NATIONAL LABORATORIES PROGRAMME

National Research, development and Innovation Office
Hungary

Ministry of Culture and Innovation

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Dear Reader,

The sustainable growth of Hungary's economy and the long-term strengthening of its competitiveness can be ensured by innovative ideas resulting in marketable products and technologies with high added value. The government's strategic goal is for Hungary to emerge as one of the major innovators in Europe and the world by the end of the decade. The key to this is a modern, efficient way of knowledge production and value creation based on research results, innovative ideas and cross-sectoral cooperation, the guidelines and tools of which are outlined in the John von Neumann Programme adopted in 2023.

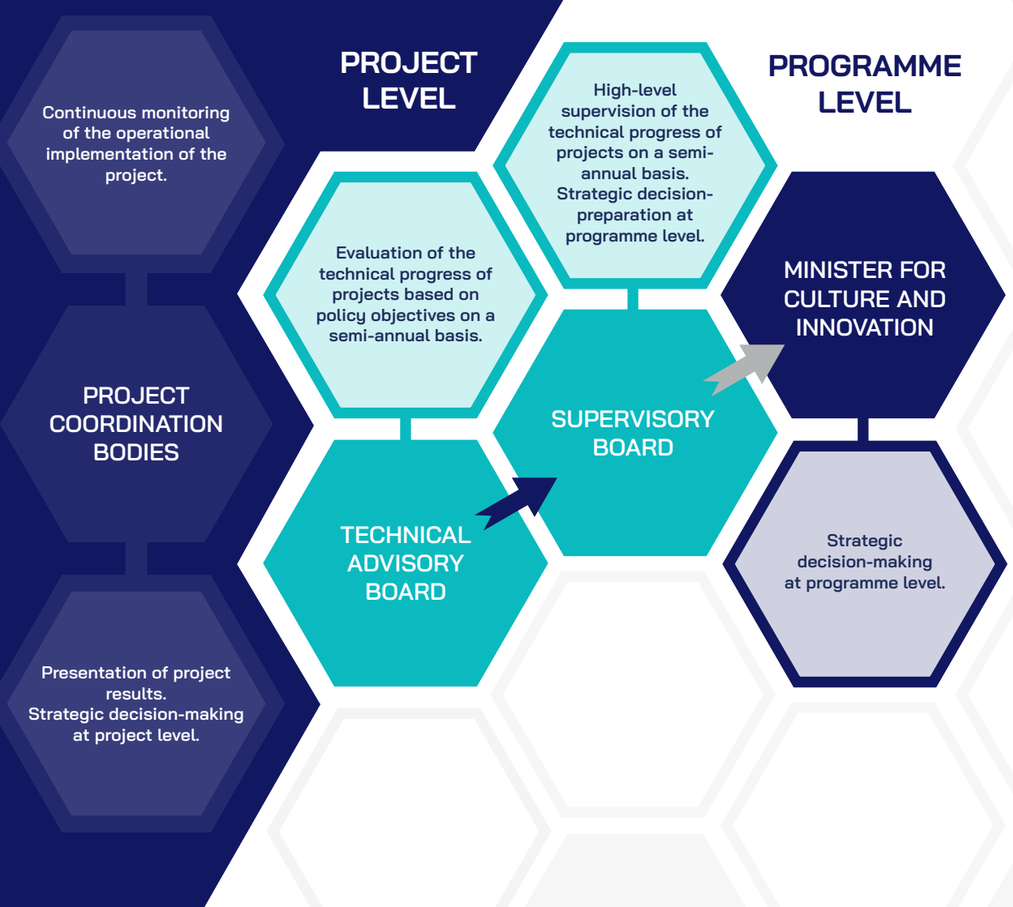
The value of Hungarian R&D expenditure has been growing dynamically since 2016. In 2023 it exceeded HUF 1,000 billion, approximately EUR 2.6 billion, of which 31% came from state resources and 69% from the business sector. Beyond the increased spending, an advanced institutional framework, modernized research infrastructures, targeted support of research careers, and fostering of industry-academia collaborations all add up to stimulate the performance of the Hungarian innovation ecosystem.

To that end, the National Laboratories Programme announced in 2021 is one of our forward-looking initiatives, a significant step towards ensuring that Hungarian knowledge and expertise serve to address global challenges, so that scientific achievements bring tangible societal, economic and environmental impact. In the era of digital transformation, the role of networks at the crossroads of knowledge transfer and knowledge exchange is becoming more important, increasing the significance of National Laboratories, but also their responsibility. Within the framework of the programme, National Laboratories have been established in four thematic areas: Safety and Security; Healthy Living; Digital Transition of Economy and Society; Green Transition. These new professional hubs bring together the most outstanding stakeholders in fields particularly promising for the national economy and combine their resources to enhance competitiveness on the international stage.

Our goal is for the new knowledge centres to achieve scientific breakthroughs, to play a proactive role in the European research area, to secure more EU funding for Hungarian RDI projects than before, and to contribute significantly to our strategic goal of increasing the prosperity and well-being of the Hungarians.

Halfway through the programme, we not only share our vision on these pages, but also provide an overview of the results achieved so far, showcasing the unique capacities and competencies of 23 National Laboratories, through which we can become useful partners in the world's leading collaborations in the given fields.

Dr. Balázs Hankó
Minister of Culture and Innovation



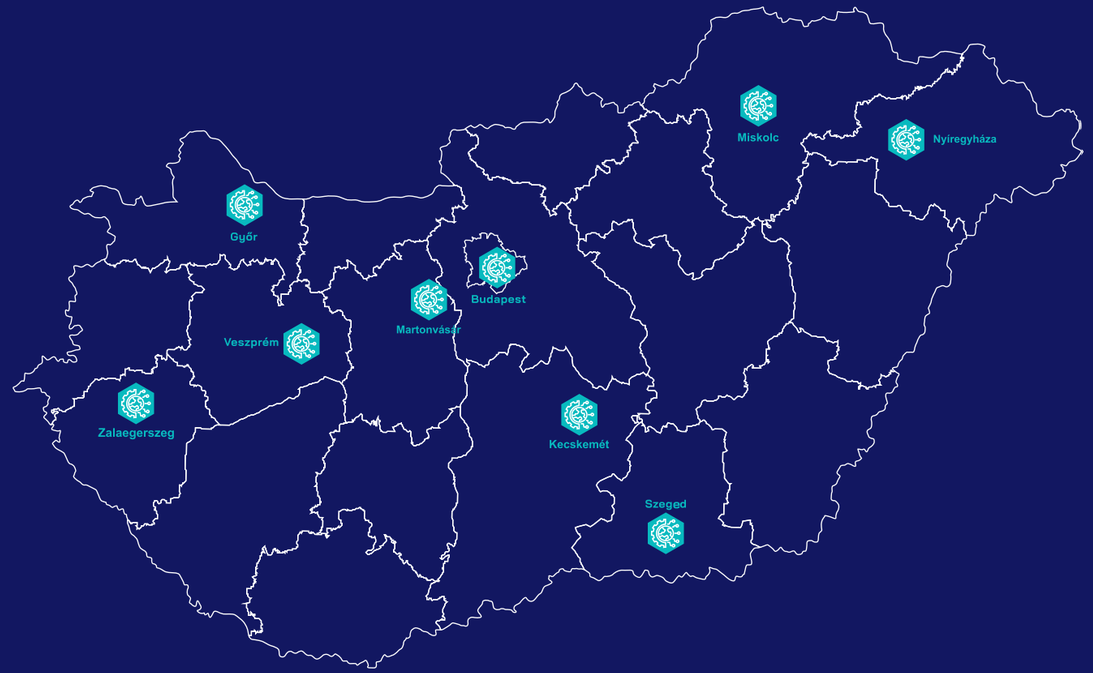
National Laboratories Programme Management System

The **National Laboratories Program Management System** has been established to ensure effective, results-oriented operations in the National Laboratories.

For the efficient and focused operation of the funded projects, each National Laboratory establishes its own **Project Coordination Body** (PIT), which is responsible for supervising and monitoring the operational management of the project. The PIT makes decisions within the designated framework of the project, accepts changes, and discusses and approves the project's semi-annual work plan for the upcoming period. Furthermore, it discusses the project's semi-annual progress report and its attachments, and decides on their acceptance or calls for modification or supplementation.

The **Technical Advisory Board** conducts the professional evaluation of the National Laboratories, supports the Supervisory Board and the Project Coordination Bodies of each National Laboratory by formulating recommendations, and provides a direct flow of information to the Supervisory Board on the progress, risks, issues of the projects, and their compliance with policy objectives.

