Ministry of
Culture and Innovation

JOHN VON NEUMANN PROGRAM 2023

PROGRAM INFORMATION

2023

MINISTRY OF
CULTURE AND INNOVATION

JOHN VON
NEUMANN
PROGRAM
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The John von Neumann Program is one of the priority strategic action packages of the Ministry of Culture and Innovation aimed at linking universities and the economy.

The program focuses on strengthening the knowledge-based economy through the development of existing institutions and the implementation of new programs.

Background

Between 2018 and 2022, the Government started implementing one of its priority goals: **linking universities and the economy**.

The first results are already visible, in particular thanks to the change in the university model:

- The number of top quality (Q1) publications in higher education institutions increased by 78% between 2018 and 2022.
- Since 2014, the share of SMEs introducing product innovation has increased by 73% (to 20.8%), but is still below the EU average (28.4%).
- The share of knowledge-intensive services exports is increasing (55.3% in 2020 vs. 47.9% in 2013), but is below the EU average (75%).
- The number of patent applications in the higher education sector increased from 18 in 2018 to 76 in 2021, while the number of patent applications in ELKH research institutes increased from 1 to 17 between 2018 and 2022, but these figures are still low.
- The number of people employed in research and development (R&D) more than doubled by 2021 (compared to 2010), producing the 2nd highest growth rate in the EU (after Poland).

In the following period this process has to be

- **extended,**
- **made more results-focused,**
- **internationalized.**

Knowledge-intensive services export rate

+55.3%

Share of SMEs introducing product innovation

+73%

Number of Q1 publications

+78%

Number of patent applications in the higher education sector

4,2x

Headcount of R&D personnel

2x

Presentation of the John von Neumann Program

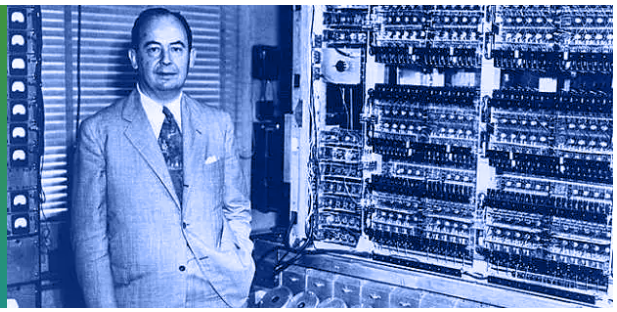
The John von Neumann Program is one of the priority strategic action packages of the Ministry of Culture and Innovation aimed at linking universities and the economy.

The program focuses on **strengthening the knowledge-based economy** through the development of existing institutions and the implementation of new programs.

The mission of science and innovation policy is to make life easier for Hungarians and create high added value jobs through innovative technological and social policy solutions. The Government's goal is for **Hungary to be among the world's top 10 innovators by 2040** (and among the top 25 by 2030). If we put this on the European Innovation Scoreboard (EIS), Hungary needs to move from the current 21st place to 10th place by 2030. **Progress in innovation can actively contribute to increasing domestic added value, which is a key economic policy objective.**

The John von Neumann Program **has identified a complex package consisting of 9 groups of actions to help us achieve these goals.**

The program is named after John von Neumann because Neumann is not only a world-famous figure of Hungarian science, without whose inventions, such as laying down the theoretical basis of the digital computer, our world would probably look radically different today, but his research was always focused on impact, on the practical application of innovations. However, Neumann, as a researcher and inventor, has made his mark not only in the field of software (scientific achievement), but also in the field of hardware (practical, marketable use).



Hungarian inventor John von Neumann next to the ENIAC

Three key words of the John von Neumann Program

1) **ASSOCIATION** – closer collaboration between knowledge-producing systems (universities, research institutes) and economic operators,

2) **IMPACT** – meaning economic impact, social impact and intellectual/scientific impact,

3) **MEASUREMENT** – the continuous and adequate measurement and impact assessment of relevant outcome and impact indicators (e.g. quality publications, revenue-generating patents, product, sales revenue, etc.) in RDI funding.


