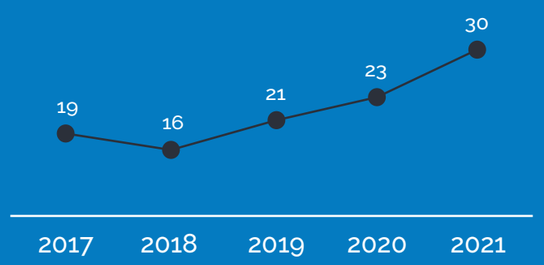
Kaunas University of Technology (KTU) has been the leader among Lithuanian institutions by the number of projects funded by the EU research and innovation programme Horizon 2020 since the beginning of the programme (2014–2020). 48 projects were implemented during this period.

KTU scientists' inventions and the development of innovative technological solutions are of a high scientific level and have a great commercial potential not only in Lithuania but also abroad.

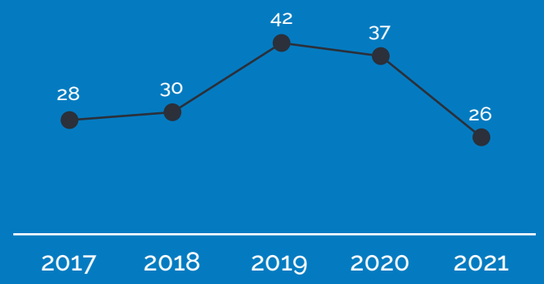
The number of revenue-generating research and innovation projects:



Filed patent applications



Valid patents



In 2021, KTU researchers filed 30 patent applications. The revenue from licensing of KTU-developed IP for commercial use has been increasing year by year and reached 77 000 Eur in 2021.

Record efficiency: hole-transporting self-organised monolayer for perovskite solar cells. Organic molecules synthesised at KTU self-assemble into a molecular-thick electrode layer. It is an effective approach to realise the high efficiency of tandem solar cells. The molecules can form self-assembled monolayers (SAMs) on numerous oxides and are based on carbazole head groups containing phosphonic acid anchoring groups. The SAM materials were applied in the production of a functioning solar cell in collaboration with Helmholtz Zentrum Berlin (HZB). 29.15 per cent efficiency was reached by integrating a SAM-based perovskite solar cell into a tandem architecture. It is the new world record for a tandem solar element. A Japanese company, Tokyo Chemical Industry Co. LTD, purchased the licence to produce the material synthesised at KTU laboratories.

A weapon against stroke: smart medical bracelet for post-stroke patients. Researchers from KTU and VU have created an invention to detect, monitor, and characterise atrial fibrillation (arrhythmia) linked with the development of atrial fibrillation and an increased risk of ischemic stroke in a non-interfering way. The system comprises a wearable device with integrated bio-signal sensors; self-intermittent atrial arrhythmia detection modules; a server or smart device uses a module to characterise the distribution of atrial arrhythmia episodes to assess disease progression. UAB Teltonika Telemedic and KTU have signed a licensed cooperation agreement; the company will produce and manufacture a smart bracelet based on an algorithm and technology created by KTU and VU researchers.

Food to address malnutrition: a food product approved in clinical trials for people with dysphagia. Researchers from KTU and LSMU have developed an innovative, milk-based food product enriched with essential nutrients (protein, unsaturated fats, vitamins, minerals) that address malnutrition. A product designed to consider changes in appetite, taste perception, swallowing, nutrient requirements. In clinical trials with elderly patients, their nutritional status improved after 10 days (upper arm volume and vitamin B12 levels increased, gait accelerated, and vitamin D levels increased).

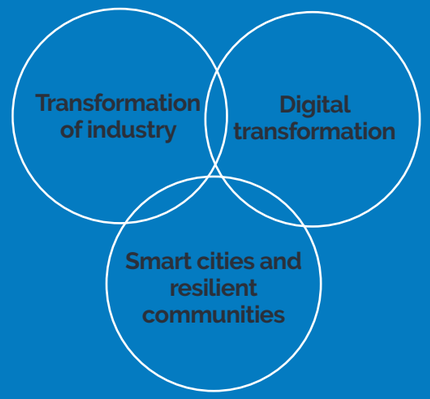
AmeraLabs: for 3D printing. AmeraLabs is a company founded in the KTU Startup Space community. It develops and manufactures materials for stereo lithographic (SLA) 3D printing. In-depth knowledge of 3D printing, material formulation and manufacturing processes enables the development of unique and novel 3D printing materials with exceptional properties. AmeraLabs products can be used in different industries to produce prototypes and end products.

