

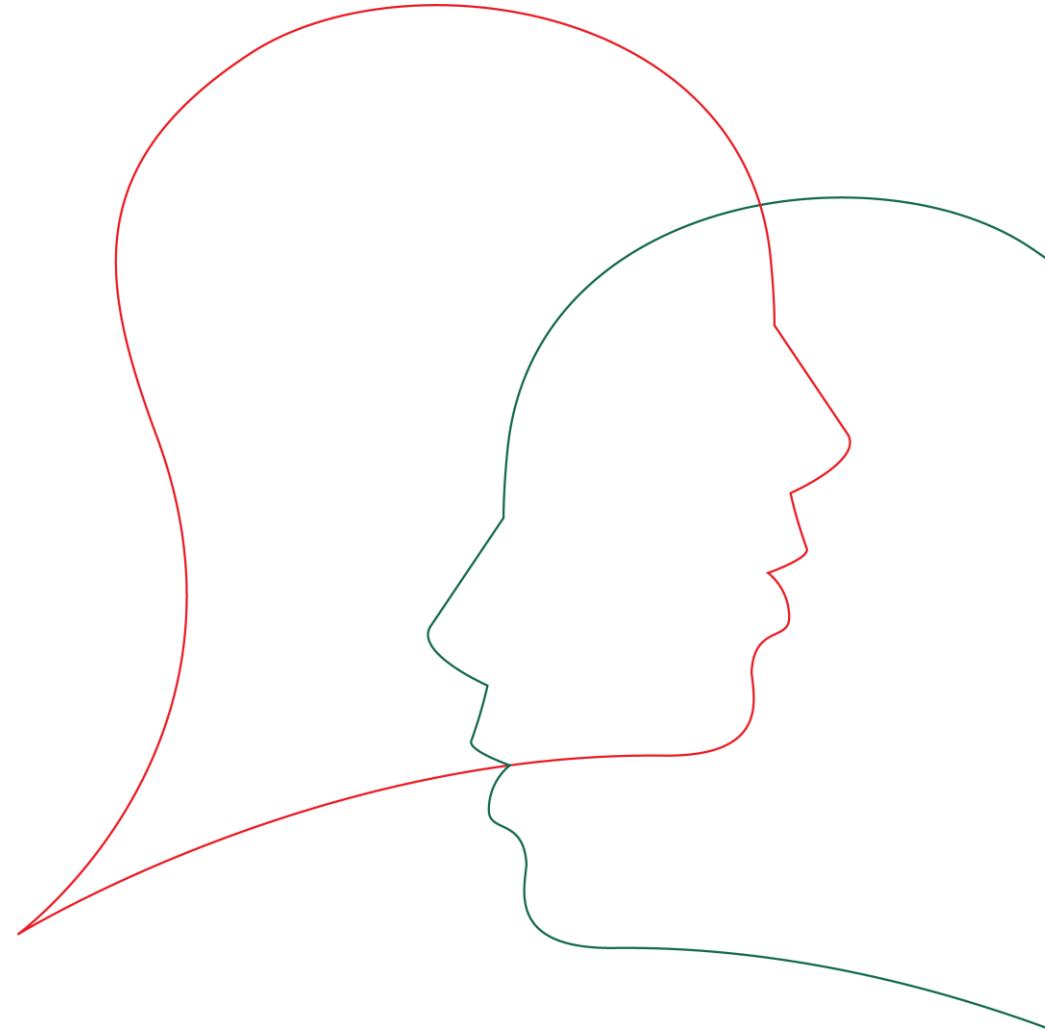


MINISTRY OF CULTURE
AND INNOVATION

Innovation Policy and Artificial Intelligence



2023 – BÓDIS László deputy state secretary, Budapest, 2023-06-28





1 Innovation and science policy landscape

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2 John von Neumann Programme

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3 Why is Artificial Intelligence important for Hungary?

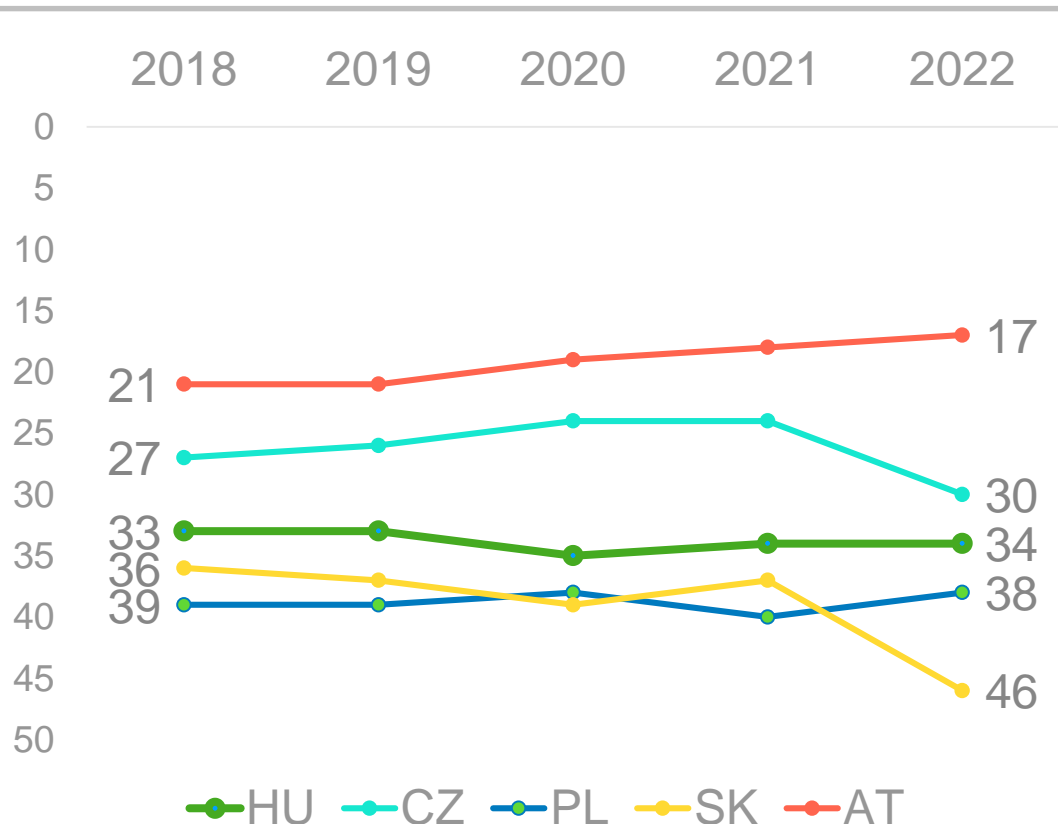
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4 Developments in the field of AI