INTERNATIONALIZING RESEARCH
HELPING TO TAKE IDEAS TO THE MARKET
FOCUSING INVESTMENTS
PROVIDING A PREDICTABLE CAREER PATH
GIVING DISCOUNTS FOR PATENTS
ENCOURAGING DOCTORAL PROGRAMS
FACILITATING THE MOBILIZATION OF RESOURCES
CREATING SCIENCE AND INNOVATION PARKS
HUNGARIAN INNOVATIONS IN THE CARPATHIAN BASIN

The 9 groups of actions of the John von Neumann Program

1. Internationalizing Hungarian research
2. Helping excellent innovation ideas to reach the market
3. Focusing our innovation investments on healthy living, twin green and digital transition and security
4. Providing a predictable career path for Hungarian researchers
5. Giving preferential access to patent procedures for Hungarian businesses and inventors
6. A patent is worth a doctorate degree: encouraging innovation in scientific careers and entry to doctoral training
7. Helping to raise funds for spin-offs
8. Creating Science and Innovation Parks, spaces for university-industry collaboration
9. Hungarian innovations across the Carpathian Basin

Renewing the Eötvös Loránd Research Network (ELKH) from a results-oriented perspective while preserving the multidisciplinary character of the network

In order **to significantly improve the scientific performance of the ELKH network** of research institutes and to put it on an international footing, 3 priority interventions need to be implemented:

1. **Renewing the governance of the ELKH** (renewing the Governing Board, delegating the powers for creating advisory bodies to the Governing Board and the Chair);
2. **Complementing the funding logic of the ELKH with a results-based funding pillar**, as in the case of the model-changing universities;
3. **Putting the ELKH on an international footing** by attracting world-class research teams to the Hungarian innovation ecosystem in the coming years, which can significantly raise the quality of domestic research.

On its own initiative, the ELKH network will continue its work under the name "Hungarian Research Network" from 1 September 2023. The aim of the renaming is to ensure that the independent Hungarian research network is easily and clearly identifiable by name among the members of both the domestic and intenational RDI ecosystem. The name of the Hungarian Research Network (HUN-REN) supports the effective communication of Hungarian research results, thus contributing to the international visibility and recognition of the research network and Hungary.

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Establishing the National Innovation Agency (NIÜ)

As a result of the renewal of innovation and science policy from 2018 and the successful work of the National Research, Development and Innovation Office (NKFIH), **the NKFIH's dominant role in the innovation ecosystem has been further strengthened in recent years**. This is also supported by the fact that **the number of its clients has more than tripled during this period**, and the annual expenditure allocation of the **NKFI Fund has more than doubled**.

To further strengthen innovation outcomes, **the NKFIH as a funding office needs to be complemented by a service-provider agency** that actively and continuously engages the innovation ecosystem, including partner ministries.

By establishing the National Innovation Agency (NIÜ) the aim is to create a key, **catalytic and flexible organization** in the Hungarian innovation ecosystem, **capable of assisting and supporting innovative ideas from their conception to their commercialization**, and capable of being **the number one enabler of economic and social exploitation of the resources** used in the field of innovation and science policy.

The main functions of the NIÜ are the following:

1. **Dynamic innovation ecosystem** – *examples:*
   a. Validation of innovative projects
   b. Linking/routing in the ecosystem (with professional, financial sponsors and support opportunities)
   c. Providing services to innovative businesses (based on internal and external resources) (e.g. project development services, industrial property rights advice, RDI application consultancy, international market entry facilitation, technology, industry, legal, business development, etc. advisory service).
2. **Measurement, monitoring, impact assessment in the RDI field**
3. **Establishing a culture of innovation** – *examples:*
   a. Creating an innovation ecosystem website
   b. Developing an innovation event support scheme
   c. Communicating success stories
   d. Running the Hungarian Design Council
4. **Implementing priority programs** – *examples:*
   a. Technical monitoring of calls financed from the NKFI Fund in cooperation with the NKFIH
   b. Hungarian Startup University program (HSUP)
   c. Promoting research exploitation (technology transfer)
   d. Student Lab program

3

Focusing investments in research, development and innovation

In the framework of the John von Neumann program, we have identified the focus areas and the selection methodology on which RDI resources should be focused on during the next period in order to increase the economic outcome of RDI spending.