Indeform: the IT accelerator. It is an IT, interactive and digital graphics technology company from the same start-up community united by KTU. Indeform develops advanced solutions for cloud computing, SaaS, data analysis and visualisation, artificial intelligence and computer vision. The company creates technology for 2D/3D product configurators, order generation and management, virtual and augmented reality simulators in interactive solutions/ digital graphics. The company's main areas of activity are energy, manufacturing, automation, healthcare and e-commerce. Indeform is proud of its professional team and experts who are valued and trusted by the US, Great Britain, European and Scandinavian companies, including Dematic, Greensmith Energy Systems, Systemair AB, Ruukki, UAB Orthobaltic, Seal Navitas Ltd., Kindred Brands Inc. etc.

Technorama: for generating ideas. KTU annually initiates the traditional exhibition-competition Technorama. For the past two decades, the event has brought together innovators: students, academics, and technology enthusiasts. The event includes an exhibition of young creators' inventions, meetings with innovators, ideas and products. The most innovative and commercially viable authors are awarded special prizes set up by interested companies.

KTU MAIN AREAS OF RESEARCH

The University's Strategy 2021–2025 confirms the priorities of R&D&I activities, which are especially important for the viability of the country and its knowledge-based sustainable economic, social and cultural development:



Technologies for sustainable future

- Artificial intelligence and robotics
- Biomedical engineering and medical technologies
- Chemical and environmental technologies
- Diagnostic technologies
- Applied mathematics
- Electronics and electrical engineering
- Functional materials and technologies
- Information and communication technologies
- Food systems and biotechnologies
- Mechanical and transportation engineering
- Construction technologies
- Applied and medicinal chemistry
- Sustainable energy

Sustainable sociocultural develepment

- Architecture, urban activities and cultural heritage
- Audio-visual arts
- Educational environments and technologies
- Financial technologies
- Economic analytics and competitiveness
- Business models
- Innovation management and entrepreneurship
- Organisational development
- Industrial design
- Digital media and culture
- Public administration

KTU MAIN AREAS OF RESEARCH:

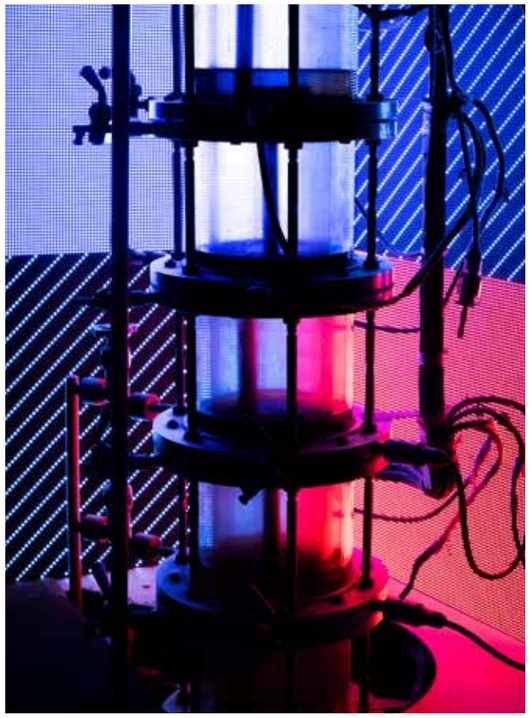
Transformation of Industry **Digital Transformation**
Smart Cities and Resilient Communities

The University's academic community will concentrate on its attempts to achieve a research and innovation breakthrough by 2025 and will pay extra attention to:

Improvement of research results: by performing the highest-level research corresponding to the changes in the economic, cultural, political and social environment

Development of R&D&I ecosystem: by developing transfer of R&D&I knowledge and technologies, entrepreneurial activities and the University's infrastructure

Planning of international project portfolio: by the University being a leader in Lithuania in the participation in EU programme Horizon 2020 projects and achieving even greater success, concentration of the leaders in science and studies, and encouraging interdisciplinary and international cooperation



LSMU: INNOVATIONS FOR HEALTH

The result of Lithuanian University of Health Sciences (LSMU) close cooperation with business is innovation in the biomedical and agricultural sectors: information technology solutions, software, implants, prostheses, new or improved medical devices, pharmaceutical technologies and innovative skincare solutions.