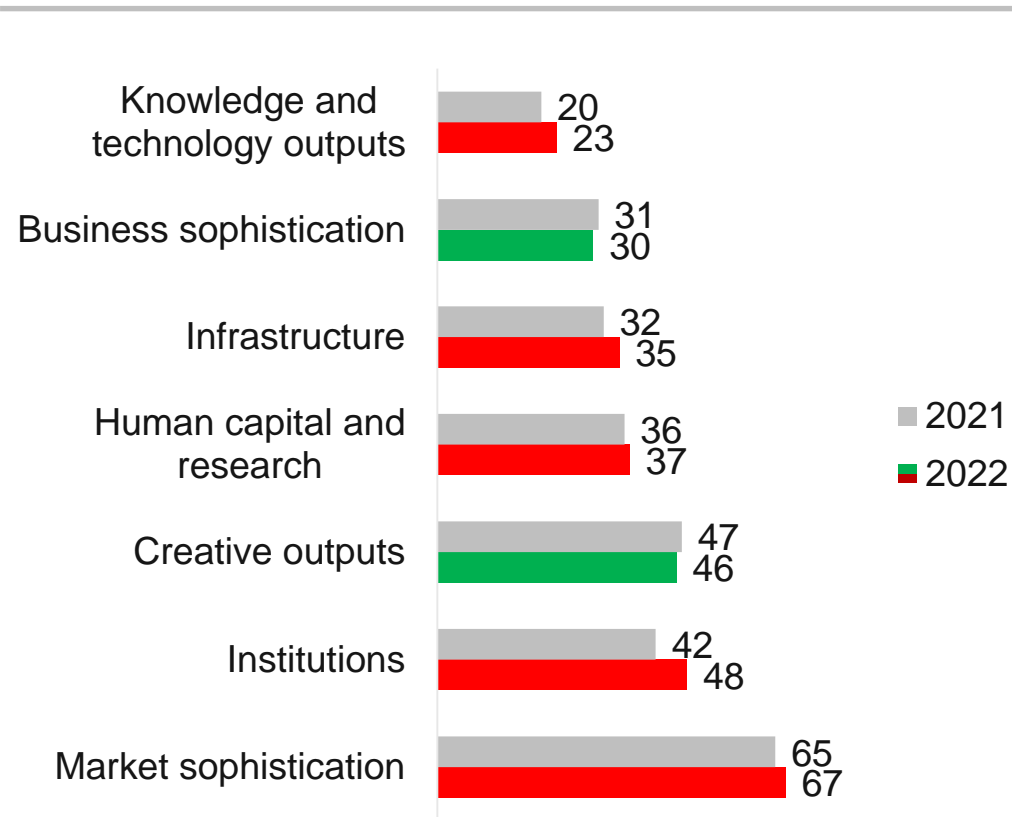
Global Innovation Index (GII): Hungary is in 34th place



The ranking of the V4 countries and Austria on the GII ranking



Hungary's position on the main pillars of the GII ranking

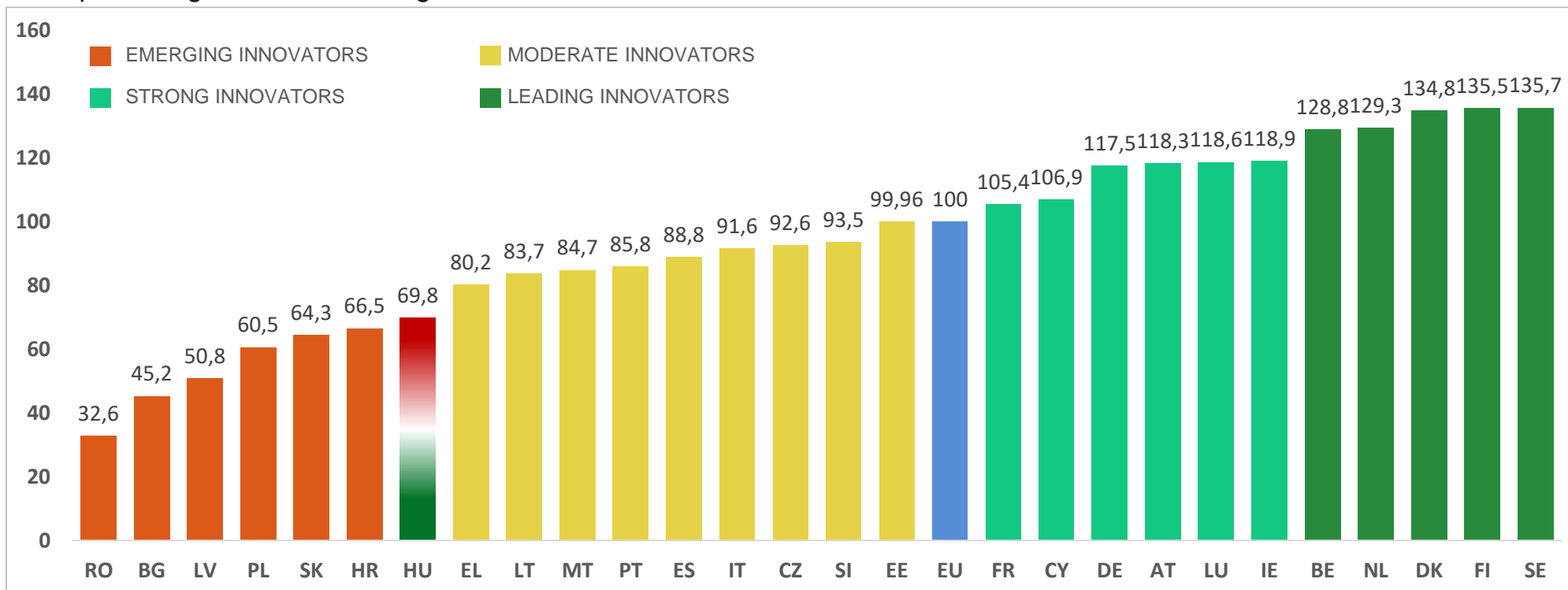


European Innovation Scoreboard: Hungary ranks 21st in the EU in the field of innovation, 1st among emerging innovators