In selecting the focus areas, the policy has taken into account 3 criteria:

1. **available skills and competences (science, R&D, innovation, industry, skilled labour);**
2. **the future potential of the area/technology, i.e. the growth potential of the area in the coming years;**
3. **matters of importance to the Hungarian community.**

Based on this criteria, the following 3+1 RDI focus areas have been identified in the framework of the John von Neumann Program:

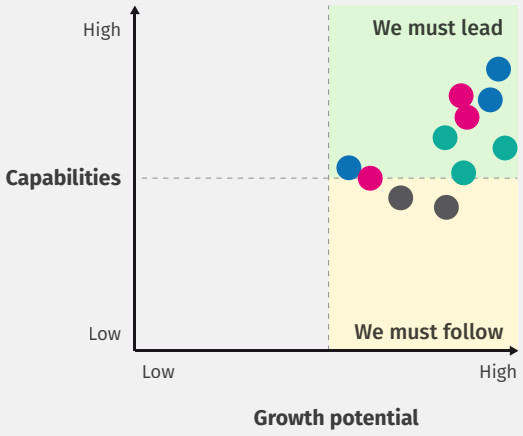
a) supporting preventive, curative and care systems to maintain healthy living

From health promotion and disease prevention developments to diagnostics (early detection, medical imaging), curative interventions and therapies (drug discovery, immunology, development of medical devices and instruments), to improving quality of life in old age (health sensors, artificial intelligence), the aim is to strengthen health systems and develop a toolbox to strengthen society's resilience to health threats.

b) supporting the green transition and the development of a circular economy

Developing solutions to support the development of a modern, resource-efficient, competitive and sustainable domestic economy, in line with the European Green Deal, to address the challenges of climate change and geographical conditions (agricultural innovation and water management); increasing energy efficiency and accelerating the transition to clean energy; exploitation of indigenous energy sources; sustainable and smart mobility; support for alternative propulsion and mobility solutions; energy storage and grid innovations; and a range of different directions in the field of sustainable environmental economy and bio-based economy (waste management, cyclical and recycling technologies, new materials).

Focusing of RDI sources



1. Digital transformation of economy and society

- AI, big data and network analysis
- Autonomous vehicles
- Quantum technology

2. Healthy living

- Biotechnology and pharmaceutical research
- Major public diseases (cancer, neurological, cardiovascular, viruses)
- Life and health preservation

3. Green transition and circular economy

- Energy production
- Agricultural technologies
- Climate change and water management technologies

+1 Security and defense

- Dual-use technologies
- Cyber and border security
- Space exploration and activities

c) supporting the digital transition of the economy and society

From exploiting our infrastructural advantages (network development, bandwidth, coverage, public administration support solutions, user-demand based digital services, common data space, community care systems), to the domestic development of cutting-edge technologies (e.g. artificial intelligence, quantum technology, smart grids, autonomous systems, blockchain, high-performance computing), to solutions enabling the development of advanced digital skills, to systems supporting skills development education and national cultural memory, to advanced cybersecurity projects and solutions.

d) security and defense

The “plus one” focus area is security and defense. Physical and cyber defense technologies have been particularly in the spotlight in the last year and a half. This focus area includes the development of dual-use technologies, strengthening our cyber and border defense capabilities, and space exploration and activities.

Setting up a Research Excellence Council

There are three main types of research grants in Hungary (which correspond to the internationally recognized types of grants):

1. next generation research grants;
2. excellence-based research grants;
3. mission-driven research grants.