Mobile app Voice screen. The Voice Screen, a mobile app developed by Prof Virginijus Ulozas, helps to assess potential voice problems, diagnose at an early stage and refer patients to a doctor on time. Almost 10 per cent of all people complain about having different voice disorders, hoarseness. The disorders are caused not only by the common cold or voice fatigue after strenuous exercise, but can also be linked to non-malignant or malignant laryngeal tumours, that can be identified by an innovative solution.

UAB Synhet. A spin-off, established in 2017 by the scientist Liudas Šlepikas. The company focuses on the synthesis and purification of biologically active substances. The company operates primarily in foreign markets, mostly in Europe, but also has customers operating in the America, Canada and the Asian regions. The company employs chemists that specialise in scientific work. Also, programmers, who focus on robotisation of activities to help perform mechanical work more efficiently and accurately.

UAB Kelifarma is a biotechnology start-up that develops advanced therapy medicinal products (ATMPs). The ATMP prototype is for the treatment of articular cartilage – autologous cells along with the membrane. The drug developed for the advanced therapy of stem cells of fetal environmental (perinatal) tissues (placental tissues) is globally unique and has an effect on both the prevention and

treatment of osteoarthritis.

UAB RamaZottius Lab is a spin-off that develops a medical device used in periodontitis with a natural biologically active substance – geranium root extract or a fraction of proanthocyanidins from this extract. The product has antimicrobial activity against oral bacteria and anti-inflammatory effect, promoting gum regeneration. The hydrogel developed by UAB Ramazottius Lab will ensure cheaper and more effective treatment of periodontitis without surgical procedures.

Linea Basalis. Basalis cream – the first Linea Basalis product – formula was created by pharmacy specialists and doctors at the Hospital of Lithuanian University of Health Sciences Kauno klinikos. This, as well as the other products in the Basalis line, are authentic Lithuanian products. The creams are manufactured adhere to good manufacturing practice standards, so their quality meets the most stringent requirements; all Basal line creams are notified in the European Union.

LSMU MAIN AREAS OF RESEARCH

LSMU's strategic directions for scientific research in biomedical sciences 2017–2021.

Health technologies

biopharmaceuticals
▼
neurosciences
▼
oncology
▼
cardiovascular research
▼
digestive tests

Regenerative medicine

Molecular medicine

Epidemiological studies

LSMU's strategic directions for scientific research in agricultural sciences 2017–2021.

One health

clinical trials for animal health and welfare
▼
sustainable husbandry technologies
▼
safer, value-added foods

Zoonoses and antibiotic resistance

Molecular technologies for animal health and productivity

Animal nutrition chains and rearing systems for sustainable husbandry production

VMU: DIRECTION OF A PARTNERSHIP

Results that can lead to synergistic changes in established environments and bring commercialised results to light are crucial in cross-sectoral cooperation. Therefore, several examples of cross-sectoral cooperation can be identified as the developed projects grow into world-class innovations.

Product Semantika. A product created by scientists received many awards. The Lithuanian language syntactic and semantic analysis information system (LKSSAIS) is a unique language technology infrastructure and state information system that provides written Lithuanian language analysis and Lithuanian speech recognition services. The system has been upgraded in 2022. The primary goal of LKSSAIS modernisation is to extract Lithuanian electronic texts from the internet and phonograms using information technologies, to analyse a wide range of Lithuanian electronic texts, to work with Lithuanian electronic texts to provide tools and electronic services that save time and increase work efficiency.

KOOPER platform. It is a platform for the management and decision-making of advanced business systems of the agricultural cooperative network. The platform aims to pilot and test a prototype of specialised process management and decision-making platform for agricultural producer organisations based on learning neural networks in real economic, technical and information conditions. Also, to collect and systematise user feedback.

The technology of UAB Amber charge. Electroporation is often used in biotechnology companies to increase the permeability of drugs, proteins or nucleic acids transfer into the cell. Also, in veterinary and medical institutions for electroporation in anticancer therapy and food companies or their laboratories for food processing. Lack of knowledge or flexible functional electroporation systems affects the electroporation efficiency. A study revealed that most times, transmembrane material transport is linked to both membrane permeation and the electrophoresis of charged materials. Studies show that high-power pulses of different amplitudes and durations better control transmembrane transport processes.