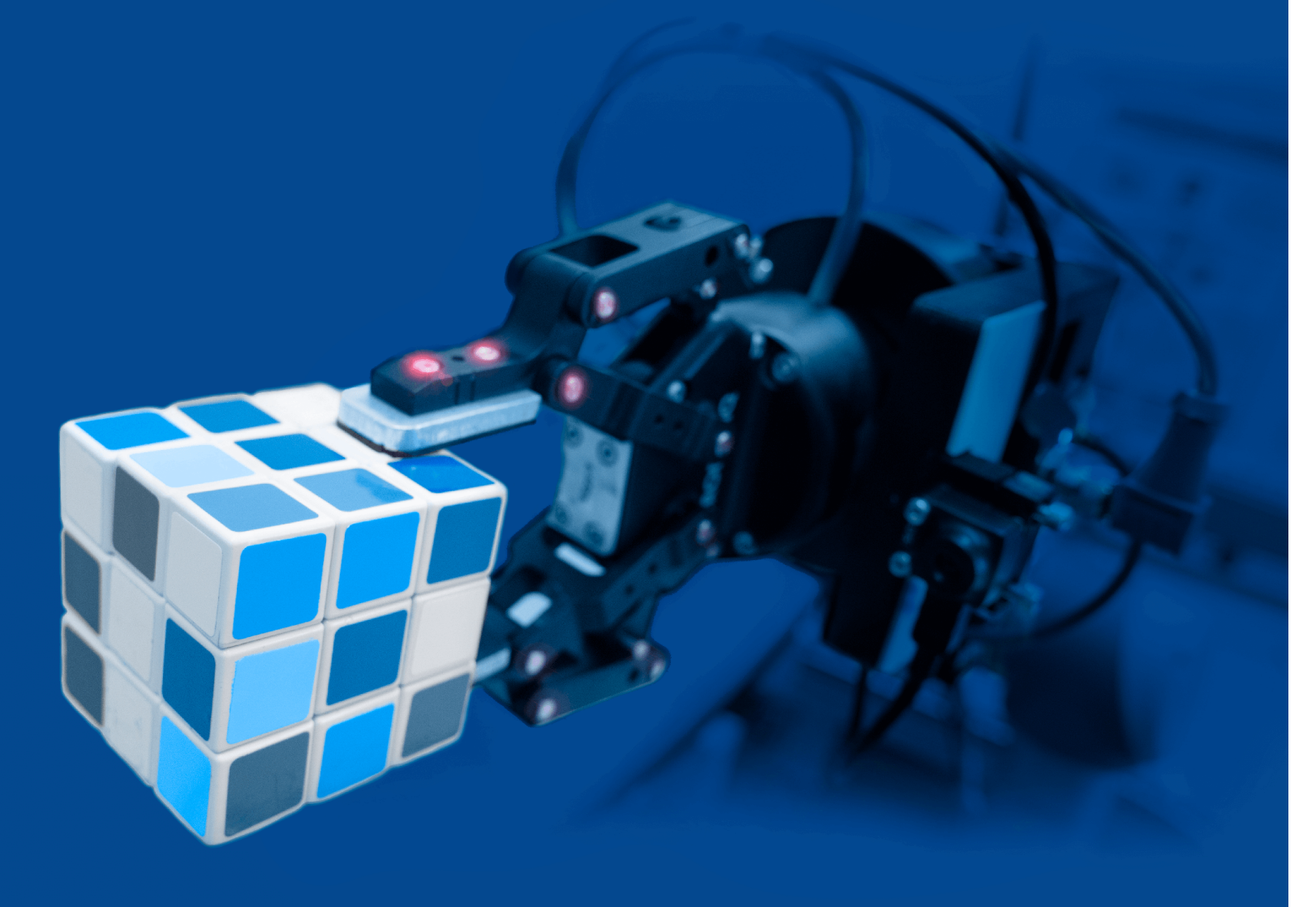
In order to ensure the effective implementation of the National Laboratories Programme, the **Supervisory Board** performs the high-level technical supervision of the projects, examines the alignment of individual projects with policy objectives within the framework of semi-annual reports, and based on this, formulates recommendations for the realisation of the professional objectives for the next period.



Digital transformation of economy and society

Implementing partners

Budapest University of Technology and Economics
Eötvös Loránd University
HUN-REN Alfréd Rényi Institute of Mathematics
HUN-REN Centre for Social Sciences
HUN-REN Institute for Computer Science and Control
HUN-REN Institute of Experimental Medicine
HUN-REN Research Centre for the Humanities
HUN-REN Wigner Research Centre for Physics
KINCSINFO Nonprofit Ltd.
National Archives of Hungary
Network for Regional Development Foundation
Semmelweis University
Special Service for National Security
Széchenyi István University
University of Miskolc
University of Pannonia
University of Szeged



Artificial Intelligence National Laboratory

ARTIFICIAL INTELLIGENCE
National Laboratory

Future is AI

Places of implementation:
Budapest, Győr, Kecskemét, Szeged

Consortium leader:
HUN-REN Institute for Computer Science and Control

Consortium partners:
Budapest University of Technology and Economics
Eötvös Loránd University
HUN-REN Alfréd Rényi Institute of Mathematics
HUN-REN Centre for Social Sciences
HUN-REN Institute of Experimental Medicine
KINCSINFO Nonprofit Ltd.
Semmelweis University
Special Service for National Security
Széchenyi István University
University of Szeged

The Artificial Intelligence National Laboratory aims to strengthen Hungary's role in the field of artificial intelligence. In response to the international and domestic challenges, the Laboratory was established in 2020 to maximise the competitive advantage of Hungary in one of the most important RDI fields of our time, strengthening both basic and applied research and innovation activities, and promoting Hungary's chances of participation in transnational megaprojects.

MAIN RESEARCH AREAS:

- Theoretical foundations of mathematics and machine learning
- Security and protection of personal data
- Machine vision and perception
- Machine learning-based smart manufacturing, logistics
- Telecommunications, IoT
- Language technology
- Medical, healthcare applications

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milab@sztaki.hu
mi.nemzetilabor.hu

National Laboratory for Autonomous Systems

AUTONOMOUS SYSTEMS
National Laboratory

Autonomous systems do watch, decide, produce, drive, and even fly

Places of implementation:
Budapest, Győr, Kecskemét, Zalaegerszeg

Consortium leader:
HUN-REN Institute for Computer Science and Control

Consortium partners:
Budapest University of Technology and Economics
Széchenyi István University

Contact:
autonom@nemzetilabor.hu
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National Laboratory for Autonomous Systems aims to coordinate mobility-related research, development and innovation solutions for road and air vehicles and robots, with a focus on complex systems, formations and applications requiring autonomous and cooperative operation.

MAIN RESEARCH AREAS:

- Autonomous road and air vehicles
- Autonomous robotics and manufacturing systems
- Management planning strategies
- Vehicle dynamics and control
- Cooperative management
- Robotics modelling and control
- Mobile robotisation
- Applied research infrastructure
- Infocommunications
- Systems integration research
- Electromobility
- Digital twin, mathematical modeling, simulation

National Laboratory for Digital Heritage

Encoding our heritage for innovation

Places of implementation:
Budapest, Miskolc

Consortium leader:
Eötvös Loránd University

Consortium partners:
HUN-REN Research Centre for the Humanities
National Archives of Hungary
University of Miskolc

Contact:
contact@dh-lab.hu
dh-lab.hu

The aim of the Laboratory is to promote the processing, research usability and broad smart accessibility of digital cultural heritage using digital technologies, especially artificial intelligence, in Hungary and in Hungarian speaking communities. The Laboratory's main task is also to organize a web-harvest with the aim of collecting web resources relevant to research and innovation in the Hungarian community.

MAIN RESEARCH AREAS:

- Gold standard corpus
- Text mining processing
- Annotated existing corpora
- Web-harvest of Hungarian texts
- "Born digital" labs
- Making digital cultural heritage searchable
- Natural language processing
- Processing literary corpora using artificial intelligence
- Digitisation and processing of Hungarian written heritage beyond the borders
- Handwriting recognition and character recognition systems

National Laboratory for Social Innovation

Together for an innovative society!

Places of implementation:
Budapest, Miskolc, Nyíregyháza, Veszprém

Consortium leader:
Eötvös Loránd University

Consortium partners:
Network for Regional Development Foundation
University of Miskolc
University of Pannonia

Contact:
tinlab.kommunikacio@innovacio.elte.hu
tinlab.hu

The objective of the National Laboratory for Social Innovation (TINLAB), established in 2020, is to implement innovations that contribute to the well-being of society and foster new social partnerships. The mission of the Knowledge Centre is to support social innovators and social innovation activities, to provide knowledge management services. TINLAB contributes to the publicity of social innovation and to the development of professional frameworks. In addition to the implementation of R+D+I projects, adult education programs (social innovation manager training and mentor training) are also provided. TINLAB supports experimental developments, operates a mentor network and thematic forums.