It is appropriate **to organize excellence-based research proposals into a single, independent system by setting up a Research Council-type body, in line with international practice** (a similar system is in place in Israel, for example).

The newly created **Research Excellence Council is proposed to become the lead actor in future research excellence funding programs**, responsible for preparing research excellence calls and making award decisions as a body (and not a legal entity). The funding schemes are financed from a separate budget line.

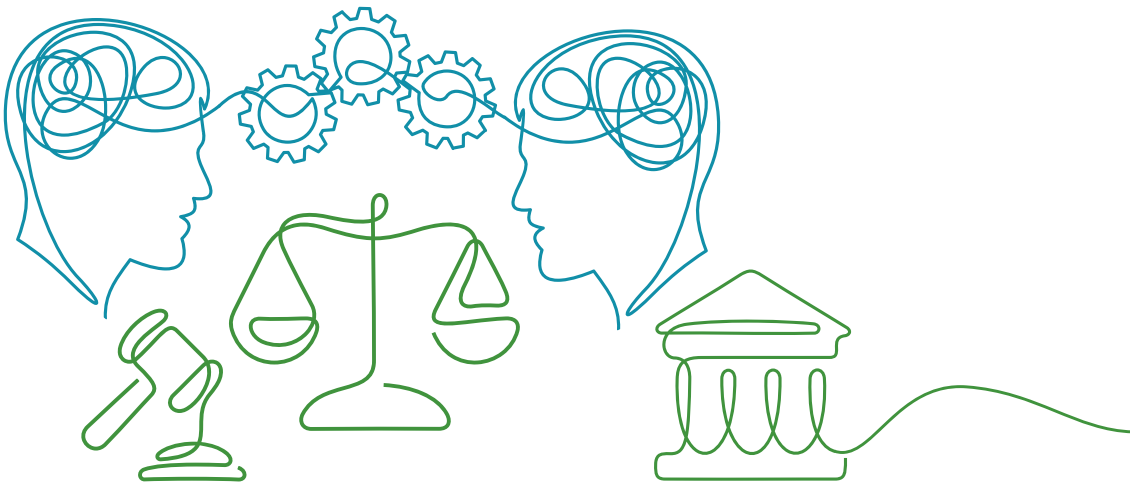
Following discussions with the Hungarian Academy of Sciences (MTA), the MTA grants (Momentum, Bolyai, etc.) will not join the Research Council, they will remain under the auspices of the MTA. However, the members of the Research Excellence Council are appointed on a consensus basis by the President of the MTA, the President of the ELKH and the Minister of the Ministry of Culture and Innovation (KIM) responsible for science policy.

5

Strengthening industrial property rights activity

In terms of international patenting activity, Hungary is significantly behind the EU's leading countries but performs above average compared to the countries of the Central and Eastern European region. Hungary lags behind internationally in the number of trademark and design applications. We are lagging behind not only the EU innovation leaders, but also the countries of the CEE region. It can therefore be said that there is **considerable room for manoeuvre in the area of strengthening industrial property rights activity**, and the following measures have been identified to take this forward:

1. A **75% reduction in patent application and maintenance fees for 4 priority target groups** (1) individuals, 2) SMEs, 3) universities, and 4) research institutions. **We also plan to reduce the fees for electronic applications by 15%**, with the aim of making IPR administration electronic to the greatest possible extent.
2. In order **to simplify the design application procedure and to reduce the turn-around time of applications**, in line with the legislation in the vast majority of European countries and the practice of the European Union Intellectual Property Office (EUIPO) regarding Community design applications, ex officio research will be discontinued.
3. **Transfer of R&D certification from Hungarian Intellectual Property Office (SZTNH) to NKFIH-NIÜ**.
4. **Transfer of the tasks of the Hungarian Design Council from the SZTNH to the NKFIH-NIÜ**.