The technology of UAB Išmanusis drenažas. Almost all outdoor drainage in Lithuania today operates in a drain mode, i. y. continuously removes free soil water from the drained soil layer. This type of drainage hinders the accumulation, storage and use of potential soil moisture reserves during dry seasons. The process of controlling soil moisture benefits all aquatic ecosystems by trapping nutrients, which then are absorbed by agricultural crops. Controlled drainage enables adaptation to or mitigation of climate change by accelerating denitrification in the soil and reducing nitrogen oxide (greenhouse gas) emissions into the atmosphere. It shows the importance of managing a controlled drainage system. Controlled drainage is a precision solution for rational management of water resources under the different moisture conditions; it is necessary to take an integrated approach of several selected characteristics and only then choose a rational solution. The system will allow the user to monitor data such as soil moisture, water runoff, groundwater level, precipitation, etc. real-time, using different sensors. The algorithms will analyse the data to generate a real-time drainage system adjustment recommendation.

UAB Intelektika Vytautas Magnus University's (VMU) science-intensive spin-off, founded in September 2020. The company is built on VMU researchers' years of experience and knowledge in the following disciplines: language technology, artificial intelligence technology, deep and machine learning, data and signal analysis. The founders are researchers at the VMU Faculty of Informatics and the university itself. The company's goals include: conducting applied research, applying scientific knowledge, introducing it to the market, and adapting it to practical business needs, as well as transforming language and artificial technologies developed at the university and the company into innovative products and services.

VMU MAIN AREAS OF RESEARCH

Vytautas Magnus University (VMU) aims to develop potentially patentable research based on the open innovation approach. Also, to encourage active participation in international open innovation platforms, and to engage in research and development of new technologies or products in collaboration with international companies, R&D and innovation orders, to conclude agreements with Lithuanian economic entities.

VMU researchers work in the following research fields, operating proactively and following the newest innovative trends:

Education and social innovation

research and innovative solutions in educology, formal and non-formal education systems, competency-based teacher education models, research to improve the education system, etc.

Creative industries and break-through innovation

research in the humanities, cultural and artistic transformations, inclusive and creative society, research in psychology, research in the legal environment, sociological research, etc.

Digital transformation

artificial intelligence, language technologies, automation systems and robotics, digital industry, digital public sector, cybersecurity, digitalisation of the agricultural sector, etc.

Biotechnology and biosystems engineering, health technologies

research on how drugs get into cells, molecular research of plants and animals, biochemical analysis and evaluation of medicinal plants and processes, etc.

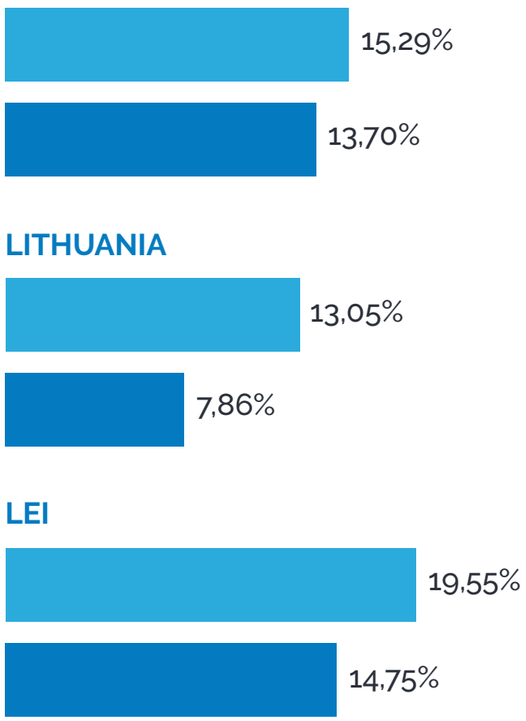
Bioeconomics

The Green Deal, sustainable community development, the circular economy, energy, innovation and knowledge transfer platforms and systems, resource management systems, etc. Sustainability of agro-, forest and aquatic ecosystems, the impact of climate change: precision agriculture, food technology, climate change mitigation solutions, research on different ecosystems, etc.

LEI: A TARGETED APPROACH

According to data from Webgate.ec.europa.eu for April 2021, the Lithuanian Energy Institute (LEI), which is participating in the Horizon 2020 programme with 26 projects, three of which are coordinated by the Institute, ranks third in Lithuania, after the country's largest universities. The value of funding is over EUR 3.7 million.

In addition, LEI projects exceed the success rates of Lithuania and the European Union.