MAIN RESEARCH AREAS:

- Social innovation methodologies
- Social impact of digitalisation
- Social innovations that improve quality of life
- Culture, competence, and human capital

Quantum Information National Laboratory

Hungary in the second quantum revolution

Place of implementation:
Budapest

Consortium leader:
HUN-REN Wigner Research Centre for Physics

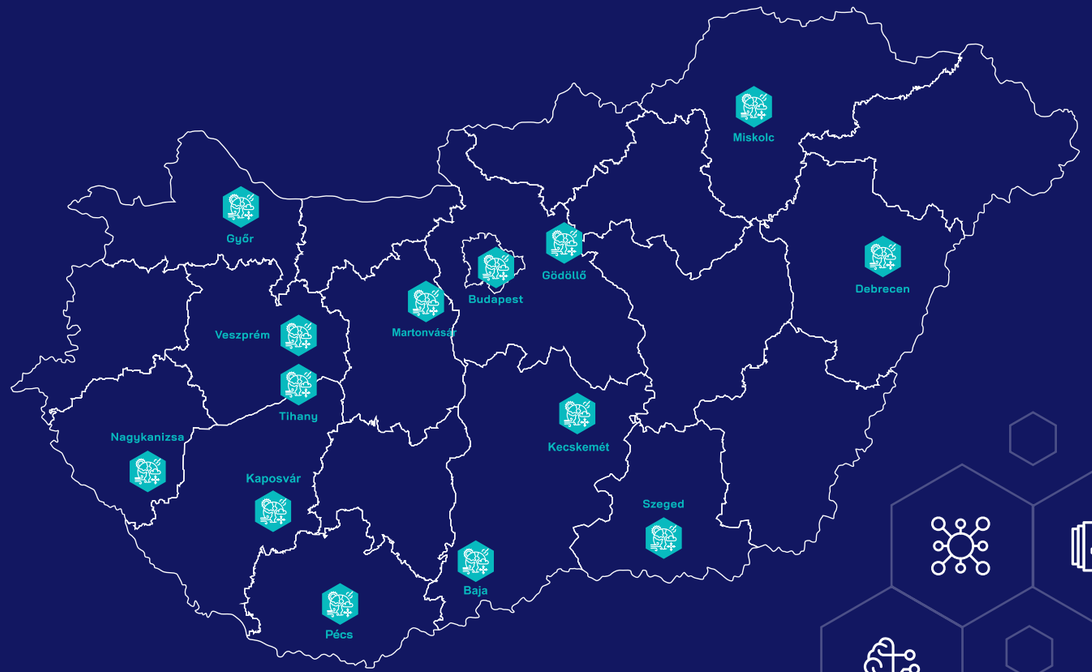
Consortium partners:
Budapest University of Technology and Economics
Eötvös Loránd University

Contact:
qnl@wigner.hu
qi.nemzetilabor.hu

One of the greatest scientific challenges of the decade is translating advancements in the quantum control of photons, atoms, and electrons into practical quantum technology solutions. The Quantum Information National Laboratory aims to bring together national resources in physics, engineering, mathematics and computer science and to focus their activities on specific theoretical and applied areas of quantum technology. The Laboratory will maximise the role and importance of Hungary in the field of quantum computing through well thought-out and coordinated developments.

MAIN RESEARCH AREAS:

- Quantum communication network
- The building blocks of quantum computing
- Quantum computation and simulation of quantum systems



Green transition

Implementing partners

Budapest University of Technology and Economics
Eötvös Loránd University
General Directorate of Water Management
Hungarian National Meteorological Service
Hungarian University of Agriculture and Life Sciences
HUN-REN Balaton Limnological Research Institute
HUN-REN Biological Research Centre, Szeged
HUN-REN Centre for Agricultural Research
HUN-REN Centre for Ecological Research
HUN-REN Centre for Energy Research
HUN-REN Research Centre for Natural Sciences
HUN-REN Wigner Research Centre for Physics
John von Neumann University
National Food Chain Safety Office
National University of Public Service
Semmelweis University
Széchenyi István University
University of Debrecen
University of Miskolc
University of Pannonia
University of Pécs
University of Szeged

Agribiotechnology and precision breeding for food security National Laboratory

Agribiotechnology for food security

Places of implementation:
Gödöllő, Kaposvár, Martonvásár, Szeged

Consortium leader:
HUN-REN Centre for Agricultural Research

Consortium partners:
Hungarian University of Agriculture and Life Sciences
HUN-REN Biological Research Centre, Szeged

Contact:
agri-biotech@atk.hun-ren.hu
agri-biotech.hu

The main objective of the Agribiotechnology and precision breeding for food security National Laboratory is to give scientifically based responses to complex challenges emerging in agriculture. The National Laboratory integrates the main components of the agroecosystem and the micro-plant-animal triangle assigning food security of „One Health View" set up by WHO as a common goal. Its results will be applied in almost every aspect of agriculture, including animal husbandry, crop production, food industry and animal health. In addition the Laboratory is actively involved in national higher education, the training of future generations of scientists and knowledge transfer.

MAIN RESEARCH AREAS:

- Characterization of mycorrhiza-plant symbioses and their application to improve crop yields
- Investigating the substitution of antibiotic use, the spread of resistance and understanding possible resistance mechanisms
- Characterization of mycotoxins and reduction of feed-derived exposure
- Molecular mechanisms of resistance to the Ralstonia pathogen in potato
- A novel precision breeding tool and its application to produce disease-resistant small grains
- Development of innovative genome editing and breeding technologies for the improvement of drought adaptation of maize
- Development of an efficient and safe genome editing technology in mammals and birds

Agrotechnology National Laboratory

Laboratory networking and data-driven decision making for sustainability

Places of implementation:
Budapest, Gödöllő

Consortium leader:
National Food Chain Safety Office

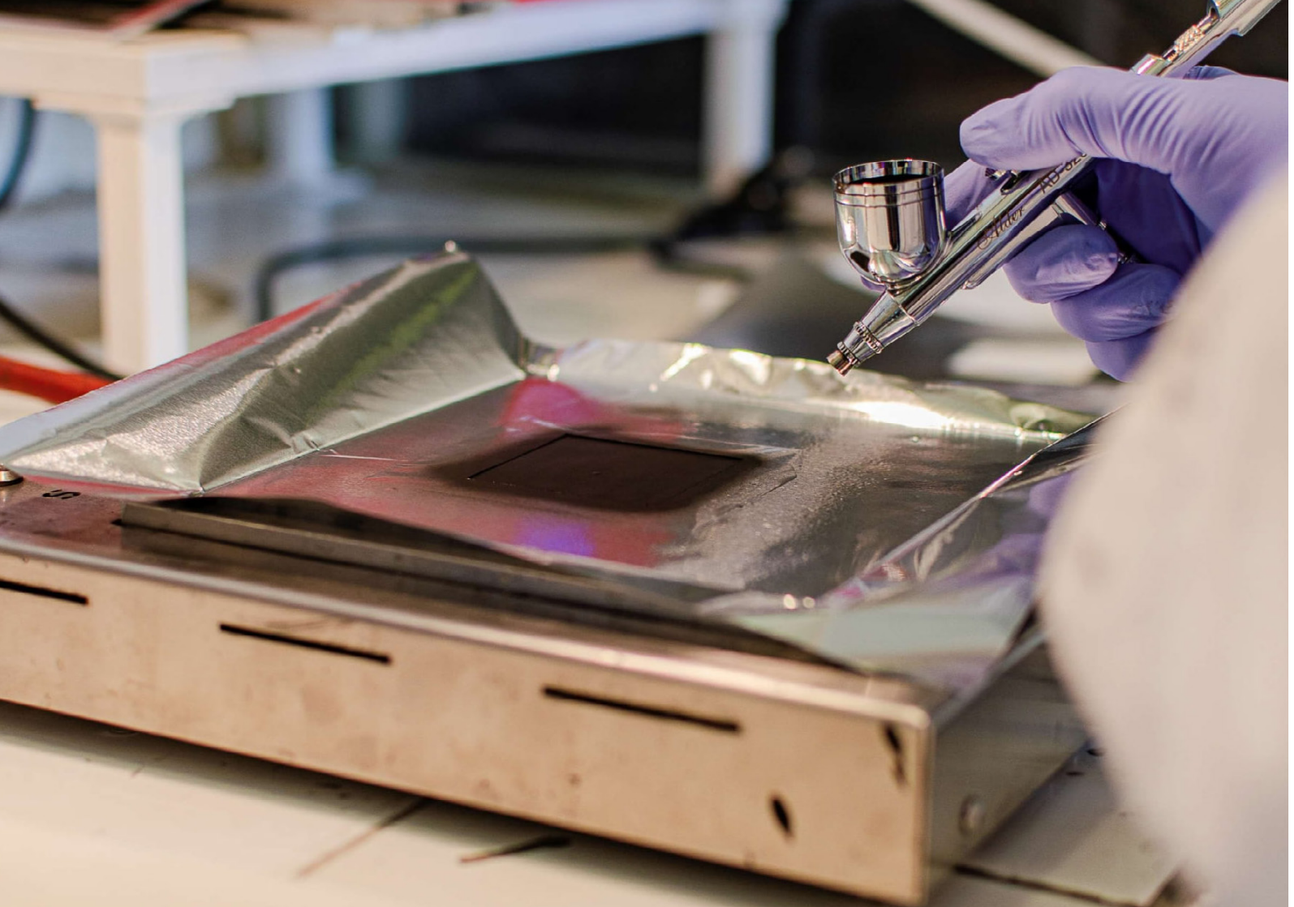
Consortium partner:
Hungarian University of Agriculture and Life Sciences

