

# HUNGARY'S INNOVATION ECOSYSTEM

## R&D CAPACITIES AND INNOVATION POTENTIAL



MINISTRY OF CULTURE  
AND INNOVATION



NATIONAL RESEARCH, DEVELOPMENT  
AND INNOVATION OFFICE  
HUNGARY



HUNGARIAN  
**INNOVATION**  
AGENCY





Published under the auspices of the Ministry of Culture and Innovation (KIM), the National Research, Development and Innovation Office (NRDI Office) and the Hungarian Innovation Agency (NIÜ). Citations, in full or in part, are only permitted with proper acknowledgement of the source. The KIM, the NRDI Office and the NIÜ are not responsible for any consequences arising from any use of this publication. Amounts shown in local currency are converted at an approximate exchange rate of 400 HUF/EUR. Finalised in January 2025



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# Introduction

Hungary is a small, open economy in the heart of Europe. As it is not abundant in natural resources, its primary asset and driving force for development are knowledge and creativity. A striking testament to this is that in 2023, two Hungarian scientists, Katalin Karikó and Ferenc Krausz, were awarded the Nobel Prize for their outstanding contributions. With these two recent achievements, Hungary now ranks 11th in the world in terms of the number of Nobel laureates per million inhabitants. However, it is not only our researchers who excel: our young talents also achieve outstanding results. Hungary ranks 5th in the overall standings of the International Mathematical Olympiad and 9th in the International Physics Olympiad, based on the total number of gold medals won.

The key to our competitiveness lies in research and innovation, in creating value through scientific discoveries and groundbreaking ideas.

The John von Neumann Programme, Hungary's new innovation strategy, adopted by the Hungarian Government in 2023, envisions that by 2040, Hungary will be among the world's 10 most innovative countries. Our strategy focuses on strengthening cooperation between knowledge-producing institutions and the business sector, while maximizing economic, social and scientific impact.

Our objectives are:

1. To ensure that Hungarian scientists continue to play a pivotal role in global scientific and technological advancement;
2. To contribute to addressing major contemporary challenges through Hungarian research and innovations;
3. To strengthen the Hungarian small and medium-sized enterprise (SME) sector through innovation and to support the development of a new technology-based innovative corporate (startup) sector.

To achieve these goals, it is necessary to both increase our research and innovation investments and ensure their efficient and impact-focused utilization.

This publication has been initiated by the three largest governmental stakeholders of Hungarian innovation: the Ministry of Culture and Innovation, the National Research Development and Innovation Office and the Hungarian Innovation Agency. Their joint mission is to foster innovative approach and entrepreneurial spirit and to strengthen a social and economic environment that encourages innovation.

The purpose of this publication is to provide a concise and illustrative overview of Hungary's research and innovation strategy, the achievements of the innovation ecosystem, its key players and flagship programmes.

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# Key achievements in the innovation ecosystem

+141%

## Number of Q1 publications

The number of top quality publications in higher education institutions increased by 141% between 2018 and 2023.

6.4x

## Patent applications

The number of patent applications in the higher education sector grew more than sixfold between 2018 and 2024.

2x

## Headcount of researchers

The headcount of researchers in Hungary more than doubled between 2010 and 2022, marking the third highest growth rate across the European Union.

+48.5%

## Number of doctoral students

Compared to the 2014/2015 academic year, the number of doctoral students increased by 48.5% in 2023/2024.

+6.5%

## Share of SMEs introducing product innovation

The share of SMEs introducing product innovation jumped from 11.1% in 2014 to 17.6% in 2022.

+8%

## Share of knowledge-intensive service exports

The share of knowledge-intensive service exports has been steadily rising, increasing from 48.5% in 2014 to 56.5% in 2022.

## WHERE WE STAND TODAY

21<sup>st</sup>  
PLACE

EUROPEAN  
INNOVATION  
SCOREBOARD (2024)

36<sup>th</sup>  
PLACE

GLOBAL  
INNOVATION INDEX  
(2024)

30.2 %

SHARE OF BUSINESSES  
ENGAGED IN INNOVATION  
(2022)

6,223

RESEARCH AND DEVELOPMENT  
HEADCOUNT PER MILLION  
PEOPLE (2023)

## GOALS FOR 2030

10<sup>th</sup>  
PLACE

EUROPEAN  
INNOVATION  
SCOREBOARD

25<sup>th</sup>  
PLACE

GLOBAL  
INNOVATION  
INDEX

52.7 %

SHARE OF BUSINESSES  
ENGAGED IN INNOVATION

9,000

RESEARCH AND  
DEVELOPMENT HEADCOUNT  
PER MILLION PEOPLE

Sources: Hungarian Intellectual Property Office (HIPO), Eurostat, Hungarian Central Statistical Office (HCSO), John von Neumann Programme