LEI in Horizon 2020 programme (according to 2021.09.03)

Portfolio of international research programmes at the institute:

Horizon Europe
1 project

Horizon 2020
26 projects

7 Framework programme
24 projects

6 Framework programme
14 projects

5 Framework programme
11 projects

LIFE 1 project

The Intelligent Energy-Europe
31 projects

INTERREG programme
14 projects

Nordic Energy Research Programme (NERP)
6 projects

Baltic Research Programme
2 projects

International Atomic Energy Agency (TATENA)
19 projects

International partnerships (EuropeAid)
4 projects

COST programme
27 projects

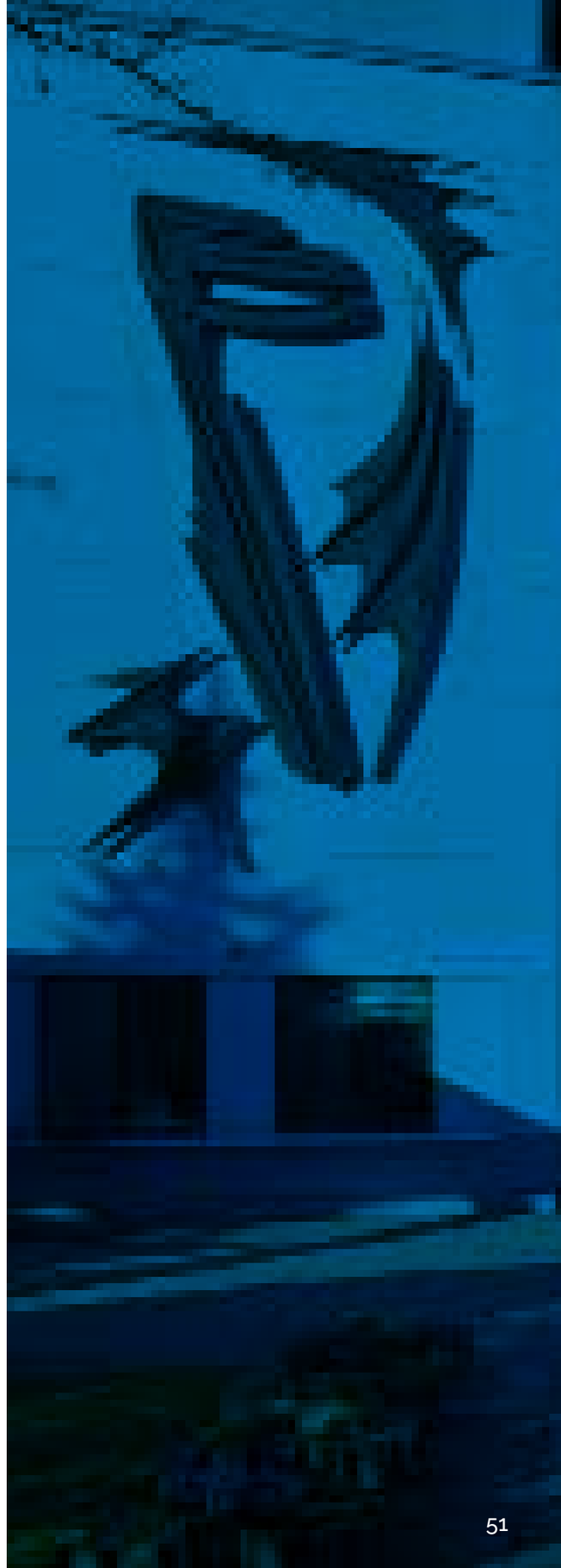
EUREKA
4 projects

Lithuanian Energy Institute Vision of the Green Campus

LEI Green Campus is an exemplary model of an ecological smart town planned in the territory of the Lithuanian Energy Institute. The model incorporates and integrates technologies for the supply of renewable energy for hydrogen production and renovated buildings. This infrastructure would be used for the development, integration, and testing of green hydrogen production for transport and buildings, as well as for other energy storage and green fuel production technologies.

LEI main areas of research

1. Energy and biofuels from biomass and waste; Research in development and upgrade of associated technologies
2. Hydrogen energy and energy storage technologies
3. Energy storage technologies and Smart energy grids
4. Nuclear energy (safety analysis, decommissioning, radioactive waste management, new generation nuclear reactors, fusion energy)
5. Environmental engineering and climate change influence on water resources
6. Measurement research related to the development and maintenance of national liquid and gas flow standards (etalons)
7. Materials science for energy generation technologies
8. Energy economy research (energy policy, energy strategy, social and macroeconomic impact assessment, energy market research, energy efficiency)



LSMU KAUNO KLINIKOS: INNOVATION IN MEDICINE

EuCanImage project. In 2020, Kauno klinikos has become a member of an international consortium that is implementing the Horizon 2020-funded project EuCanImage, which aims to create a European database of radiological images of oncological diseases. While creating this platform, researchers rely on data from Euro-BioImaging and the European Genome-phenotype Archive, as well as collaborate with The Cancer Imaging Archive. It is expected to develop a European database on radiological imaging, clinical and genomics of oncological diseases in line with the general data protection regulation by combining diverse experiences. The project brings together researchers from 20 world-renowned research institutions, companies and clinical centres. The value of the project is EUR 9.9 million.