Innovation ranking of European countries based on EIS2022

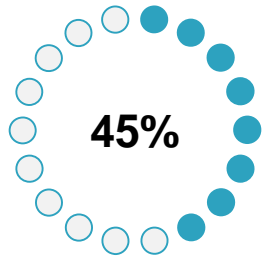
As a percentage of the EU average in 2022



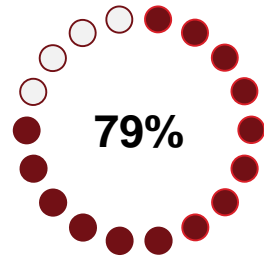
In 2022, Hungary moved up 1 place to 21st place



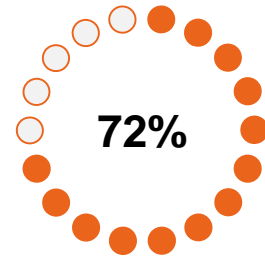
There is a room for improvement in: 1) human resources, 2) innovative enterprises and 3) intellectual property



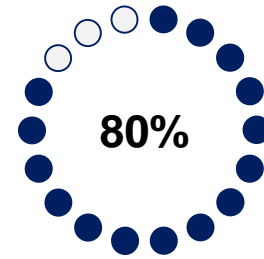
HUMAN RESOURCES



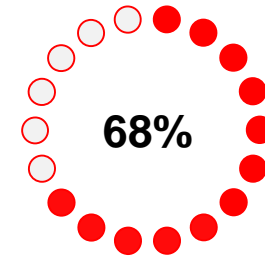
ATTRACTIVE RESEARCH SYSTEMS



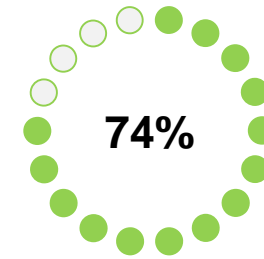
DIGITALISATION



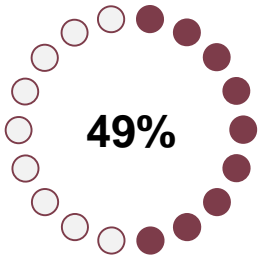
FINANCE AND SUPPORT



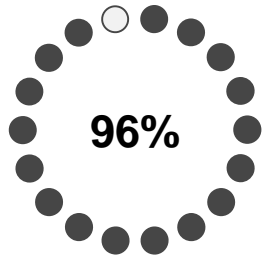
FIRM INVESTMENTS



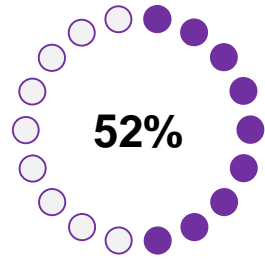