# RDI landscape

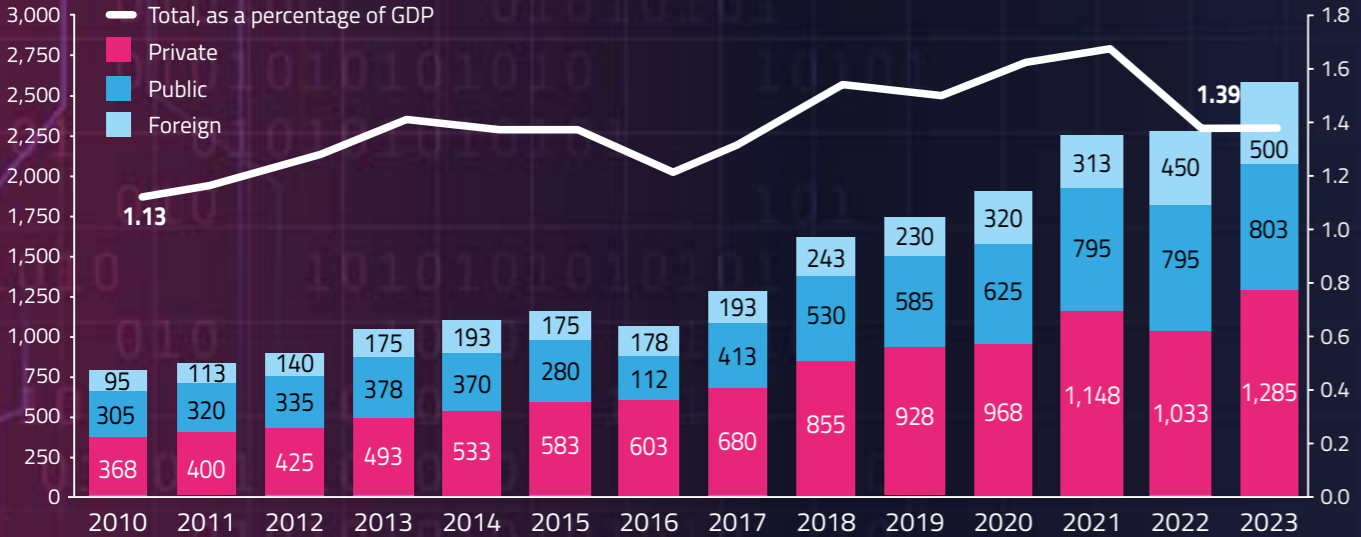
Hungary’s research, development and innovation (RDI) funding has been growing dynamically. In 2023, R&D expenditures exceeded HUF 1,000 billion (EUR 2.5 billion), accounting for 1.39% of the GDP. 72.7% of R&D expenditures were spent by businesses, 15.8% by higher education institutions, and 11% by state research institutions and other public research entities.

The private sector plays an increasingly significant role in R&D spending: in 2023, businesses accounted for nearly three-quarters of total expenditures, as opposed to 50% seen fifteen years ago.

## HUNGARY INVESTED A RECORD AMOUNT, HUF 1,041 BILLION (EUR 2.6 BILLION) IN R&D IN 2023

### Evolution of domestic R&D expenditure\*

Million EUR (left axis, bar chart) and share of GDP (right axis)



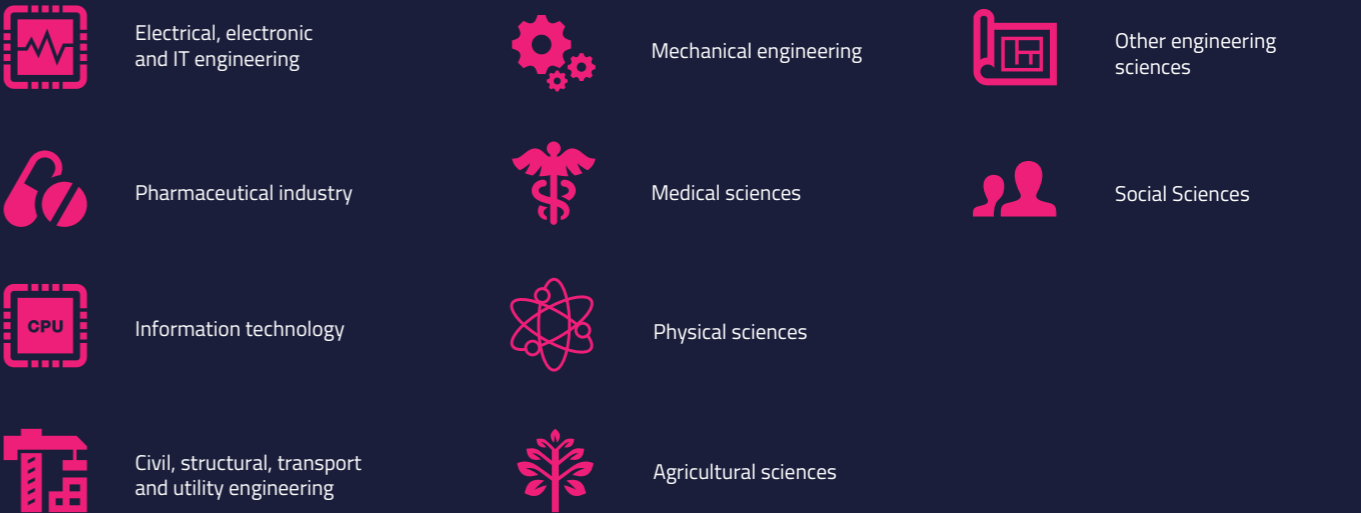
Source: HCSO \* Due to their low shares, the “higher education” and “other domestic” sources are not displayed, for the sake of better visibility.

# RDI landscape

In 2023, the total R&D workforce in research institutions approached 60,000 people. Of these, almost 62% worked in businesses, 23% in higher education and 15% in other research institutions. The number of scientific publications related to R&D exceeded 40,000, with two-thirds published in foreign languages.

Among research fields, engineering sciences experienced the most dynamic increase in R&D spending. In 2023, this sector accounted for 57% of total R&D expenditures. Within engineering sciences, the largest share of R&D funding was allocated to pharmaceutical research (14%), and electrical, electronic and IT engineering (15%). Natural sciences represented the second-largest research discipline, with above-average growth in funding.

## TOP 10 SCIENTIFIC FIELDS BY R&D EXPENDITURE



Source: HCSO, 2023

# Interconnecting stakeholders

Hungary's innovation ecosystem is structured along the triple helix model, where the innovation performance is fuelled by the cooperation between government, research institutions and businesses. Efficient cooperation and information flow enable the faster dissemination and practical application of innovations, making the ecosystem dynamic and vibrant, while contributing to economic growth and competitiveness.

Hungary's knowledge-producing universities and research institutions engage in a wide range of scientific activities, from fundamental research to applied research, playing a crucial role in innovation processes. Their scientific potential serves as a significant resource of innovation.

In Hungary, an increasing number of domestic and international large companies pursue R&D operations, while the innovation activity of the very significant small and medium-sized enterprise (SME) sector is also growing. Overall, corporate R&D expenditures have been steadily increasing, reflecting the business sector's commitment to conscious innovation.

Innovation policy consistently supports ecosystem participants: under the auspices of the Ministry of Culture and Innovation, three dedicated, task-oriented organisations collaborate to foster innovation. The National Research, Development and Innovation Office operates an extensive funding system, providing appropriate funding opportunities for researchers, research institutions, universities and businesses. The Hungarian Innovation Agency offers services and consultancy to support the efficient use of resources and the exploration of market opportunities. The Hungarian Intellectual Property Office facilitates domestic and international IP protection, supporting the effective commercialisation of intellectual assets.