Contact:
talajvedelem@nebih.gov.hu
portal.nebih.gov.hu

The Agrotechnology National Laboratory aims to support the preservation and improvement of soil and its intrinsic environmental condition, while promoting environmental sustainability. Its activities cover the integration of domestic soil test results into a unified database, the creation of opportunities for the routine application of spectral methods enabling time- and cost-efficient, environmentally friendly laboratory soil testing, the establishment of the first domestic soil spectral library, the investigation of different biomass materials and their potential for energy and soil replenishment through different technologies, and the innovative development of modern crop protection technologies with minimal environmental impact.

MAIN RESEARCH AREAS:

- A national, high-resolution soil database
- Spectroscopy-based soil parameter determination method
- Domestic soil spectral library
- Biomass fuels
- Performance and environmental testing and certification of solid fuel combustion equipment
- Plant protection machinery and plant protection technologies
- Environmental analysis, monitoring of environmental pollutants



National Laboratory for Renewable Energy

Science and technology for a sustainable future

Places of implementation:
Budapest, Debrecen, Győr, Kecskemét, Miskolc, Nagykanizsa, Pécs, Szeged, Veszprém

Consortium leader:
University of Pécs

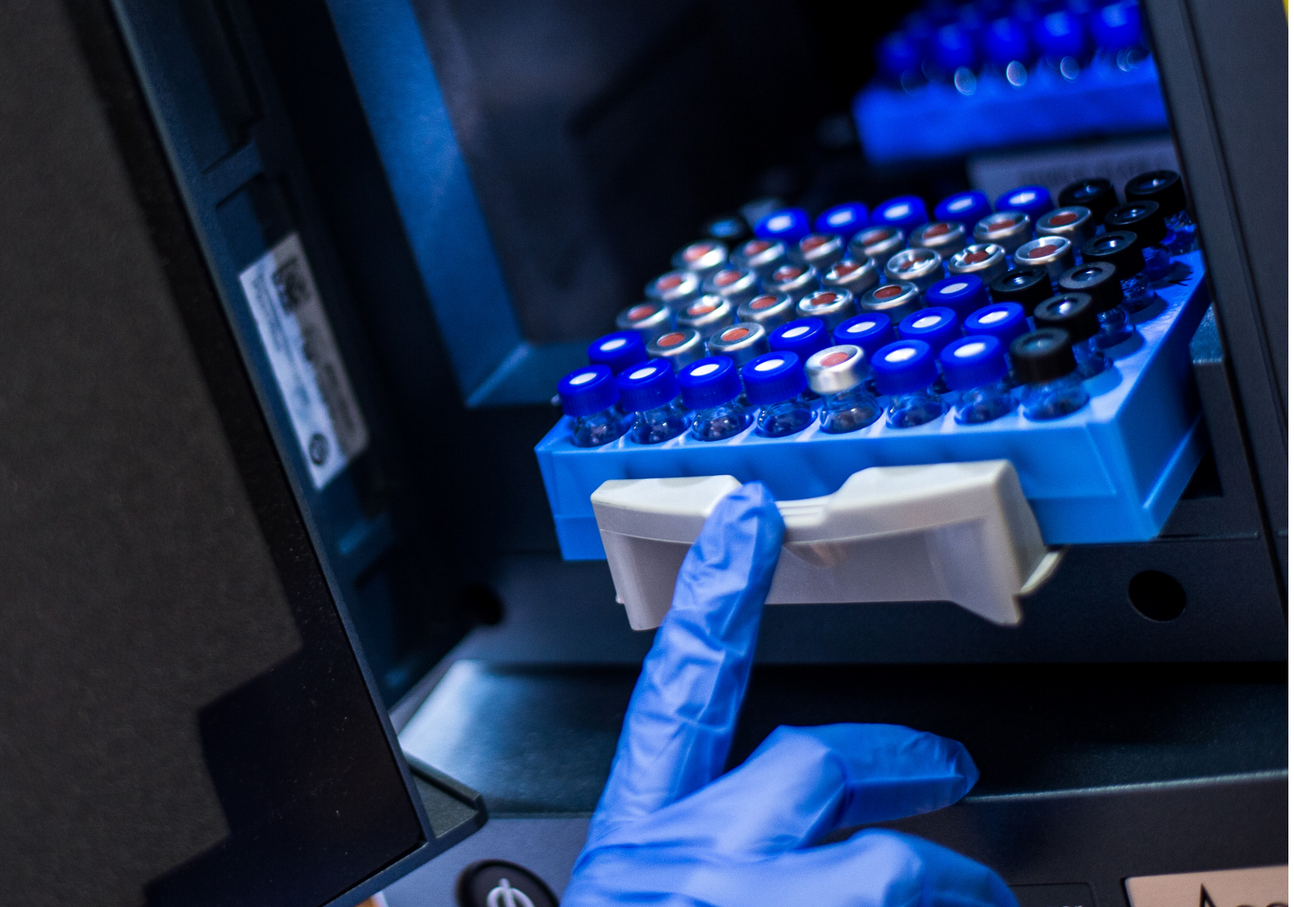
Consortium partners:
Budapest University of Technology and Economics
HUN-REN Centre for Energy Research
HUN-REN Research Centre for Natural Sciences
John von Neumann University
Széchenyi István University
University of Debrecen
University of Miskolc
University of Pannonia
University of Szeged

Contact:
menl@pte.hu
projektek.pte.hu/en/node/671

The National Laboratory for Renewable Energy is building the scientific and technological, legal, economic and industrial law protection base for small-footprint energy technologies, especially H2 production/transport/storage/use and CO2 utilization (CCU). The two technology groups can play a significant role in sectoral integration in parallel, supporting each other, iin strengthening energy security of supply and achieving decarbonization goals.

MAIN RESEARCH AREAS:

- R&D of the electroactive and structural components of fuel cells (TCs) and new generation Li-ion batteries, the related electrochemical and electrical engineering, manufacturing technology, and recycling aspects
- Comparing different H2 and CCU technologies and their life expectancy, by the development of test stations
- Scaled-up H2-generating and CO2-converting electrolyzers and catalytic technologies
- Design a demonstration plant that can produce e-synthesis gas and then e-kerosene/e-wax from it
- Disruptive H2 production / storage and CCU processes
- Economic and legal analysis of H2 and CCU and technologies
- Supporting corporate competence creation, sectoral integration and educational activities



National Laboratory for Water Science and Water Security

With applied research for sustainable water management

NATIONAL LABORATORY FOR WATER SCIENCE AND WATER SECURITY

Places of implementation:
Baja, Budapest, Debrecen, Győr, Miskolc, Nagykanizsa, Tihany, Veszprém

Consortium leader:
University of Pannonia

Consortium partners:
HUN-REN Balaton Limnological Research Institute
Budapest University of Technology and Economics
HUN-REN Centre for Agricultural Research
HUN-REN Centre for Ecological Research
General Directorate of Water Management
Hungarian Meteorological Service
National University of Public Service
Széchenyi István University
University of Debrecen
University of Miskolc

Contact:
vvnl@pen.uni-pannon.hu
www.vvnl.hu

Considering Hungary's location, water management and water resources, the National Laboratory aims to support the implementation of water science and water safety innovations with our current research that contribute to the protection of water quality. The Laboratory assesses in detail the status of various surface and groundwater bodies, using laboratory measurements, computer simulations and taking into account the complexity and central importance of climate change, in order to ensure the security of groundwater resources, territorial and agricultural water management, the „smart" management of urban water, and the modernisation of water and wastewater treatment.