The Envision project. In 2020, together with international partners from the public and private sectors, Kauno klinikos launched the Horizon 2020-funded project called Envision, which aims to create the digital tool Sandman.MD. By using artificial intelligence algorithms, the tool will help to develop an intelligent decision-making system for patients with COVID-19 in intensive care units. It will be introduced and tested in 14 European hospitals. The project involves scientists and researchers from cutting-edge science and healthcare centres. The European Society of Anaesthesiology and Intensive Care supports the Envision project. The total value of the project is EUR 5.7 million.

Agreement with Siemens Healthineers. In 2020, LSMU Kauno klinikos was the first in the Baltic States to sign a research contract with Siemens Healthineers, a healthcare giant specialising in research imaging and diagnostic technologies. The signed agreement includes confidentiality and collaboration guidelines that allow Kauno klinikos to use Siemens Healthineers technologies, which are not yet commercially available. They can be used for research and project implementation as well as to jointly develop innovative solutions to improve diagnostic tools for detecting cardiovascular diseases.

Agreement with start-up Ligence. In 2021, Kauno klinikos has signed a cooperation agreement with the Lithuanian artificial intelligence start-up Ligence, which uses artificial intelligence and deep learning technologies to develop software that automatically assesses the anatomical properties and quality of the heart and prepares a detailed report for the doctor. It is expected that faster and more efficient cardiovascular disease diagnostics will help the patients to get a more accurate diagnosis and treatment faster, reduce the workload for cardiologists and reduce queue waiting times. Even though companies around the world are already using artificial intelligence techniques to analyse ultrasound images of the heart, Ligence aims to automate not only individual measurements or individual pathologies but the entire protocol of cardiac ultrasound.

COVend project. In 2021, Kauno klinikos will start COVend project, funded by the new Horizon 2021-2027. The project aims to develop an effective medicine to treat the COVID-19 disease caused by the SARS-CoV-2 virus to prevent the disease from progressing from mild to moderate to severe. COVend will be carried out as a multiphase Phase II-III clinical trial. During the project, researchers will assess the effects of the new medicine FX06 on endothelial cells using modern omics technologies. They will also deploy algorithms and open-source software to process health data and develop predictive models and will assess the socioeconomic value and cost-effectiveness of the new drug. The value of the project is EUR 9.9 million.

LSMU Kauno klinikos main areas of research

Establishment of the Infectious Disease Cluster. It will include the development and installation of state-of-the-art infrastructure for the diagnosis and diseases treatment of dangerous and particularly dangerous infectious diseases (construction of infectious disease facilities, procurement of medical equipment, etc.) that meets the highest safety standards. Also, purchase and develop research and innovation infrastructure, as well as implement methodological management activities.

Establishment of the Nuclear Medicine Research Center. Kauno klinikos, together with Lithuanian University of Health Sciences and Kaunas University of Technology, is launching a national investment project called Implementation of Innovative Technologies for Diagnosis, Treatment, and Research of Oncological Diseases. The goal is to make advanced diagnostic services more accessible to Lithuanians and to mobilise the country's research potential. As part of the project, new infrastructure will be established: The Nuclear Medical Research Center, which will include a medium-energy (16-24 MeV) cyclotron and all the equipment needed to produce radiopharmaceuticals.

Development and testing of a model for the provision of telemedicine services in emergency departments (pilot study). The project aims to improve the availability and quality of emergency medical services in the admission-emergency departments of Lithuanian district/regional hospitals by developing and implementing a model for emergency telemedicine services provision, bridging the gap between city and district residents. To achieve this goal, 3 major medical institutions in Lithuania – Kauno klinikos, Vilnius University Hospital Santara Clinic and Republican Vilnius University Hospital – collaborated in pilot project activities.

Establishment of the Human Biological Resources Center (biobank). The goal of this project is to create a national Human Biological Resources Center (HBRC) with a standardised system for collecting, processing, storing and managing biological samples and related health data. The project is being carried out in collaboration with the following partners: Vilnius University Hospital Santaros klinikos, Lithuanian University of Health Sciences, National Cancer Institute, Vilnius University, and the Centre for Innovative Medicine.