## Government actors

- Ministry of Culture and Innovation
- National Research, Development and Innovation Office
- Hungarian Innovation Agency
- Hungarian Intellectual Property Office

## Research institutions

- Universities
- HUN-REN Hungarian Research Network
- Other research facilities

## Business sector

- Large companies
- Small and medium-sized enterprises
- Startups
- Incubators and accelerators
- Venture capital
- Business angels and other investors



# Strategic framework

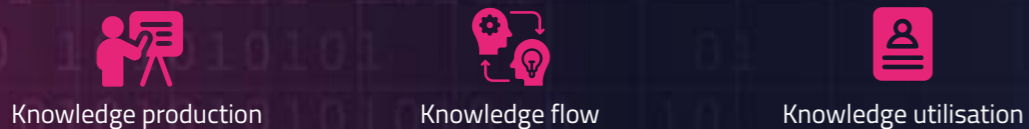
## National Smart Specialisation Strategy (S3)

Through the design and implementation of smart specialisation strategies, EU member states contribute to the “Smarter Europe” objectives for the 2021-2027 period. For effective policy planning, Hungary has identified eight national economic priorities and two horizontal priorities. These are the strategic directions on which Hungary focuses during the implementation of smart specialisation.



## Research, Development and Innovation Strategy

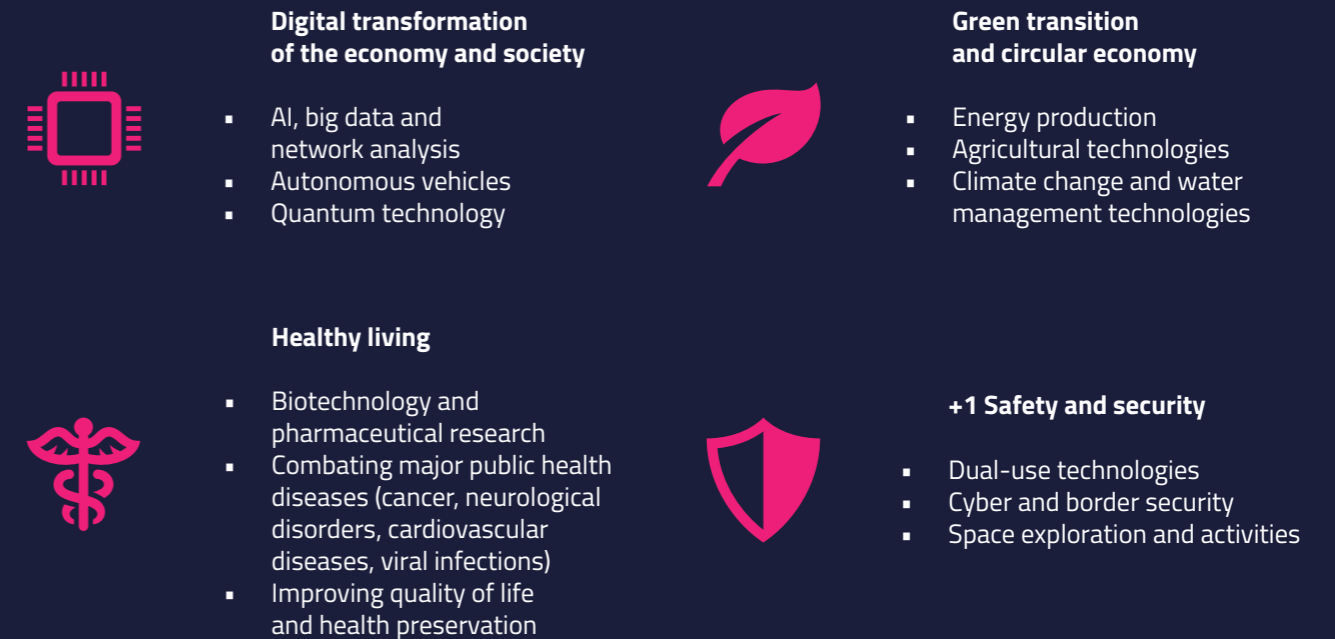
Hungary's RDI strategy for 2021–2030 envisions a knowledge-based, well-balanced and sustainable economy and society capable of generating high added value across all regions of the country. To realise this vision, the government acts through RDI policy measures, with particular focus on boosting knowledge production, knowledge flow and knowledge utilisation.



# Focus areas of innovation in Hungary

The John von Neumann Programme is one of the strategic flagship initiatives of the Ministry of Culture and Innovation, aiming to connect universities and research institutions with economic actors. The programme focuses on strengthening the knowledge-based economy by improving the existing institutional system and implementing new initiatives.

The programme defines the focus areas where RDI funding should be concentrated in the coming period to increase the economic outcome of RDI investments. These focus areas are built on existing capabilities and competencies within the ecosystem while considering future potential and challenges relevant to Hungarian society.



## National Research, Development and Innovation Office

As the managing authority of the National Research, Development and Innovation Fund, the NRDI Office ensures the efficient, transparent and predictable support of research, development and innovation. Its funding opportunities are outlined in the Programme Strategy, which is approved annually. The Office works in close collaboration with ecosystem players, and its programmes facilitate cross-sector cooperation and the commercialisation of scientific results.



### Comprehensive support for business innovation

Innovation funding is available to all types of enterprises, from large companies to SMEs and micro-enterprises. A key objective is to strengthen connections with universities and research institutions, encouraging collaborative associations.



### Motivating research careers

Excellence-based research funding covers all stages of the scientific career path. Talented BA and MA students, PhD candidates, young and senior researchers can all find funding opportunities to support their goals.



### Global integration

The funding system supports the internationalisation of the Hungarian research and innovation ecosystem, helping Hungarian researchers and innovators integrate into global scientific and innovation networks.