MAIN RESEARCH AREAS:

- Extreme hydrological conditions
- Microplastics, micropollutants
- Freshwater ecology and nature protection
- Early-warning systems for algae dynamic forecasts and for catchments of small rivers
- Karst hydrogeology, hydrogeological monitoring
- Integrated urban hydrological management
- 5G-based rainfall monitoring system
- Hydrodynamic, morphodynamic and ecological processes of river habitats
- Water monitoring system based on artificial intelligence (AI).
- Water resources management practices to safeguard drinking water, ecological water demand and irrigation.
- Drought, irrigation and reclamation, increasing water supply and storage capacity

National Multidisciplinary Laboratory for Climate Change

National Laboratory for Climate Change

Climate change: Integrated science for better adaptability

Places of implementation:
Budapest, Miskolc, Nagykanizsa, Tihany, Veszprém

Consortium leader:
University of Pannonia

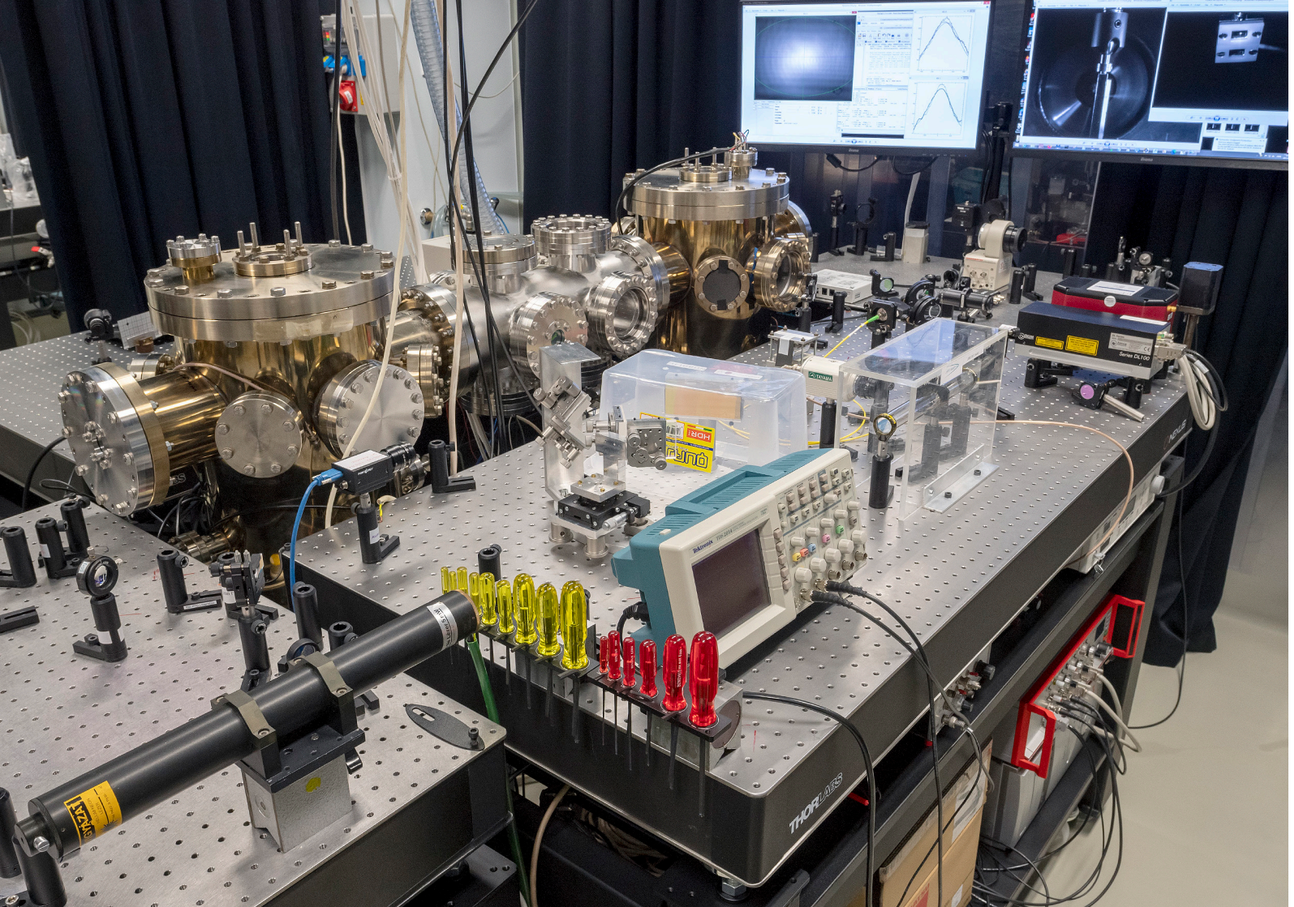
Consortium partners:
Eötvös Loránd University
HUN-REN Balaton Limnological Research Institute
HUN-REN Centre for Ecological Research
Hungarian Meteorological Service
Semmelweis University
University of Miskolc

Contact:
emnl@uni-pannon.hu
klimavaltozas.org

The National Multidisciplinary Laboratory for Climate Change conducts research and development in the field of technological, economic and social adaptation, in addition to studying the drivers of climate change and their impacts on natural and economic systems and society.

MAIN RESEARCH AREAS:

- Meteorological data assessment for evaluation of trends in regional climate change
- Impact of climate change on planktonic organisms and lake sediments
- Impact of climate-change driven weather extremes on acute cardiovascular diseases
- Improved communication to raise public awareness on climate change
- Mitigation of emissions of climate &health-related air pollutants
- Big data-driven research of on mitigation solutions
- Water 4.0 solutions for reducing freshwater use
- Mitigation of CO2 emissions from industrial processes



Research Laboratory for Nanoplasmonic Laser Fusion

NAPLIFE

Nanofusion: unlocking clean energy

Places of implementation:
Budapest, Szeged

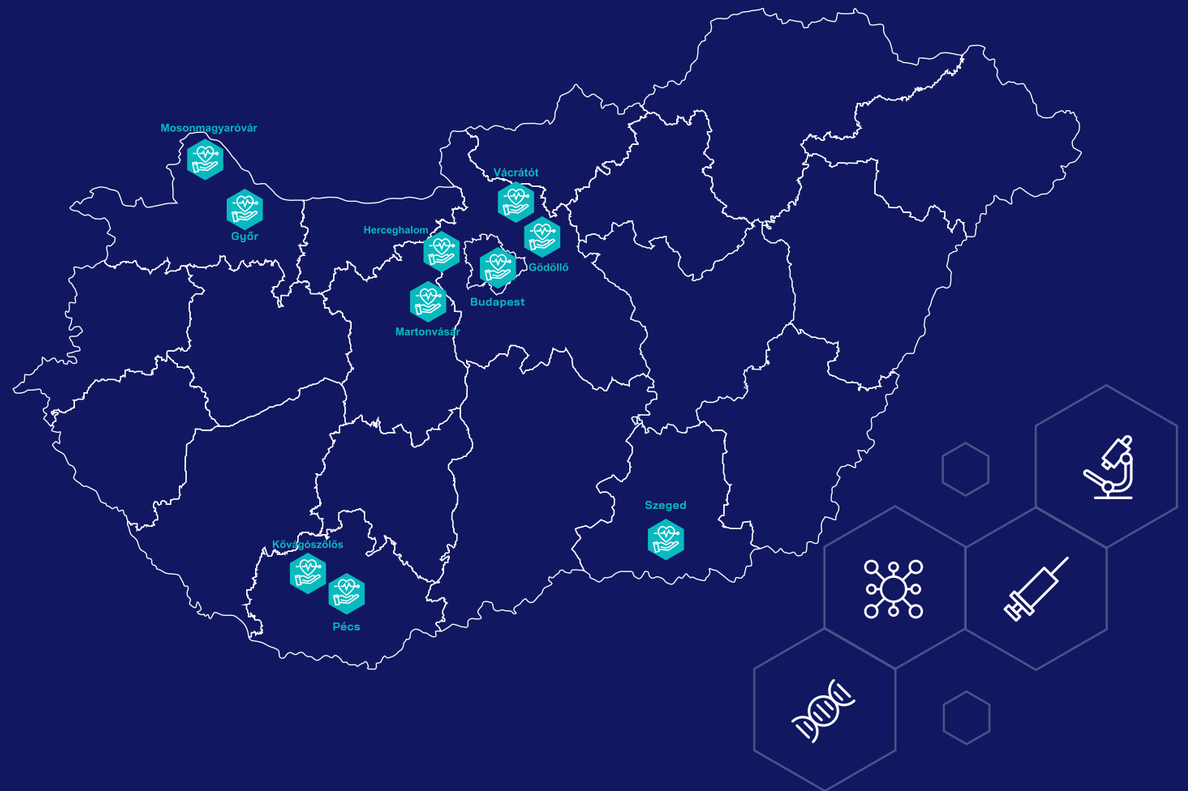
Implementer:
HUN-REN Wigner Research Centre for Physics

Contact:
szeledi.anett@wigner.hu
wigner.hu/naplife

The fusion of light nuclei offers the prospect of highly efficient energy extraction, with no long-term polluting by-products. Alongside the magnetic confinement plasma (ITER), laser-assisted fusion is the subject of research around the world. The lab is exploring new ways to nanotechnologically prepare and laser irradiate the fusion target to increase the efficiency of energy absorption and avoid the development of instabilities during ultrashort pulses.