Development of precision medicine to improve the quality and accessibility of personal healthcare services by creating a modern and advanced platform for holomics of personal health data that can use artificial intelligence to analyse medical data, identify specific symptoms and predict disease progression based on a diverse medical data. The project will increase the availability of innovative treatments for Lithuanian patients suffering from cancer, ischemic heart disease, and rare diseases. Increased opportunities for Lithuanian scientists and researchers to develop innovative products and apply artificial intelligence, allowing clinical data to be used to its maximum potential and diseases to be identified and diagnosed early. Furthermore, more precise predictions of patient clinical outcome, to apply the principles of precision medicine in Lithuania, which is expected to become a daily practice in Europe within 5–10 years.

The Center for Clinical and Basic Research will increase the availability and quality of clinical trials for Lithuanian residents, create an environment favourable to patients and doctors, doctors-researchers, and will ensure the increase in the number of researches initiated by researchers. Clinical researchers working in Kauno klinikos will directly contribute to the development of science and innovation after the establishment of the Clinical Research Centre and its laboratories that meet the requirements of good laboratory practice, also after providing the Centre with an infrastructure that fulfils other essential criteria, by introducing standards of good clinical practice. The concept proposes conducting a feasibility study of clinical research in the Kaunas region and developing a regional development strategy.

KAUNAS STP: FLEXIBLE SOLUTIONS

Kaunas STP is a hub for science, business, and technology developers. It creates a synergy that helps new initiatives to emerge and grows the innovation community. Over 110 of our companies and teams develop technologies and products that are being recognized in local and global markets.

Key achievements of Kaunas STP community:

2020		2021
42,4 M	Income	42,2 M
6,86 M	Paid taxes	7,8 M
169	Scientists in teams	183
82	Inovation projects	84
7	Technology transfers	6
92	New products/ services	81
8,15 %	R&D expenditure	14,83 %
133	Community members	128
793	Team members	614
21	New teams	17
3	Spin-offs	2
19	Freelancers in 2 coworking spaces	7

Companies and their solutions

Rubedos: Computer vision for robots

Rubedos is developing three-dimensional environmental perception technology for the rapidly growing number of autonomous robots. This technology combines the principles of machine stereoscopic vision and artificial intelligence into a single system. The technology has led to the development of a commercial product

Softneta: MedDream DICOM Library solution

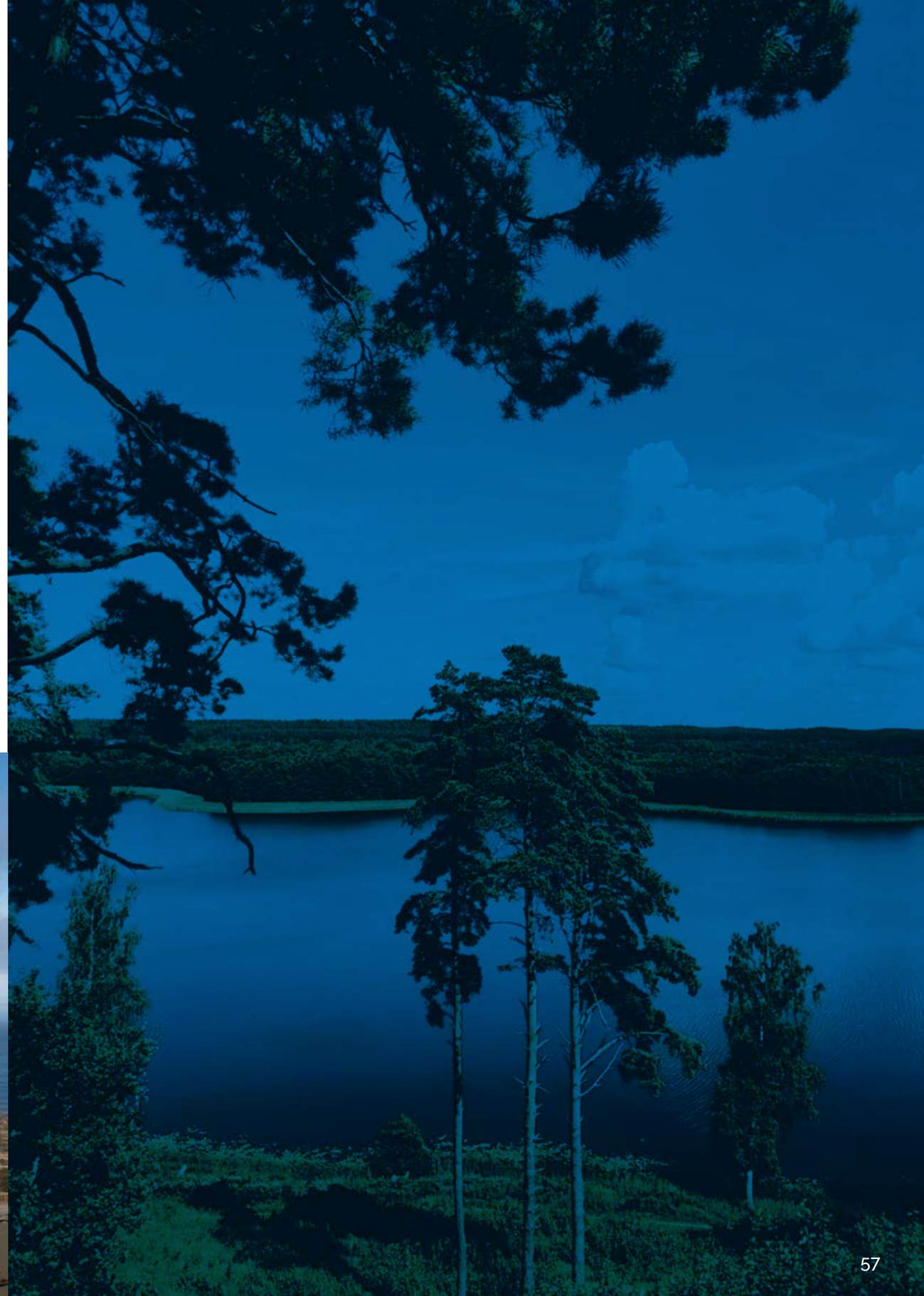
Softneta is an innovative IT company is developing specialised software, medical imaging and communication solutions to improve the quality of healthcare. The DICOM Library is a free portal for sharing medical DICOM studies for scientific and educational use. The uniqueness and relevance of the DICOM Library has led to its worldwide popularity.