## Hungarian Innovation Agency

The Hungarian Innovation Agency (NIÜ) plays a key role in supporting Hungary's innovation ecosystem, from the conception of ideas to market entry. Its goal is to enhance innovation capabilities and performance, ensuring that individual successes translate into economic growth. The Agency evaluates innovation impact, provides data, knowledge and networking opportunities, and fosters interdisciplinary collaboration among businesses, higher education institutions and research centres. Through mentoring, it fosters an innovation-driven mindset among businesses and facilitates market entry. The vision of NIÜ is to develop the innovation ecosystem with a system-oriented approach, ensuring that creativity, implemented ideas and the exploitation of Hungary's innovation potential contribute to economic and social value creation in the long run.



### Education services

Strengthening the next generation of researchers and entrepreneurs



### Knowledge utilisation services

Facilitating the market uptake of research results



### Corporate services

Validating innovative projects and startups and facilitating their market entry



### International market services

Supporting innovative companies in entering foreign markets



### Ecosystem analysis services

Data-driven monitoring and analysis of the innovation ecosystem



### Culture-shaping services

Promoting innovation and enhancing the international visibility of the domestic ecosystem

# Hungarian Intellectual Property Office



The Hungarian Intellectual Property Office (HIPO) is Hungary’s institution dedicated to the legal protection of intellectual property and innovation, with a proud history spanning over 125 years. With customer-friendly solutions, HIPO provides comprehensive support for IP protection, covering patents, trademarks, industrial designs and copyright. HIPO actively engages in international cooperation and contributes

to legislative development to ensure that Hungary’s intellectual assets and economic interests are properly represented on the global stage. Through modern digital services, HIPO efficiently supports value creation in the Hungarian economy and society. It places a strong emphasis on awareness and education, ensuring that Hungarian stakeholders understand and actively utilise the tools of IP protection.

## TOP 5 fields of expertise

Number of patents in force in Hungary in the five most popular areas

FIELD OF EXPERTISE	NUMBER OF NATIONAL PATENTS	NUMBER OF EUROPEAN PATENTS	TOTAL NUMBER OF PATENTS IN FORCE
Pharmaceutical industry	126	9,608	9,734
Other equipment	147	4,108	4,255
Instrumentation	145	3,469	3,614
Chemicals, except pharmaceuticals	115	3,423	3,539
Electronics	20	2,691	2,711

Source: HIPO, 2023

# Innovative higher education

Higher education in Hungary plays a key role in meeting labour market demands, ensuring a pipeline of researchers, and advancing research, development and innovation. These days, universities have become key players in the innovation ecosystem and are increasingly open to market-driven collaborations with businesses. A growing number of higher education–industry partnerships and research collaborations are driving the development of new technologies and innovative solutions, strengthening Hungary’s economic competitiveness and scientific progress.

## Education      Research      Knowledge transfer

### HUNGARIAN HIGHER EDUCATION IN FIGURES (2024)



**64**  
higher education institutions



**69,652**  
graduate students



**8,381**  
Q1 publications



**318**  
national and international IP applications

# HUN-REN Hungarian Research Network



The HUN-REN Hungarian Research Network connects research and innovation with social responsibility and environmental sustainability. Its multidisciplinary research centres and institutes of outstanding excellence conduct both basic and applied research across a wide range of STEM, natural sciences, life sciences and humanities disciplines.

The primary goal of HUN-REN is to ensure the broad utilisation of research results to help address societal and environmental challenges. The organisation is actively involved, among others, in coping with climate change and developing green technologies. Beyond scientific excellence, HUN-REN's results contribute to economic development and innovation, thereby strengthening Hungary's competitiveness. HUN-REN is committed to transparency in research outcomes and actively supports open science.

## RESEARCH FIELDS



## HUN-REN IN FIGURES



# Bay Zoltán Nonprofit Ltd. for Applied Research



The Bay Zoltán Research Centre aims to enhance the competitiveness and efficiency of Hungarian enterprises through successful innovation and technology transfer, working in close collaboration with leading domestic and international partner institutions. The centre provides complex scientific and technical solutions across multiple disciplines for its industrial clients, contributing to their competitive edge. With a team of highly skilled researchers and experts, Bay Zoltán Research Centre is capable of delivering high-level applied R&D solutions that meet industrial demands at an international standard, guiding projects from concept to implementation.

As of July 2024, Bay Zoltán Research Centre has become a member institution of the HUN-REN Hungarian Research Network. The transfer of ownership rights and integration into the research network create a new framework for collaboration, allowing the centre to strengthen HUN-REN's innovation capacities and capabilities through applied R&D and technology transfer. By serving as a bridge between science and industry, the centre also contributes to the objectives of the John von Neumann Programme. By aligning strengths, new solutions of scientific and economic significance can emerge, further solidifying Bay Zoltán Research Centre as a major player in the international research and innovation landscape.