USE OF INFORMATION TECHNOLOGIES



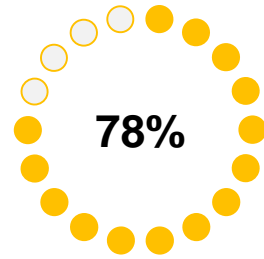
INNOVATORS



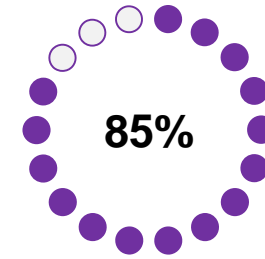
LINKAGES



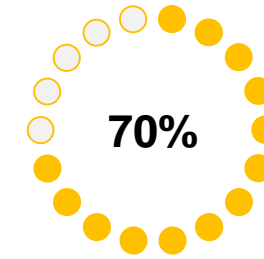
INTELLECTUAL PROPERTY



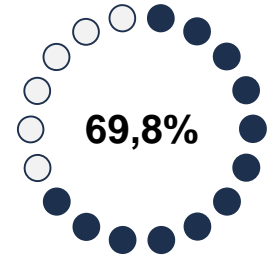
EMPLOYMENT IMPACTS



SALES IMPACTS



ENVIRONMENTAL SUSTAINABILITY



SUMMARY INNOVATION INDEX

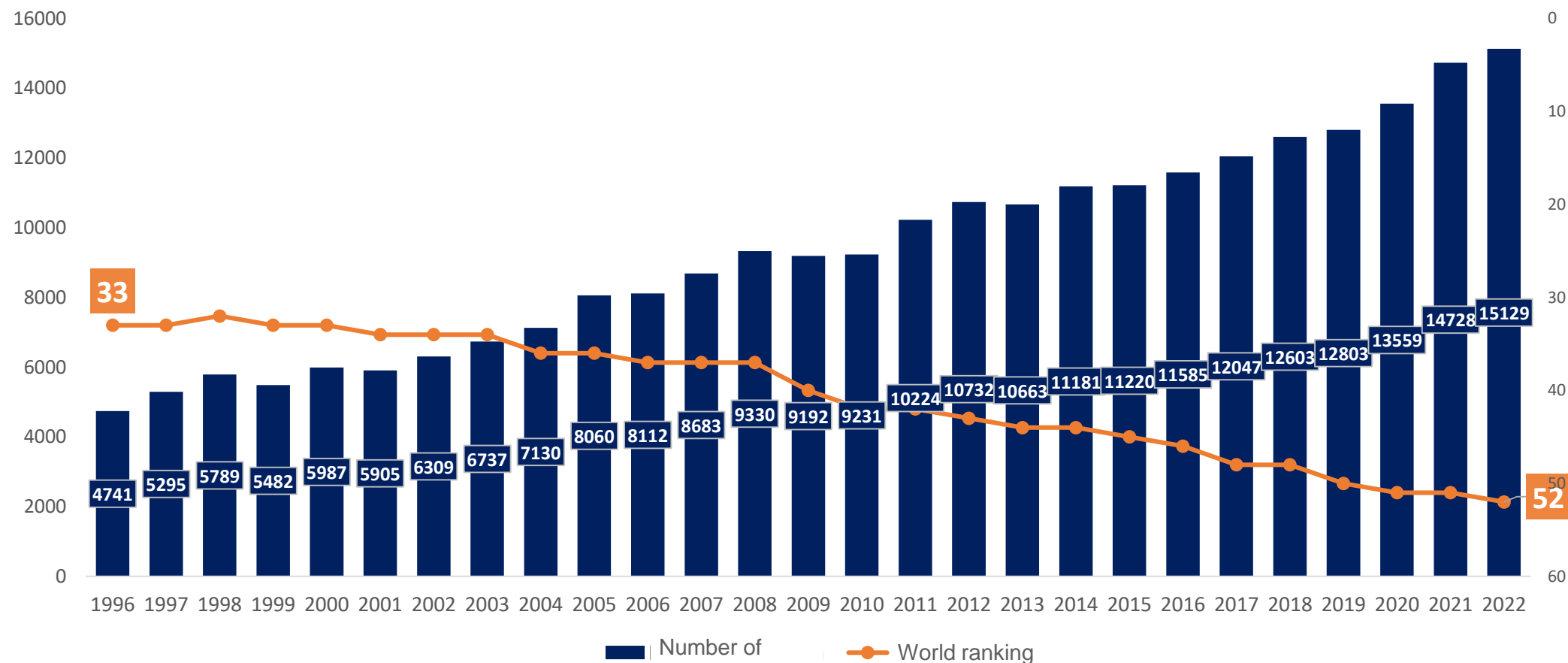


Despite the fact that the number of Hungarian publications has tripled in the last 25 years, we have dropped from 33rd to 52nd place in the world ranking.



Number of Hungarian publications and their ranking in the world ranking (1996-2022)

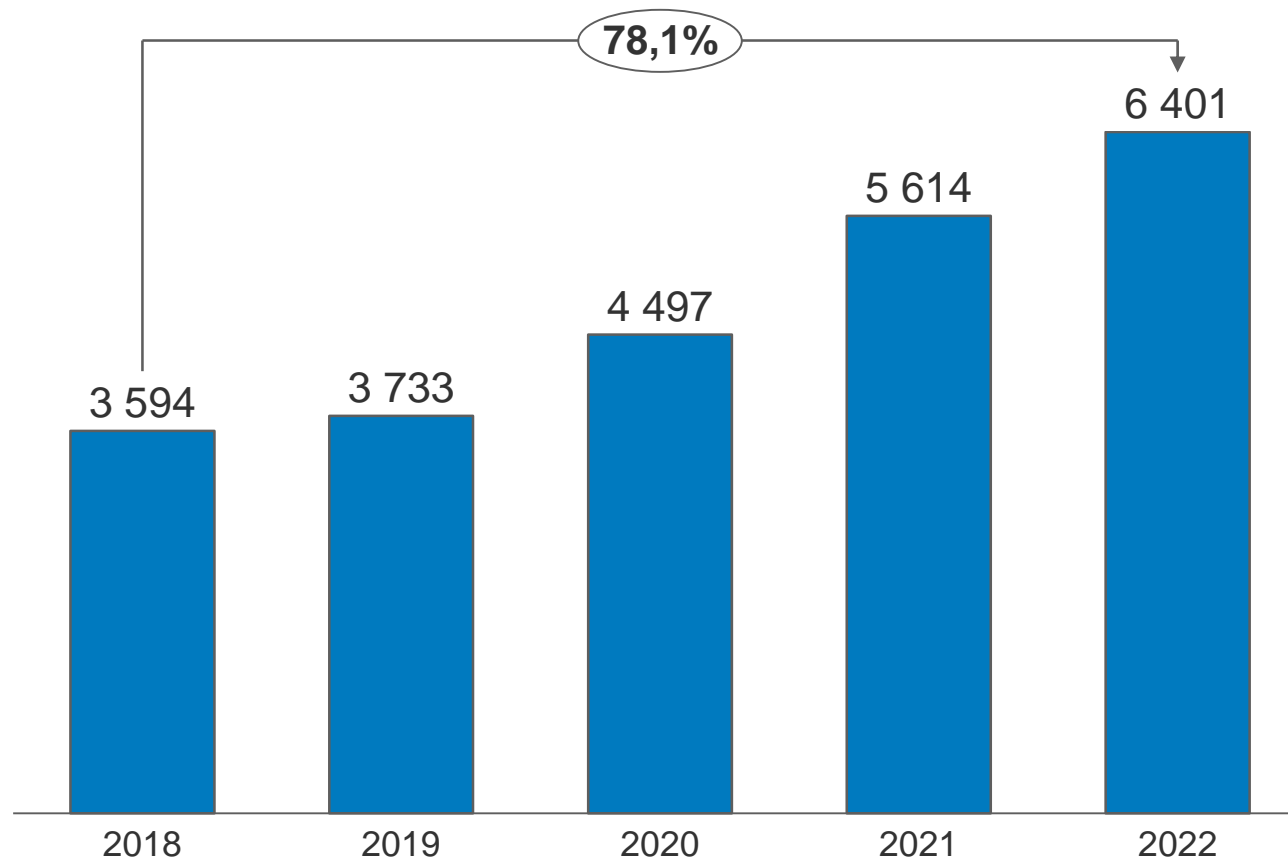
piece (left axis, bar chart), ranking (right axis)