Gruppo Fos Lithuania: Biomedical electronic equipment for post-stroke monitoring

Biomedical engineers from the biotechnology company Gruppo Fos Lithuania, based in Kaunas Science and Technology Park, and scientists from Kaunas University of Technology and Lithuanian University of Health Sciences have patented an advanced a health monitoring technology for stroke survivors. It is the first solution in the world to simultaneously monitor and analyse the patient's health status, both in the part of the brain affected by the stroke and in the functioning of the cardiovascular system.

NanoAvionics: Space Engineering Laboratory

NanoAvionics is a Lithuanian space technology company that was founded 6 years ago at Vilnius University. Recently, the company opened its branch in Kaunas Science and Technology Park and set up a space engineering laboratory. NanoAvionics is the first Lithuanian space technology company to develop and supply the next generation electronic and mechanical solutions and components for small satellite systems.



CONCERN ACHEMA GROUP: TOWARDS REDUCING EMISSIONS

As an active participant not only in business but also in many communities and initiatives, the company became a co-founder of the Santaka Valley Association, founded in 2009.

Achema Group is the sole business representative of Santaka Valley. Together with the four largest educational institutions in Lithuania – Kaunas University of Technology (KTU), Lithuanian University of Health Sciences (LSMU), Vytautas Magnus University (VMU), Lithuanian Energy Institute (LEI), Hospital of Lithuanian University of Health Sciences (LSMU) Kauno klinikos and Kaunas Science and Technology Park (Kaunas STP) – Achema Group develops and maintains a model for collaboration between science and business.

In line with the European Union's Green Deal policy, Concern Achema Group initiated a competition for scientific ideas on CO_2 utilisation at KTU last year. Out of nine proposed topics, four were selected:

- Feasibility study on reducing CO_2 emissions through electrochemical technologies
- Plasma hydrogenation of CO_2 to methanol
- Development of technology for the production of calcareous binders that harden in the CO_2 environment
- Development of artificial fillers from biofuel and municipal waste incineration ash and various binders using pellet and CO_2 hardening technology

Besides collaborating with scientists, the Concern Achema Group uses the Santaka Valley Open Access Centre. The Centre has a high level of modern laboratory equipment that allows addressing technical problems in manufacturing.

Cooperation with the academic community provides faster access to first-hand information, identifying current trends, learning about scientific news, and anticipating future research trends. Furthermore, as a business representative, the Achema Group can communicate what business expects from academic institutions, as well as share its future visions, insights, and plans.


SANTAKOS
SLĖNIS