## THE BAY ZOLTÁN RESEARCH CENTRE IN FIGURES

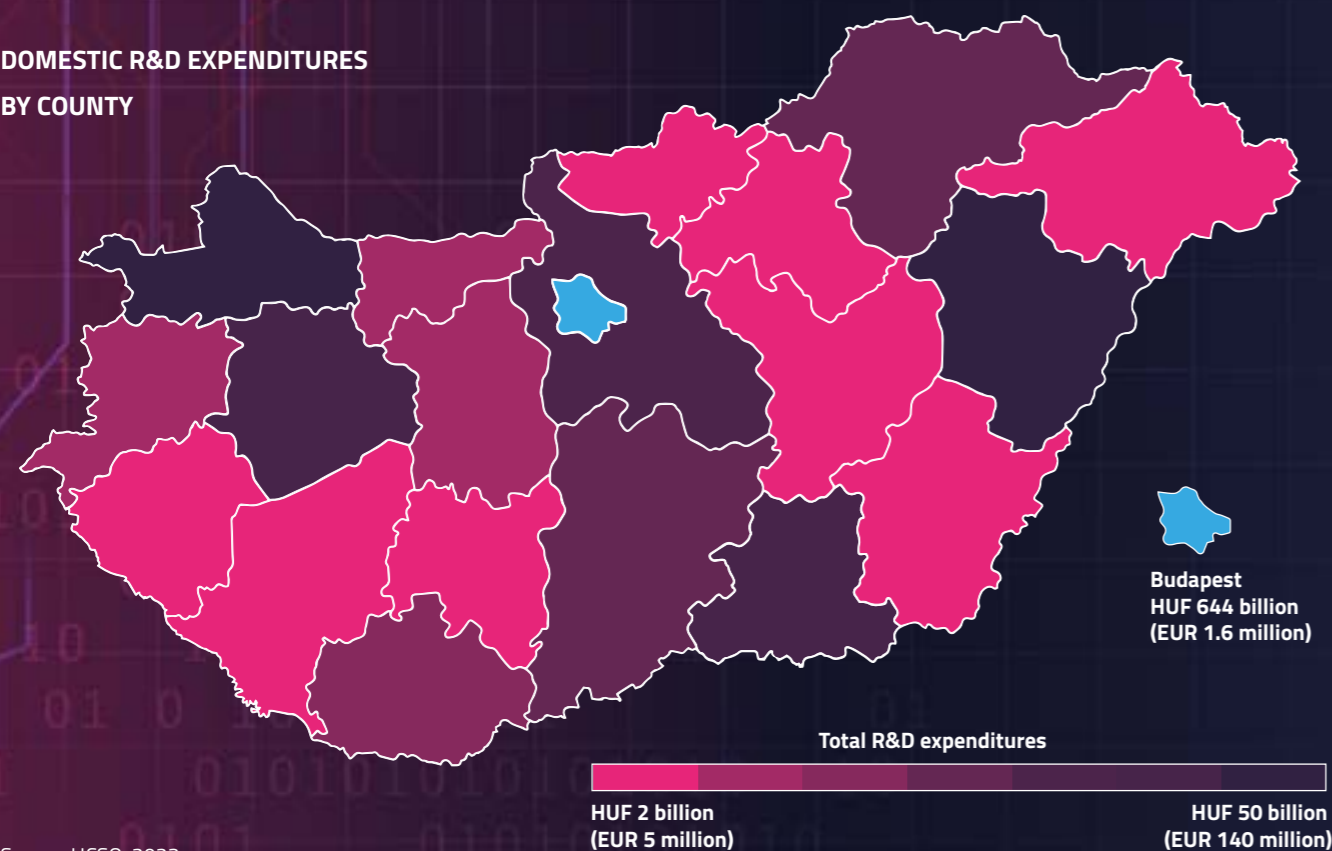


# Corporate landscape

Hungary's R&D directions are aligned with global trends, while also leveraging local strengths and opportunities.

The automotive sector remains dominant, but pharmaceuticals, agriculture and the food industry also hold significant shares. With HUF 560 billion (EUR 1.4 billion) in R&D expenditures, Budapest stands out compared to other regions. In 2023, the capital accounted for 53% of state and higher education sector R&D expenditures and 66% of corporate R&D expenditures. More than one-third (38%) of corporate R&D expenditures were concentrated at the top 10 companies, with mainly engineering-related research and development activities.

DOMESTIC R&D EXPENDITURES  
BY COUNTY



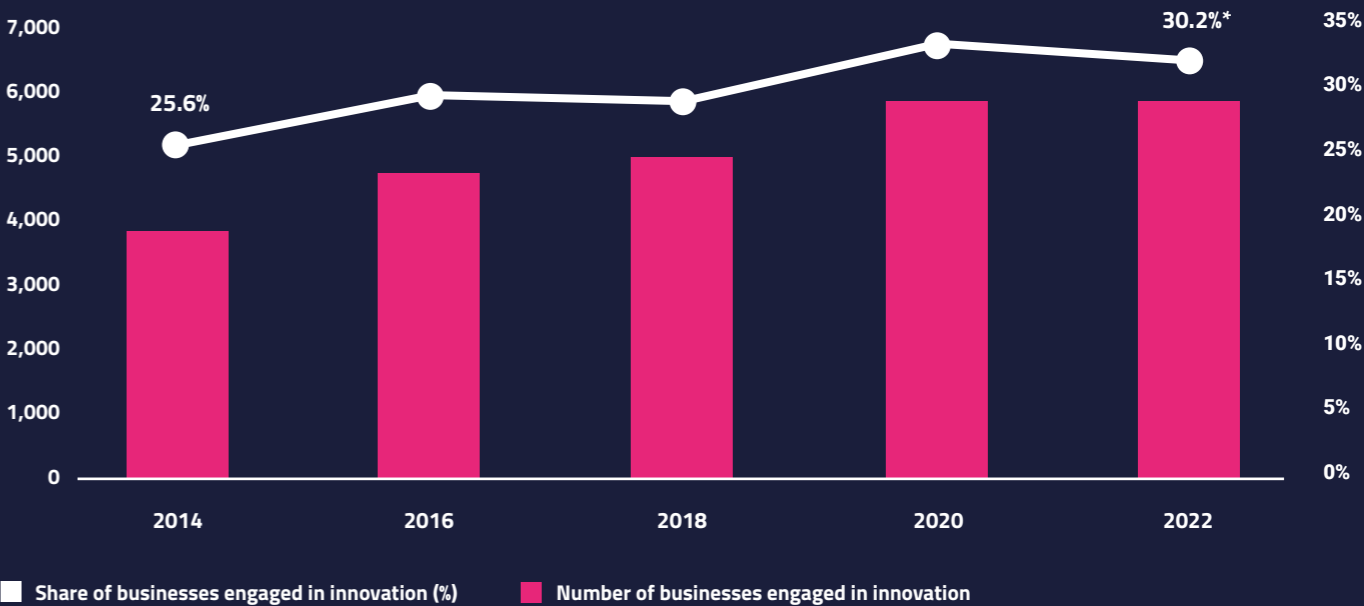
Source: HCSO, 2023

# An increasingly innovative corporate sector

Due to their role in creating jobs, SMEs are the driving force of the Hungarian economy. The number and share of businesses engaged in innovation have steadily increased in recent years. Currently, almost every third Hungarian business (30.2%) is engaged in innovation: Hungary's performance in the European Innovation Scoreboard (EIS), specifically in the "Innovative Enterprises" dimension, has improved by 18.8 percentage points between 2017 and 2024.

Budapest has the highest proportion of businesses engaged in innovation (36.9%) and implementing product and/or business process innovation (33%).