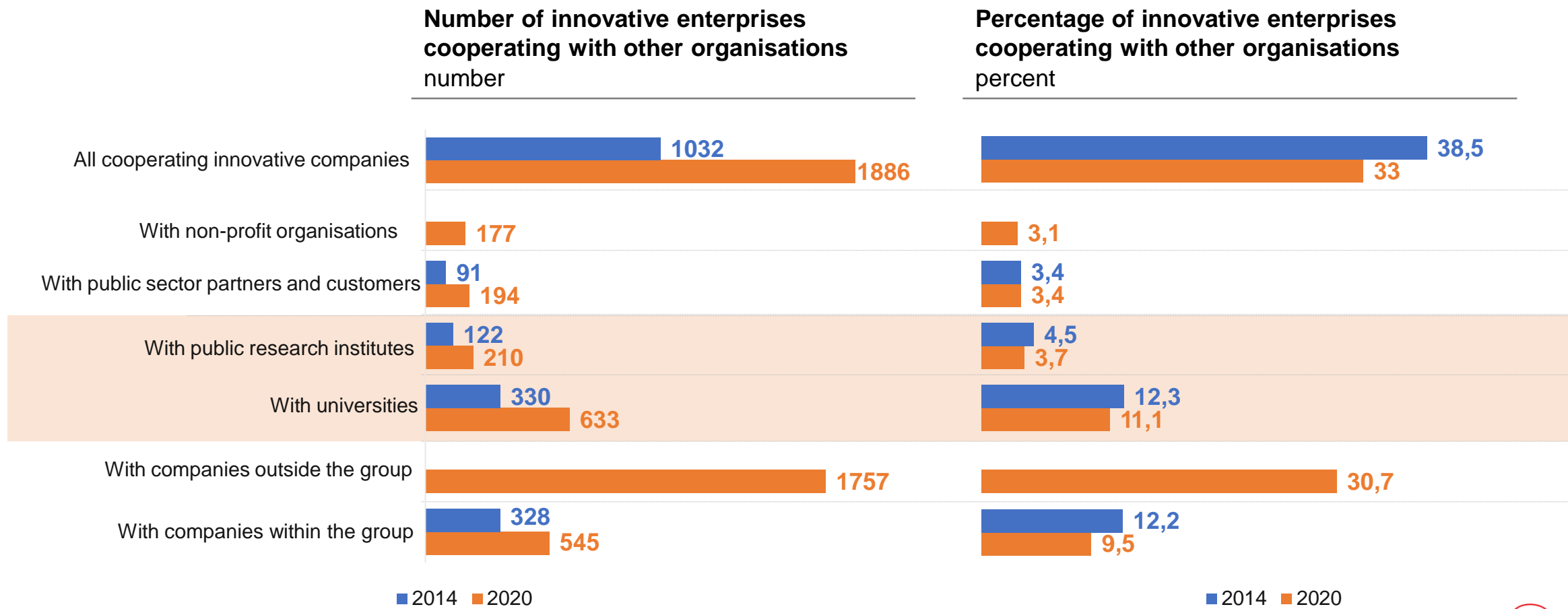
At universities, the number of Q1 publications increased by nearly 80 percent and the number of high-impact publications by nearly 30 percent, indicating the success of the model-changing



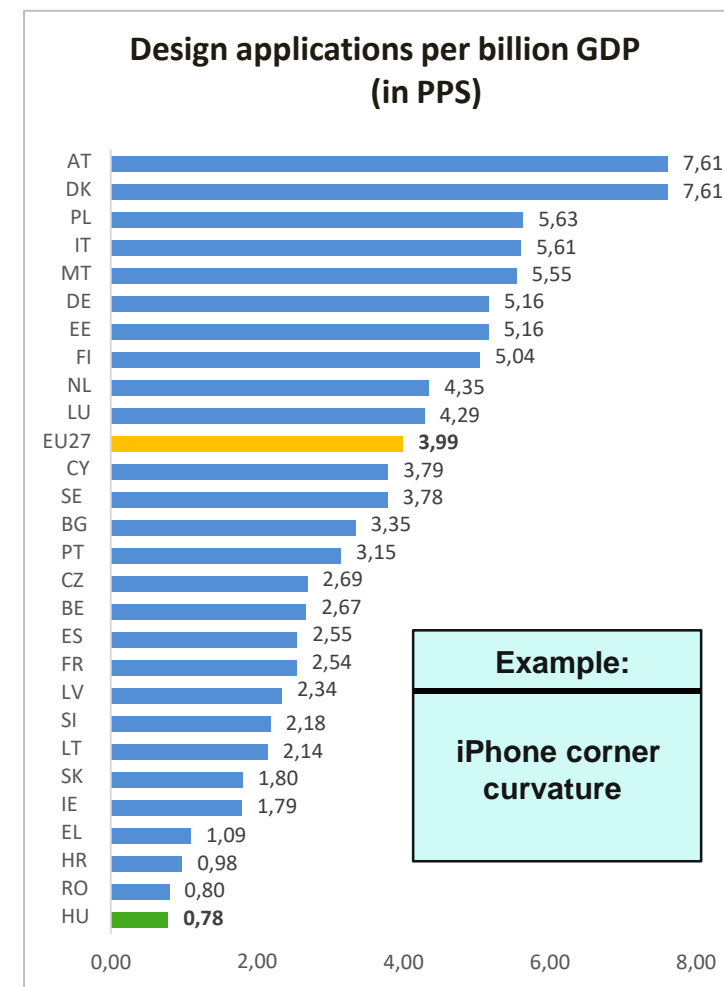
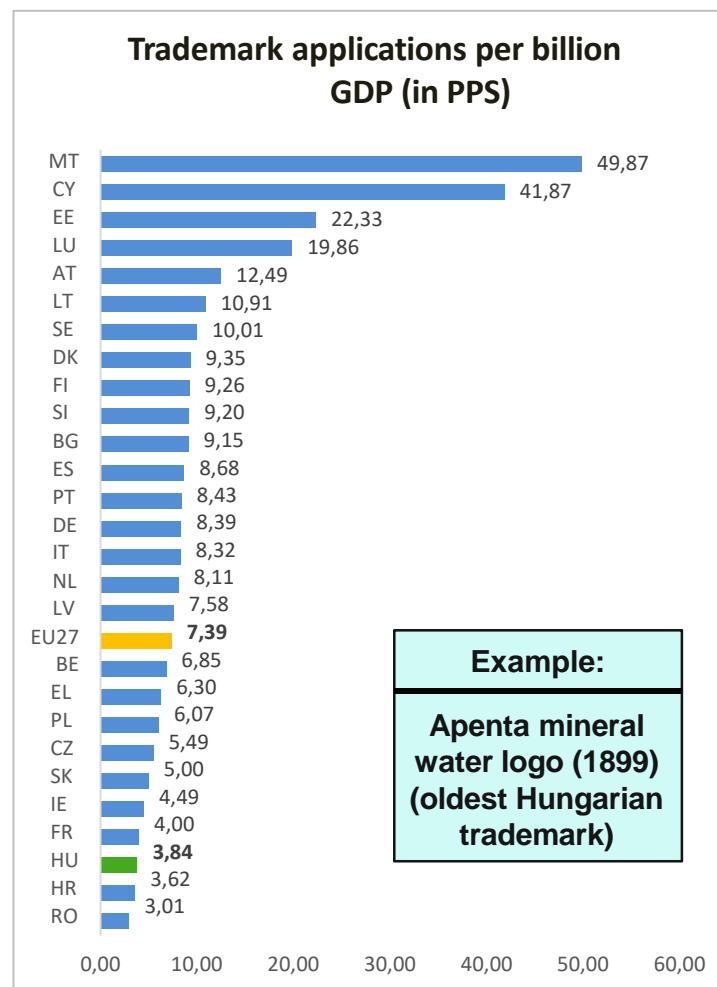
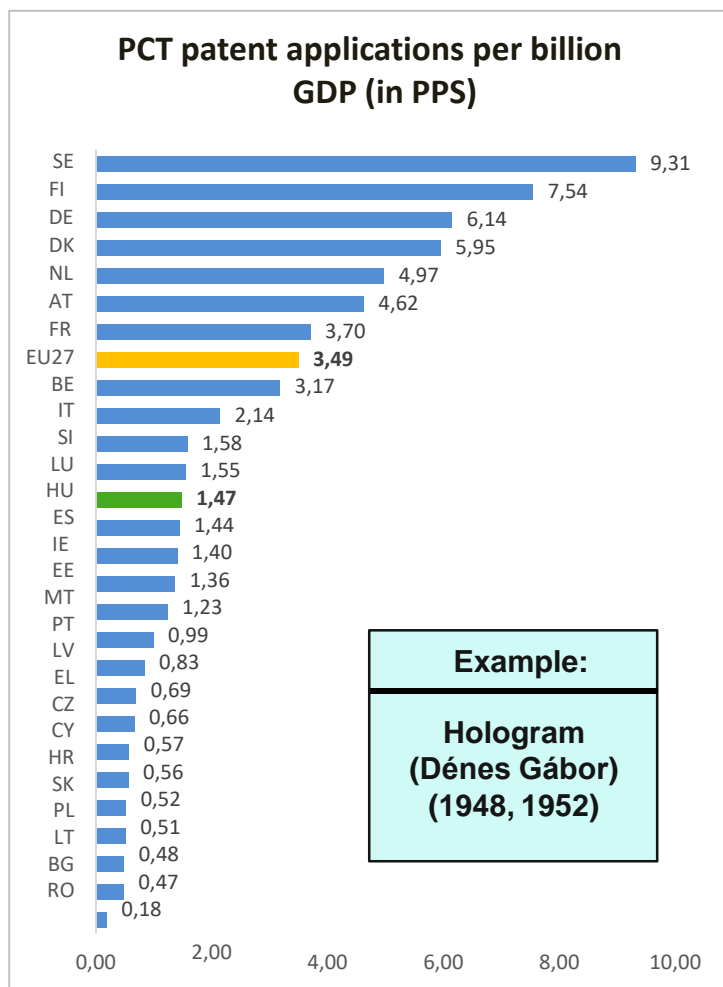
Number of Q1 publications number