6

Increasing the number of doctoral students and mandatory inclusion of innovation activities in the academic career path

An international comparison of the number of entrants to doctoral studies shows that Hungary is below the OECD average. **Our strategic goal is to increase the number of R&D staff per million people from the current 6273 to 9000**, but this requires a PhD enrolment rate at least equal to the OECD average, and preferably equal to the Austrian rate. To achieve these objectives, we propose to introduce the following actions:

1. **Extension of the social contribution tax relief** linked to the employment of doctoral students;
2. **In the case of an employee enrolled in a doctoral course**, provision of half of the employer's contribution to the cost of the course as a matching fund;
3. In order to encourage people to become doctoral students, provision of an additional support of 50% to higher **education institutions that take over the payment of pension contributions from their doctoral students under a service agreement**.

The academic promotion system, including the rules for access to teaching and research posts and for obtaining doctoral degrees, **currently does not sufficiently emphasize the research exploitation aspects**, i.e. the social and economic exploitation and innovative nature of scientific research.

Rules should be enacted to ensure that, **in addition to scientific or artistic publications**:

- **when applying for teaching and research positions, it will be necessary to assess scientific research and its socio-economic utility**, in particular its innovative character, and;
- **when determining the requirements for doctoral training and the conditions for the award of the doctoral degree, it will also be necessary to take into account the research achievements of the doctoral student** (e.g. patent, industrial R&D, etc.)

7

Easier financing for innovative start-ups

In the current legal environment in Hungary, the legal-financial structure (convertible note), which is considered to be established by international standards, under which an investor (whether an individual or a legal entity) can invest capital in a company in such a way that the proportion of the business share/ownership share received as consideration for the capital investment is not determined immediately, but only during a later investment round, i.e. the acquisition of the share is made at a later date, is not substantially applicable. To address this, **we are creating the possibility to use convertible notes and SAFE notes as financing instruments for start-ups**.

Development of Science and Innovation Parks

The main objective of Science and Innovation Parks is to foster the growth of domestic SMEs and large companies, start-ups and spin-offs in future-oriented technology areas such as AI, machine learning, IoT, biotechnology, virtual reality, robotics, materials sciences, self-driving vehicles or quantum technologies.

The combination of universities, research institutes, high-tech companies, industrial enterprises and start-ups in these parks create an environment rich in knowledge sharing, collaboration and innovation. Many good practices around the world can be identified for the significant added value generated by Science and Innovation Parks, just to mention the **Silicon Valley in the US, the Cambridge Science Park, the Amsterdam Science Park or InnoPolis in South Korea**.

Science and Innovation Parks are therefore key spaces for linking universities and the economy.

On behalf of the Ministry of Culture and Innovation, we are working on a review of Science and Innovation Park development concepts from 2021 Q1. In the next period, new expectations will be defined, on the basis of which Science and Innovation Park developments can continue. Since its creation, the Ministry of Culture and Innovation has placed a strong emphasis on the exploitation of R&D results. Our strategic goal is to ensure that the results of research and development are used not only for scientific, but also for economic and social purposes, i.e. to create innovative products, services and solutions that can be applied in practice and that provide answers to the main challenges of the Hungarian economy and society. The review and renewal of the Science and Innovation Park developments and the formulation of new expectations will be in line with these strategic objectives.

The National Innovation Agency (NIÜ) will have a major role in the future in the renewal of the development plans of Science and Innovation Parks, as well as in the validation of the soundness of such developments and in continuous professional monitoring.

Making cross-border higher education institutions eligible

Our strategic goal is to support research and innovation activities related to Hungarian-speaking higher education institutions in the Carpathian Basin.

Under the current legislation, the National Research, Development and Innovation Fund can only provide grants domestically. Therefore, the program proposes **to extend the scope of the NKFI Fund from Hungary to the Carpathian Basin**.

All this can contribute to making higher education institutions abroad the organizing centers and knowledge bases of Hungarian social, economic and cultural life. Our main ambition is that Hungarian higher education institutions abroad can create an industrial and entrepreneurial environment based on university RDI and provide an attractive career path for young Hungarian academics and researchers, thus supporting them to stay in their home country.

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