Businesses engaged in innovation (2014–2022)

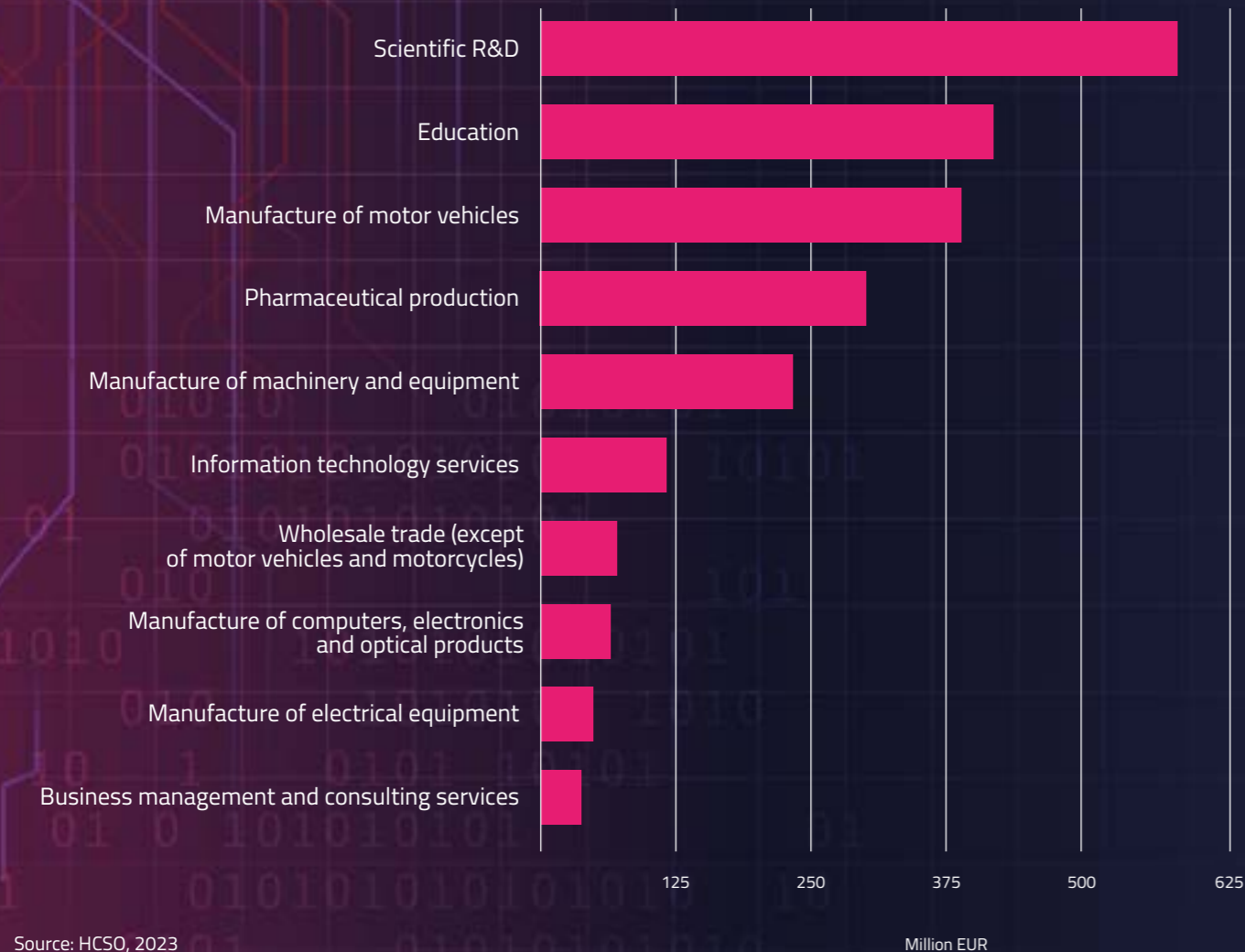


Source: HSCO-CIS

\*Calculated on an updated statistical methodology

# Key areas of research and development

TOP 10 R&D areas by expenditure (NACE classification)



## Hungarian Startup University Program

The Hungarian Startup University Program (HSUP) is a university startup training programme operated by the NIÜ, now entering its fourth academic year. Over the past years, more than 17,000 students have participated in HSUP courses. The number of participating higher education institutions has also been steadily increasing, with 33 universities now involved in the programme.

HSUP aims to promote an innovation-driven mindset and expand entrepreneurial knowledge among university students to encourage the creation of more innovative businesses in Hungary. Launched in 2020, the programme introduces students to the world of innovation and startups through a two-semester e-learning course. Throughout the programme, students acquire theoretical knowledge and practical skills that they can apply not only to their own business ideas but also in everyday life. Overall, HSUP prepares young people for real market challenges, strengthening their innovative approach.

SCAN  
ME



**33**  
participating  
institutions



**17,188**  
participating  
students



Over  
**100**  
mentors



**474**  
project teams  
established



**HUF 1.3 bn**  
student scholarships  
awarded  
(EUR 3.25 mn)

## Startup incubation

Since 2013, Hungary has launched four technology startup incubator programmes, adapting the successful Israeli model. The core of this model is that accredited incubators select startups for development. To finance these startups, incubators receive state capital in addition to their own private investment. Through public-private co-investment, incubators gain equity stakes in startups, ensuring that their success also benefits the incubators.

By 2022, the technology incubator programme had supported 163 startups, with 29 exits. The total revenue of incubated startups approached HUF 8 billion (EUR 20 million) by 2022. In autumn 2023, the NRD Office launched a new programme, selecting 12 winners from a record 29 applicants. Of these, seven had participated in earlier programmes, while five were completely new incubators for the programme.

### Market investments

By 2022, startups participating in the technology incubator programme had received a total of HUF 9.2 billion (EUR 23 million) in state funding and HUF 15.6 billion (EUR 39 million) in external investment.