Although we have nearly twice as many innovative businesses working with universities as in 2014, the proportion remains low (11%)



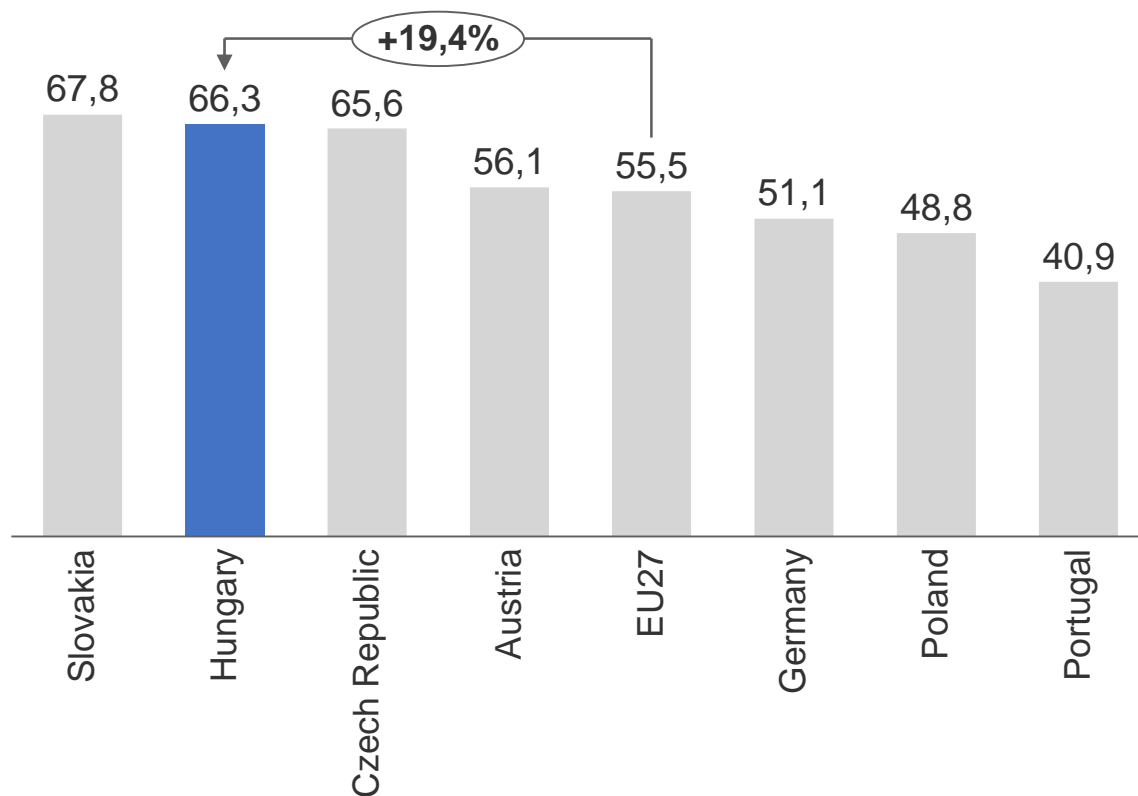
There is a huge room for improvement in the field of intellectual property (IP) rights