MAIN RESEARCH AREAS:

- Nanoplasmonics
- Nuclear physics
- Spectroscopy
- Quantum optics
- Non-equilibrium plasma fusion



Healthy living

Implementing partners

3DHISTECH Ltd.
Budapest University of Technology and Economics
Eötvös Loránd University
HCEMM Nonprofit Ltd.
Hungarian University of Agriculture and Life Sciences
HUN-REN Biological Research Centre, Szeged
HUN-REN Centre for Agricultural Research
HUN-REN Centre for Ecological Research
HUN-REN Centre for Social Sciences
HUN-REN Institute for Computer Science and Control
HUN-REN Institute of Experimental Medicine
HUN-REN Alfréd Rényi Institute of Mathematics
HUN-REN Research Centre for Natural Sciences
HUN-REN Veterinary Medical Research Institute
InterSynk Solutions Ltd.
National Institute of Oncology
Óbuda University
Pázmány Péter Catholic University
Pharmahungary 2000 Ltd.
Richter Gedeon Plc.
Semmelweis University
Széchenyi István University
University of Pécs
University of Szeged
University of Veterinary Medicine Budapest

HCEMM Teaming National Labortory

Place of implementation:
Szeged

Implementer:
HCEMM Nonprofit Ltd.

Contact:
natlab@hcemm.eu
hcemm.eu

The main activity of the HCEMM Teaming National Laboratory is research into the causes, treatment, diagnosis and prevention of diseases. Its objective is to establish a centre with a strong focus on translational medicine for healthy ageing, to promote the clinical application of basic research results and to ensure scientific excellence based on an international peer review system. A translational medicine centre will be built to train highly qualified researchers and to carry out cutting-edge research in molecular medicine for chronic and infectious diseases.

MAIN RESEARCH AREAS:

- Translational medicine
- Healthy ageing
- Immuno-inflammatory diseases
- Metabolic and cardiovascular diseases
- Genomic instability and cancers
- Infectious diseases, in particular co-morbidities
- Scientific computing, Bioinformatics and Medical Informatics
- Biobanking and Phase I Clinical Trials

National Cardiovascular Laboratory

Science and innovation for our healthy future

Places of implementation:
Budapest, Herceghalom, Szeged

Consortium leader:
Semmelweis University

Consortium partners:
InterSynk Solutions Ltd.
Pharmahungary 2000 Ltd.
University of Szeged
3DHISTECH Ltd.

Contact:
nkl@semmelweis-univ.hu
semmelweis.hu/nkl

With a brand new revolutionary approach, the National Cardiovascular Laboratory aims to explore the pathophysiological mechanism responsible for age-associated cardiovascular disease in order to develop innovative tools for the diagnosis, prevention and therapy of such diseases. Its main professional pillars are clinical - epidemiological programs, innovative drug and biotechnology developments and the development of innovative medical and diagnostic tools and databases.

MAIN RESEARCH AREAS:

- Clinical-epidemiological programs for the study of ischemic heart disease and heart failure
- Elucidate the potential medium- and long-term cardiovascular consequences of COVID-19 infection
- Innovative drug and biotechnology developments
- New drug targets and repositioning of existing drugs
- The development of in vitro cardiovascular platforms based on human induced pluripotent stem cells
- Innovative medical and diagnostic tools and databases
- Biomarkers and measurement methods for extracellular vesicle-based diagnostic and therapeutic approaches

National Laboratory for Health Security

Multiple disciplines for One Health

National Laboratory HEALTH SECURITY

Places of implementation:
Budapest, Gödöllő, Martonvásár, Pécs, Szeged, Vácrátót

Consortium leader:
University of Szeged

Konzorciumi partnerek:
Eötvös Loránd University
Hungarian University of Agriculture and Life Sciences
HUN-REN Centre for Agricultural Research
HUN-REN Centre for Ecological Research
HUN-REN Centre for Social Sciences
HUN-REN Institute for Computer Science and Control
HUN-REN Alfréd Rényi Institute of Mathematics
HUN-REN Szeged Biological Research Centre
HUN-REN Veterinary Medical Research Institute
Neumann Nonprofit Ltd.
Óbuda University
Pázmány Péter Catholic University
Semmelweis University
University of Pécs
University of Veterinary Medicine Budapest

The vision of the National Laboratory for Health Security is to provide the scientific basis for data and analysis-based decision making in the fields of health, disease prevention and ecosystems in Hungary. The three areas are closely intertwined and new synergies will be created through innovative surveillance systems, big data methods and mathematical modelling. The Laboratory will bring together and coordinate research teams that have been working in isolation in the country, fostering networking and creating a collaborative research community with high visibility on the international scene.

MAIN RESEARCH AREAS:

- Mathematical epidemiology, network science, biostatistics
- Eco-epidemiology
- Zoonotic viruses and bacteria
- Invasion biology
- Ecological causes and consequences of invasion
- Prediction and prognostics
- Diagnostic decision support
- Data-driven health decision support

Contact:
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www.eglab.hu

National Laboratory for Infectious Animal Diseases, Antimicrobial Resistance, Veterinary Public Health and Food Chain Safety National Laboratory

ZOONELAB

To effectively control infectious animal diseases and antibiotic resistance while maintaining food chain safety, a multidisciplinary approach is inevitable.

Places of implementation:
Budapest, Győr, Mosonmagyaróvár

Consortium leader:
University of Veterinary Medicine Budapest

Consortium partners:
HUN-REN Veterinary Medical Research Institute
Széchenyi István University

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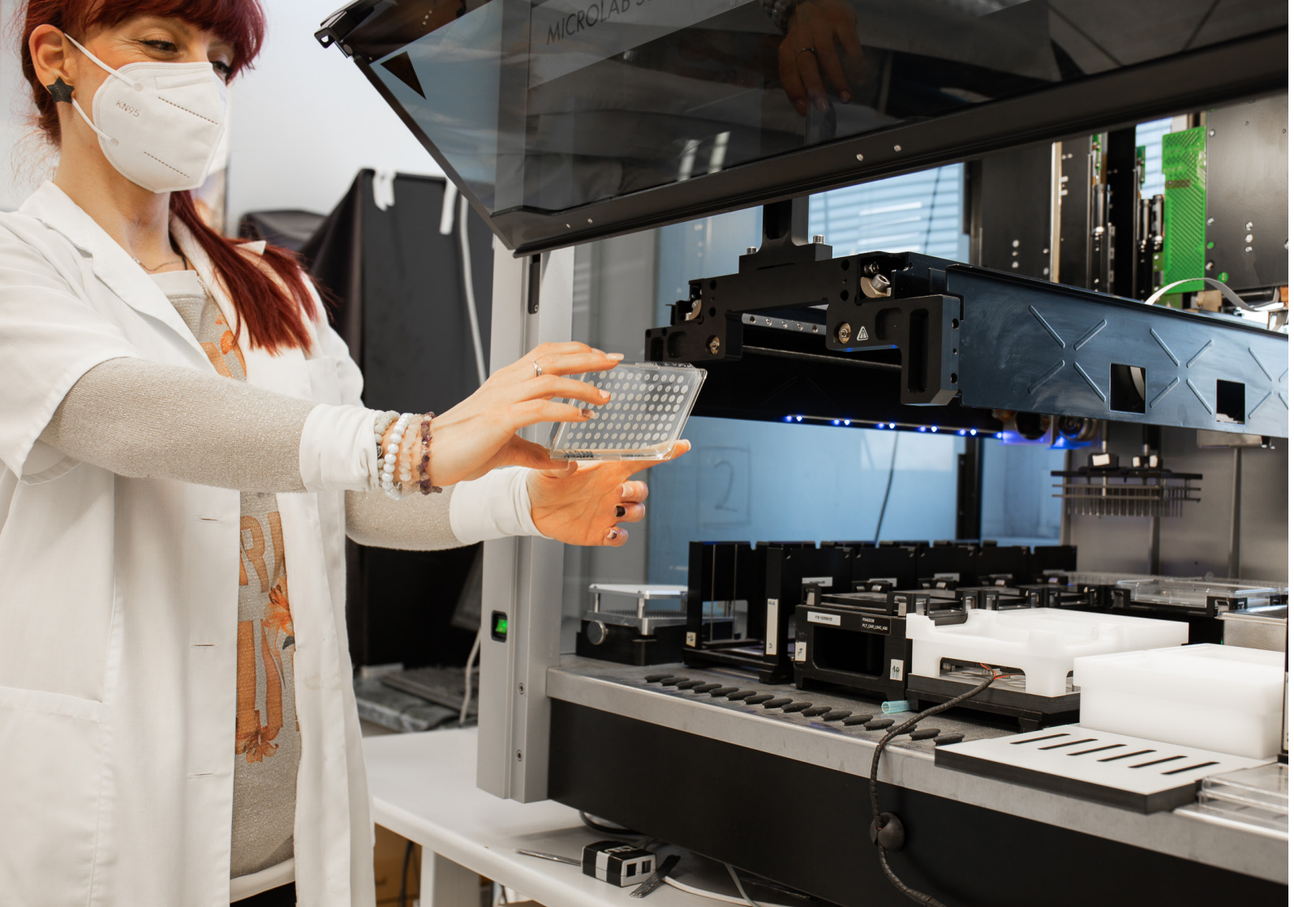
nemzetilabor@univet.hu
univet.hu/nemzetilabor