### THE STARTUP ECOSYSTEM IN FIGURES



**USD 2.4 billion**  
total ecosystem value  
(2021-2023)



**41%**  
increase in ecosystem value compared  
to the previous period  
(2021-2023)



**USD 755 million**  
total venture capital investment  
(2019-2023)



**9.5 years**  
average exit timeframe  
(2019-2023)

Source: Startup Genome, 2024

## Talent pipeline for businesses and research institutions

### HIGHER EDUCATION DUAL STUDY PROGRAMMES

Dual and cooperative education benefit both companies and students. Companies can directly participate in the education process, ensuring a tailored talent pipeline. Students gain practical experience alongside their theoretical university education, helping launch their careers.



**28**  
higher education  
institutions



**416**  
active partner  
organisations



**33**  
educational  
locations

### UNIVERSITY RESEARCH SCHOLARSHIP PROGRAMME

The University Research Scholarship Programme (EKÖP) supports the next generation of researchers and lecturers in higher education, as well as the research talent pipeline for innovative businesses. The programme provides scholarships to university students conducting successful research and creative activities at their institutions.



**29**  
higher education institutions



**HUF 125 to 250 thousand**  
in monthly scholarships (EUR 312 to 625)

### EKÖP COOPERATIVE DOCTORAL PROGRAMME

The EKÖP Cooperative Doctoral Programme (EKÖP-KDP) primarily offers scholarships in STEM+ fields, supporting PhD students conducting industry-relevant research in collaboration with companies. This mutually beneficial model enables companies to integrate fresh research expertise and tailor research topics to their needs, while allowing doctoral schools to gain industrial experience by working on real-world challenges.



**20**  
higher education institutions



**HUF 400 thousand**  
in monthly scholarships (EUR 1,000)

# University technology and knowledge transfer

## Technology Transfer Office

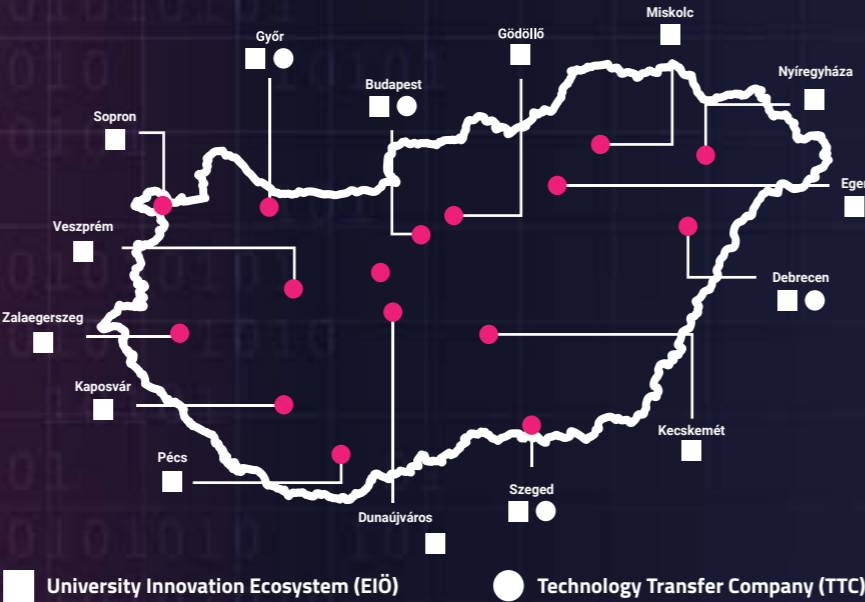
These days, higher education institutions are an integral part of the innovation ecosystem. Since 2019, altogether 22 universities have established technology transfer offices to commercialise research competencies and R&D capacities. This ensures that theoretical research results become market-ready innovations in the form of products, technologies and services.

### UNIVERSITY KNOWLEDGE TRANSFER IN FIGURES (UNIVERSITY INNOVATION ECOSYSTEM, 2019-2023 RESULTS)



## Technology Transfer Company

Five Hungarian universities have stepped up a gear from 2024: they have organised their entire knowledge transfer activities into independent university enterprises. Greater organisational autonomy, flexibility and task-orientation will help to make better use of results.

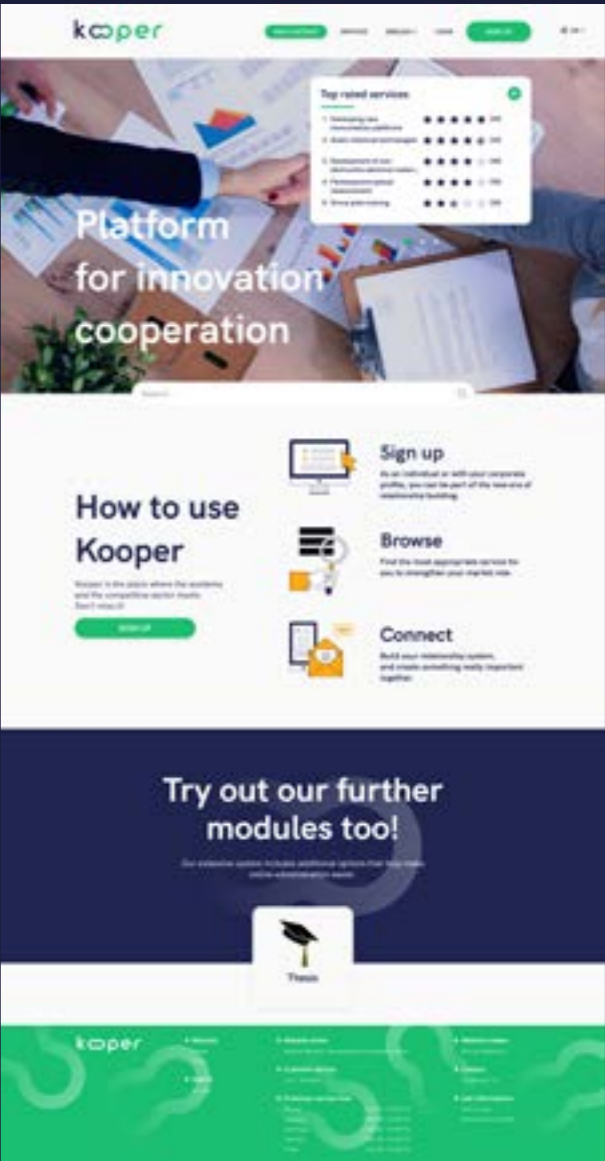


# KooperLabs



Businesses often require RDI capacities and competences that are not readily available in-house. The Kooper platform is a virtual catalogue that connects the supply of R&D services offered by Hungarian universities with the demand of businesses seeking the same.