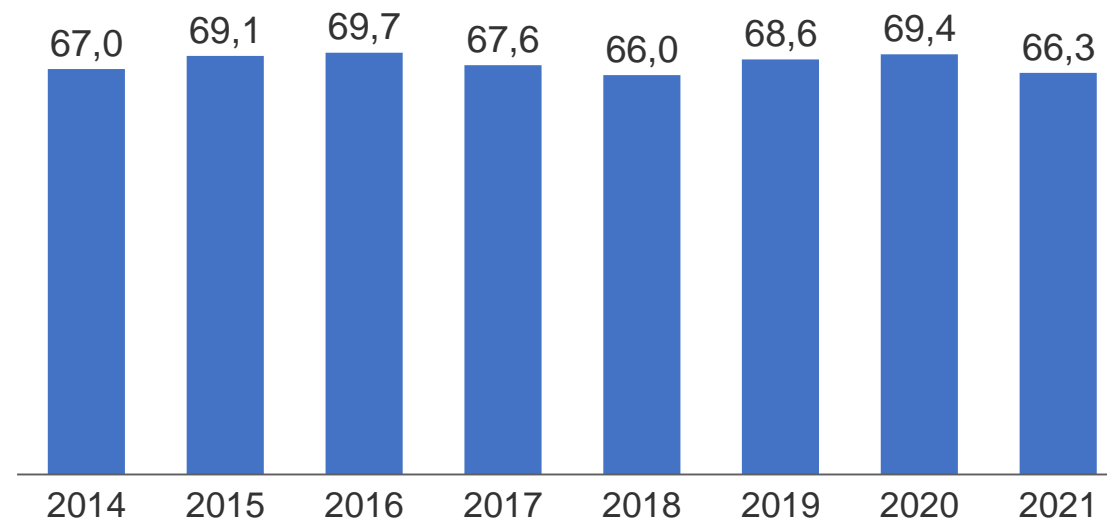
The share of high-tech exports in Hungary exceeds the EU average



Export of medium high-tech and high-tech products in an international comparison
as a percentage of total exports



Development of knowledge-intensive service exports in Hungary
as a percentage of total service exports

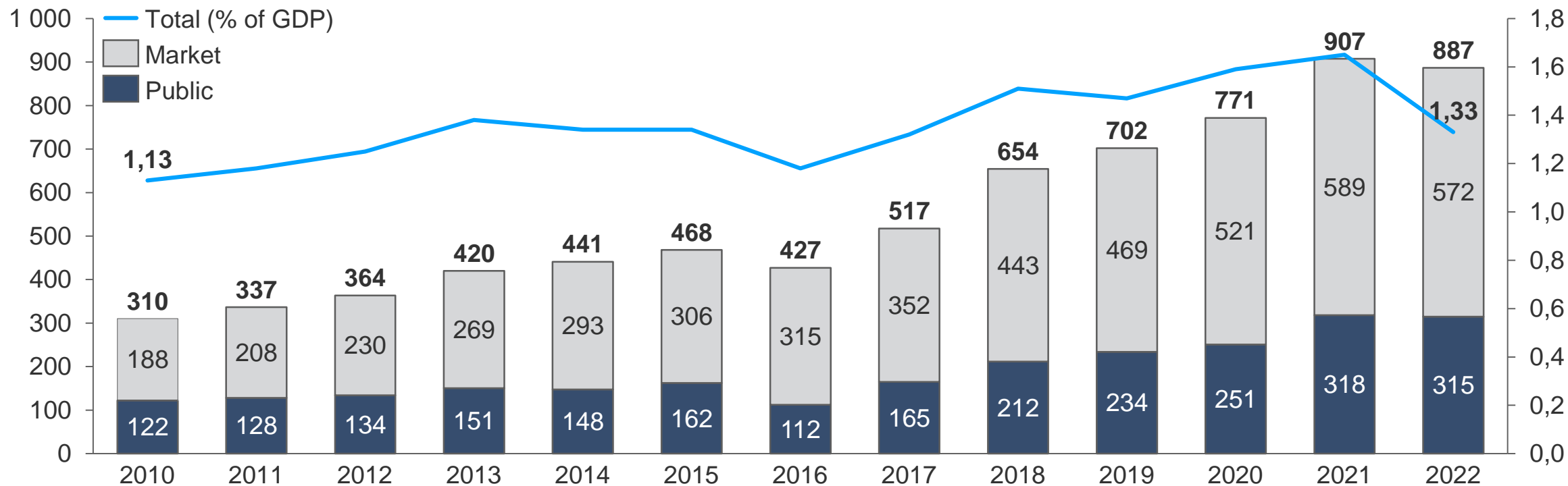


R&D expenditure has been growing dynamically in both the public and market sectors since 2016



The change of the domestic research and development (R&D) expenditures

HUF billion (left axis, bar chart) and in proportion to GDP (right axis)