Main goal of the National Laboratory is to explore and analyse various veterinary and public health risks and to perform research and innovation activities for the development of recommendations, guidelines, diagnostics, vaccines, and drugs for mitigating these risks. In the meantime, professional relations are formed and strengthened with national and international representatives of the animal health and food chain safety sectors, and researchers-lecturers with multidisciplinary, innovation-driven approach are trained. Besides scientific achievements, innovative products and services developed during the project will also be marketed, contributing to an increase in the sector's competitiveness.

MAIN RESEARCH AREAS:

- Antimicrobial resistance
- Infectious diseases of food producing animals
- Development of veterinary drugs, vaccines, and diagnostics
- Chemical and biological risks in the food chain



National Laboratory of Biotechnology

Biotechnology for a healthier future

National Laboratory of Biotechnology

Place of implementation:
Szeged

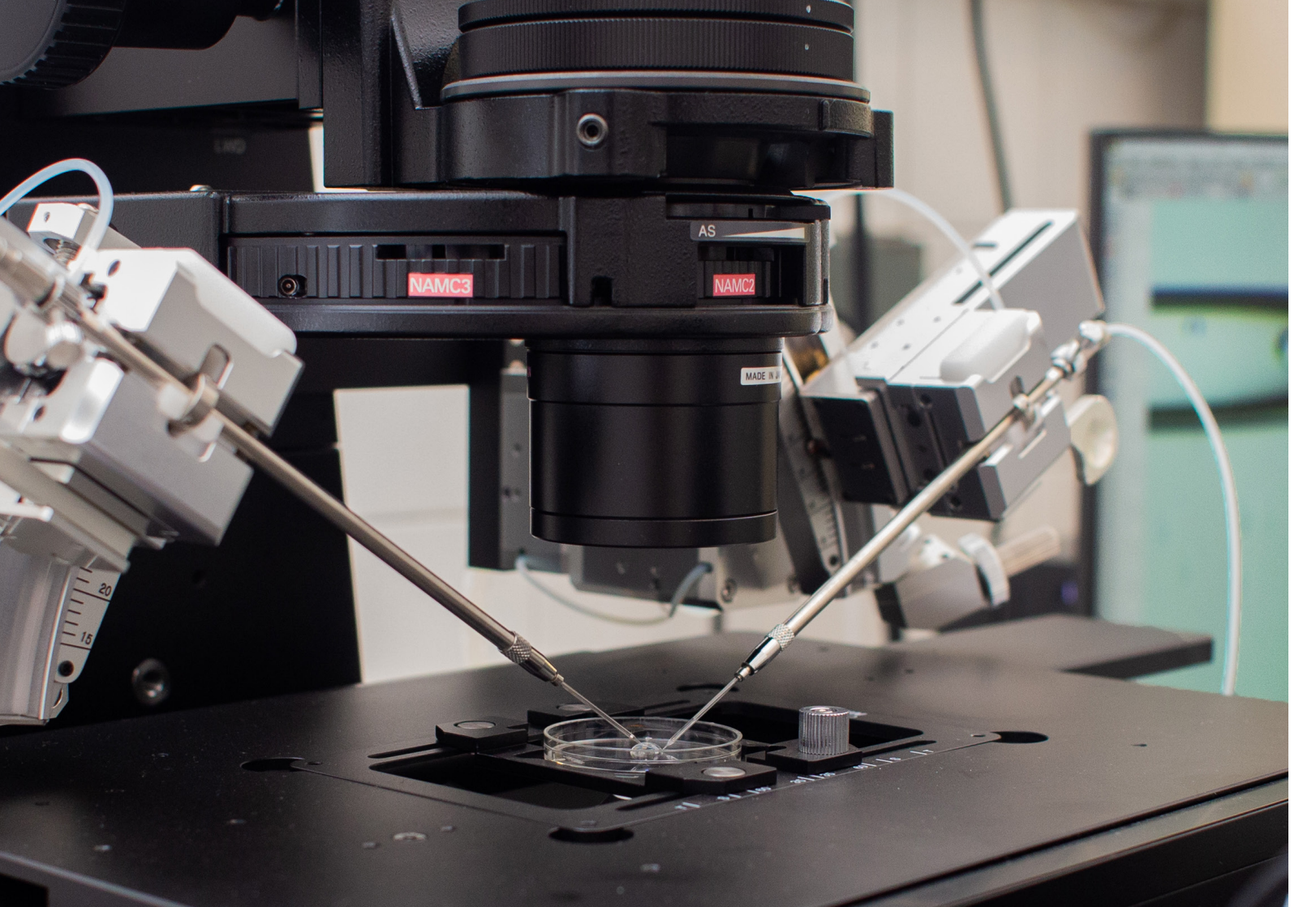
Implementer:
HUN-REN Biological Research Centre, Szeged

Contact:
bnl@brc.hu
bnl.brc.hu

The aim of the National Laboratory of Biotechnology is to develop uniquely competitive technologies and therapeutic methods using the most advanced biotechnology tools in Hungary in three priority health areas: the spread of antibiotic-resistant bacteria, the emergence of pandemic diseases worldwide and the treatment of rare hereditary diseases.

MAIN RESEARCH AREAS:

- Developing new antibiotics and alternative therapies
- mRNA-based vaccination methods
- Therapy for rare inherited diseases



National Laboratory on Human Reproduction

National Laboratory on Human Reproduction

Human reproduction: the meaning of life!

Place of implementation:
Pécs

Implementer:
University of Pécs

Contact:
hrnl@pte.hu
hrnl.pte.hu

The National Laboratory on Human Reproduction is dedicated to research into the stages of human conception, including a wide range of inherited and acquired disorders of the female and male organism, the assisted reproductive process and the long-term health problems of the resulting children. The Laboratory's methodological repertoire includes state-of-theart molecular genetic, genomic and immunological methods, but it also deals with health economics and social issues of human reproduction. The research findings provide a technical basis for new health policy objectives, policy packages and the development of primary health care.

MAIN RESEARCH AREAS:

- Assisted reproduction
- Female and male infertility
- Molecular maternal and embryo diagnostics
- Genetic problems of reproduction
- Immunological problems of reproduction
- Embryo light protection

National Laboratory of Pharmaceutical Research and Development

Health together: cooperation to promote health research and development

Places of implementation:
Budapest, Kővágószőlős, Pécs, Szeged

Consortium leader:
HUN-REN Research Centre for Natural Sciences

Consortium partners:
Budapest University of Technology and Economics
Eötvös Loránd University
HUN-REN Biological Research Centre, Szeged
HUN-REN Institute of Experimental Medicine
University of Pécs

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pharmalab@ttk.hu
pharmalab.hu

The aim of National Laboratory of Pharmaceutical Research and Development's (PharmaLab) activities is to create a critical mass in Hungary, in cooperation with universities, research institutes, European research organizations, SMEs and large companies, which is uniquely suited to the development of competitive technologies, therapeutic and diagnostic procedures. In addition to early research projects, the laboratory aims to provide chemical, biological, biotechnological, pharmacological and pharmaceutical technology activities related to preclinical and generic development in cooperation with its small, medium and large company partners.