Through an easy-to-navigate online platform, stakeholders can quickly browse and access up-to-date university research capabilities.



## National Laboratories



The National Laboratories aim to leverage Hungary's strengths to address global challenges while advancing sustainable economic growth and competitiveness in strategic future-shaping fields.

Currently, 25 national laboratories conduct large-scale research by bringing together Hungary's leading research institutions in key areas. These collaborations open cross-border dimensions for discovery and applied research, fostering dynamic, cooperative environments for the scientific, economic and environmental utilisation of research results.

Collaboration in consortia,  
partnership

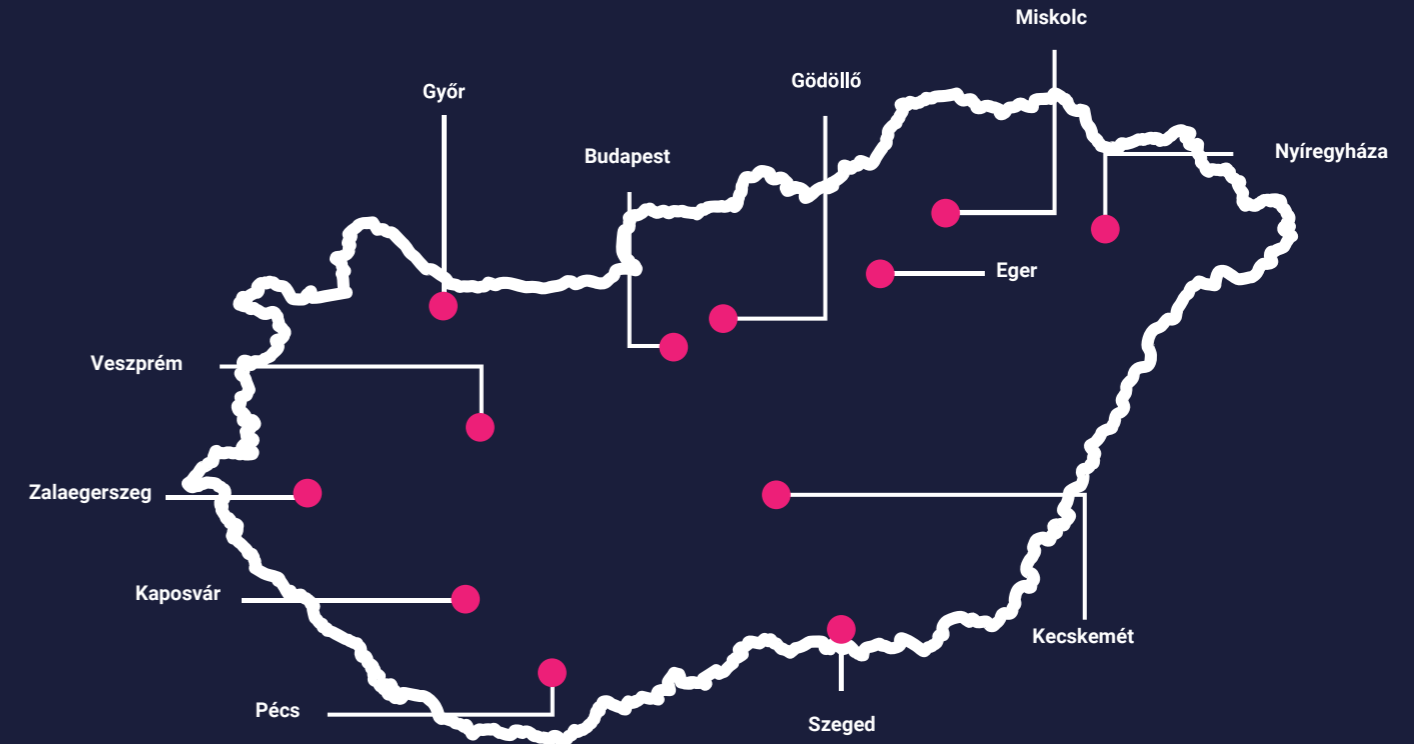
Research infrastructure  
development

Scientific  
performance

Utilisation of research  
results

International  
visibility

Training the next generation  
of researchers



### NATIONAL LABORATORIES IN FIGURES

**25**  
National Laboratories

**55**  
consortium members

**19**  
locations

**2,631**  
publications

**420**  
business cooperation  
established

**521**  
academic-professional  
partnerships

**1,538**  
PhD students and young  
researchers involved

## International programmes

## Research Grant Hungary

The programme provides high-level support to attract top foreign and expatriate Hungarian researchers to continue their scientific work in Hungary. By focusing on the priority innovation areas of the John von Neumann Programme, Research Grant Hungary strengthens Hungary's R&D ecosystem and its aspiration to become a regional hub for research, development and innovation.

## Hungary Research Chair

The Hungary Research Chair programme offers long-term and prestigious research opportunities for Hungarian researchers living abroad, enabling them to apply their expertise and international networks in Hungary. The programme provides competitive funding to support research and opportunities for collaboration with domestic research groups and universities.

## HU-rizon Programme

The programme supports internationally excellent research collaborations led by Hungarian research institutions. Projects focus on addressing key challenges relevant to both Hungarian and international communities, in line with the John von Neumann Programme's focus areas.

## Pannonia Scholarship Programme

The programme offers short- and long-term mobility scholarships, allowing Hungarian university students and lecturers to study, research, teach or complete internships at top foreign universities across Europe and beyond, in almost any country of the world.

## International presence

## Bilateral relations

Hungary has signed 36 intergovernmental and 10 inter-institutional science and technology (S&T) cooperation agreements to strengthen links between partner countries in research, development and innovation.

## S&T diplomacy

Hungary deploys Scientific and Technological (S&T) attachés in its key science policy partner countries under the professional supervision of the NRDI Office. Their main responsibilities include maintaining bilateral scientific and R&D cooperation, facilitating institutional partnerships and supporting cross-border research collaborations. Currently, 15 S&T attachés are stationed worldwide.