MAIN RESEARCH AREAS:

- Molecular oncology
- Neuropharmacology
- Biotechnology
- Drug development technology

National Laboratory of Translational Neuroscience

Exploration of developmental and adult disorders of the nervous system

Places of implementation:
Budapest, Pécs, Szeged

Consortium leader:
University of Pécs

Consortium partners:
HUN-REN Institute for Computer Science and Control
HUN-REN Institute of Experimental Medicine
HUN-REN Research Centre for Natural Sciences
Richter Gedeon Plc.
Semmelweis University
University of Szeged

Contact:
doczi.tamas@pte.hu
projektek.pte.hu/en/node/673

The mission of the National Laboratory is to comprehensively understand the disease mechanisms underlying pathological changes in the nervous system that occur in the early stages of life, resulting from the multifaceted interaction of genetic and environmental factors, and thereby develop new diagnostic and intervention options. Methodologically improve the prevention and treatment of CNS diseases, with a unique research spectrum covering nervous system developmental disorders and diseases from childhood to adulthood. Using the methods of digital medicine and data-driven health care, the Laboratory utilizes the structured national clinical data assets in the therapy of nervous system pathologies through the development of online platforms/registries and analytical programs through the direct integration of real-life data.

MAIN RESEARCH AREAS:

- Autism spectrum disorder
- The pathomechanisms of perinatal insults (preterm birth, asphyxia, hypoxic-ischemic encephalopathy)
- Disturbances in childhood social environment
- Epilepsy
- Schizophrenia
- Stroke
- Inflammatory mechanisms in early nervous system disorders
- Endocrine factors (abnormal changes in hormone levels, endocrine disruptor compounds, microbiome metabolites)
- Skull-brain damage
- Movement disorder (Parkinson's disease)

National Laboratory of Virology

Preparing for the age of epidemics

UNIVERSITY OF PÉCS
NATIONAL LABORATORY
OF VIROLOGY

Place of implementation:
Pécs

Implementer:
University of Pécs

Contact:
vnl@pte.hu
vnl.pte.hu

The global threat and spread of infectious diseases pose a serious social and health risk for all nation. In addition to solving local problems, a joint national and international effort is necessary in every case. The National Laboratory of Virology serves as a domestic base for innovative and fundamental research aimed at the rapid management and prevention of epidemics, and it is an internationally recognized practitioner in this field. The risk analysis of pathogens transmitted by arthropod vectors, which pose the greatest threat to Europe, as well as highly pathogenic viruses and unknown viruses of major importance in terms of global public health emergencies, is conducted with state-of-the-art tools and continuous developments.

MAIN RESEARCH AREAS:

- Understanding virus-host interactions and infection mechanisms
- Development and discovery of antiviral agents
- Complex investigation of disease-carrying arthropods and development/introduction of epidemic prevention procedures
- Development and testing of globally significant epidemic investigation and prevention systems
- Development of diagnostic industrial procedures
- Biodefense, biosafety developments and education

National Tumor Biology Laboratory

Science against cancer

Place of implementation:
Budapest

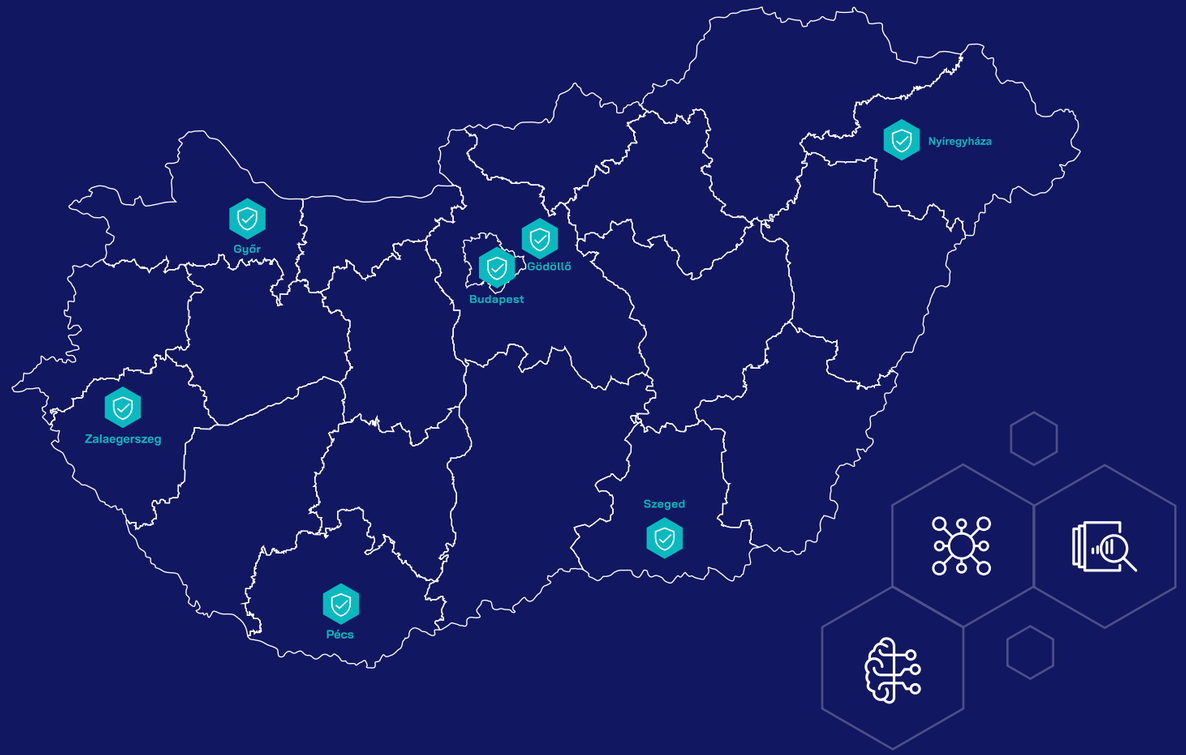
Implementer:
National Institute of Oncology

Contact:
info.tumorbiologia@oncol.hu
onkol.hu/nemzeti-tumorbiologiai-laboratorium

The National Tumor Biology Laboratory is designed to increase the efficiency of patient care and develop modern therapeutic procedures using state-of-the-art research tools. The basis of this comprehensive R&D programme is the optimisation of cancer-specific diagnostic and therapeutic procedures, and the introduction of new procedures into daily clinical practice to reduce cancer-related mortality nationwide.

MAIN RESEARCH AREAS:

- Development of a national, complex oncology database
- Innovative therapies based on modifications with redox systems
- Preclinical and clinical application of new therapeutic procedures



Safety and security

Implementing partners

Budapest University of Technology and Economics
CollMot Robotics Ltd.
Femtonics Ltd.
HM Electronics, Logistics and Asset Management Ltd.
Hungarian University of Agriculture and Life Sciences
HUN-REN Institute for Computer Science and Control
IdomSoft Ltd.
MouldTech Systems Ltd.
National University of Public Service
Special Service for National Security
Széchenyi István University
TECHTRA Public Benefit Nonprofit Ltd.
University of Pécs
University of Szeged
ZalaZONE InnoTech Nonprofit Ltd.

Infocommunications and Information Technology National Laboratory

To ease safely the everyday life in the future

Places of implementation:
Budapest, Nyíregyháza

Consortium leader:
Special Service for National Security

Consortium partner:
IdomSoft Ltd.

Contact:
infolab@nbsz.gov.hu
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The members of the consortium setting up the Infocommunications and Information Technology National Laboratory have set themselves a dual objective, in line with relevant national strategies: to support the safe deployment and use of emerging ICTs; and to support the digital transformation of public administrations. As a result, the Laboratory will focus on research on the vulnerabilities of 5G and 6G technologies that will form the backbone of future communications, on specific aspects of cybersecurity, and on the deployment of artificial intelligence (AI)-based solutions in e-government and law enforcement.

MAIN RESEARCH AREA:

- 5G radio interface protocol testing
- 5G radio interface vulnerability
- Cyber defence related researches
- Secure communication channels
- AI-based eGovernment
- Administrative use of AI
- National data assets
- Development integration points based on AI technology

The National Laboratory for Cooperative Technologies

Building up and development of dual use innovation capacities and competencies

Places of implementation:
Budapest, Gödöllő, Győr, Pécs, Szeged, Zalaegerszeg

Consortium leader:
TECHTRA Public Benefit Nonprofit Ltd.

Consortium partners:
Budapest University of Technology and Economics
CollMot Robotics Ltd.
Femtonics Ltd.
HM Electronics, Logistics and Asset Management Ltd.
Hungarian University of Agriculture and Life Sciences
HUN-REN Institute for Computer Science and Control
MouldTech Systems Ltd.
National University of Public Service
Széchenyi István University
University of Pécs
University of Szeged
ZalaZONE InnoTech Nonprofit Ltd.

The National Laboratory for Cooperative Technologies builds and develops dual use innovation capacities and competencies. Its main goal is the physical and content realization of an “innovation space” that plays a key role in the digitization, research and development of industry and the relating dual use industry at both national and regional levels.

MAIN RESEARCH AREAS:

- Off-road unmanned ground vehicles
- Drone technology
- Network centric cooperative automation
- Bionics, robotics
- Additive manufacturing and material technology

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