Source: KSH

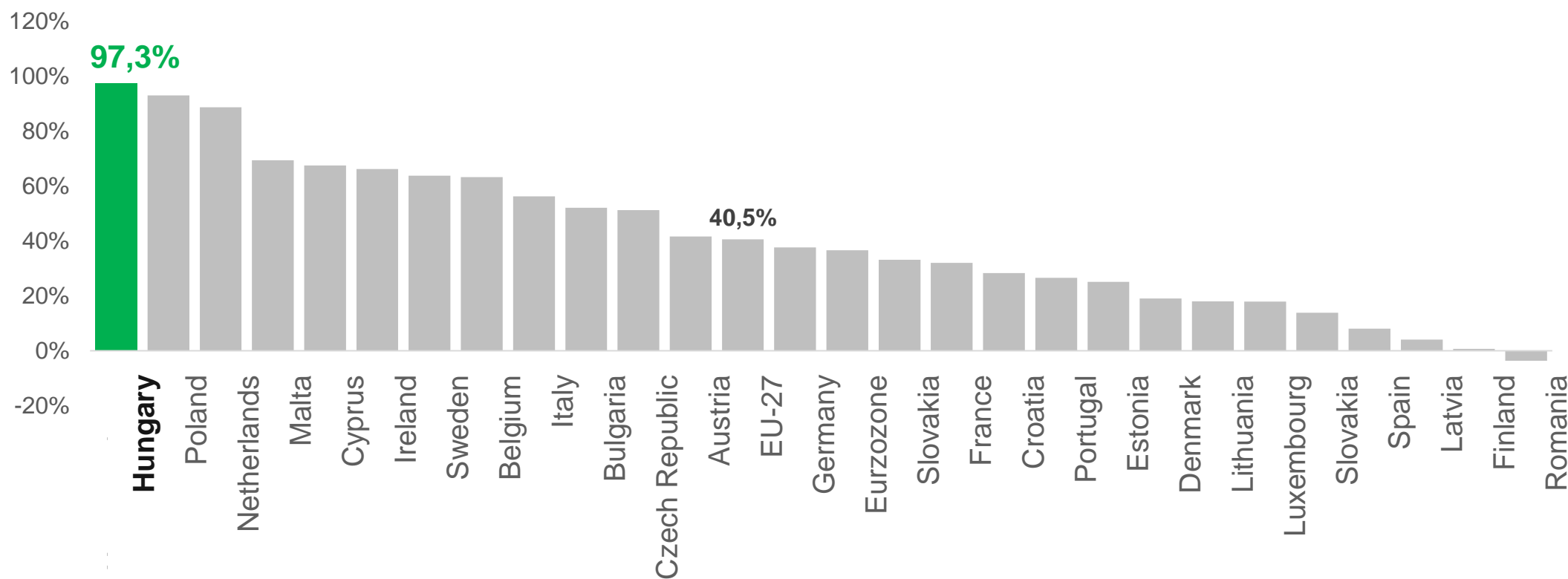


Hungary has seen the highest increase in the number of people working in research and development in the EU since 2010



Significant increase in the number of people working in R&D

Increase in the number of R&D workers compared to 2010, FTE, %





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Why is Artificial Intelligence important for Hungary?

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Developments in the field of AI



The aim is to increase commercialization

Innovation = Invention **x** Commercialization

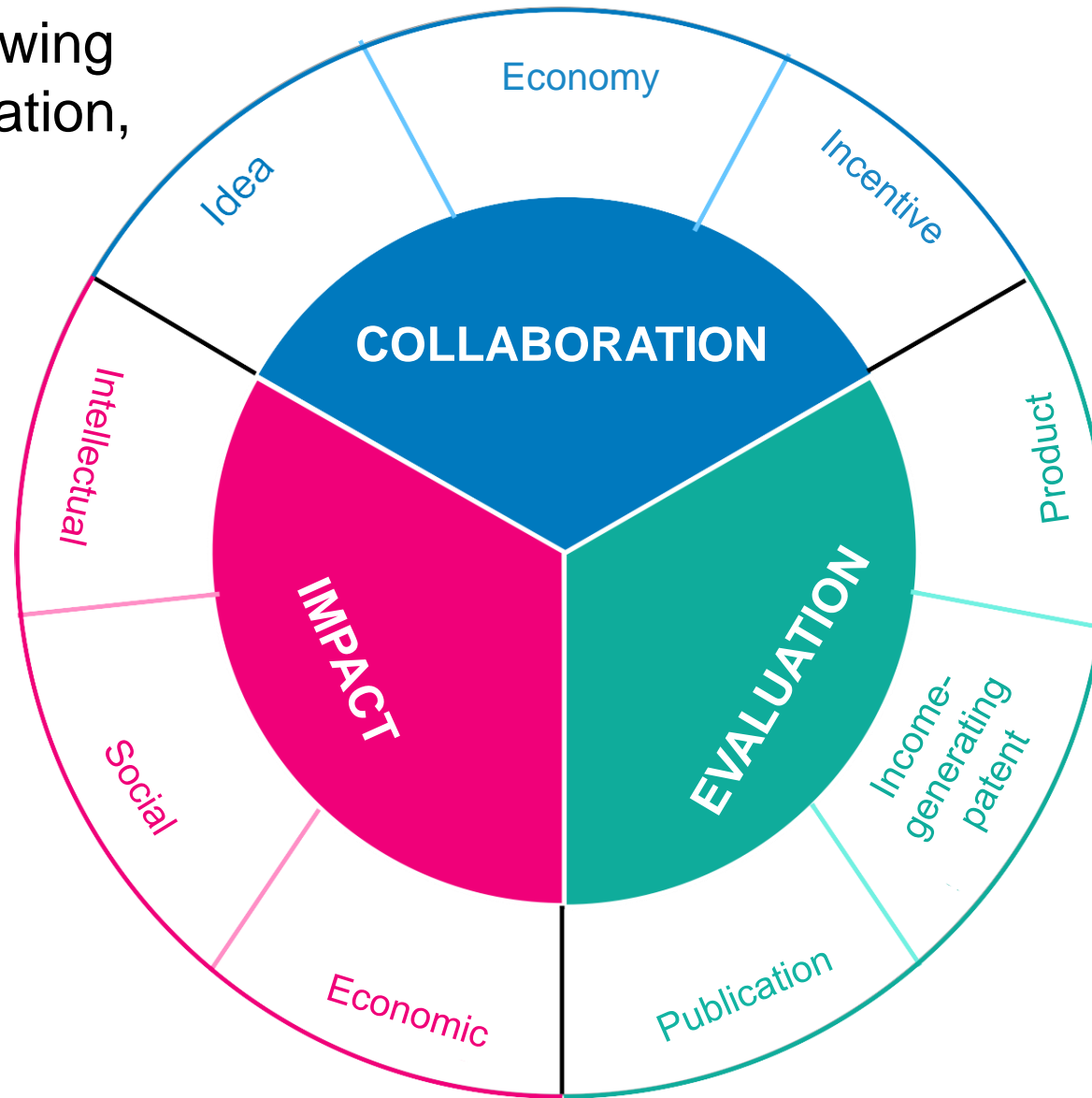
(new idea, explorative
research, technology)

(commercialisation,
value creation)

Source: MIT



The three key words of the following period: 1) collaboration / association, 2) impact, 3) evaluation



John von Neumann Programme – the aim is building bridges between our universities and the economy



1

Result-based financing model and internationalisation of the **HUN-REN**

2

Establishing the **National Innovation Agency of Hungary** besides our funding agency (NRDIO)

3

Defining focus areas in R&D and focusing heavily on economic and social impacts

4

Establishment of the **Research Council**

5

Reinforce the **industrial rights protection** activity

6

Facilitate **startup** financing

7

Measures to increase the number of **doctoral students** and mandatory inclusion of innovation activities in scientific progress

8

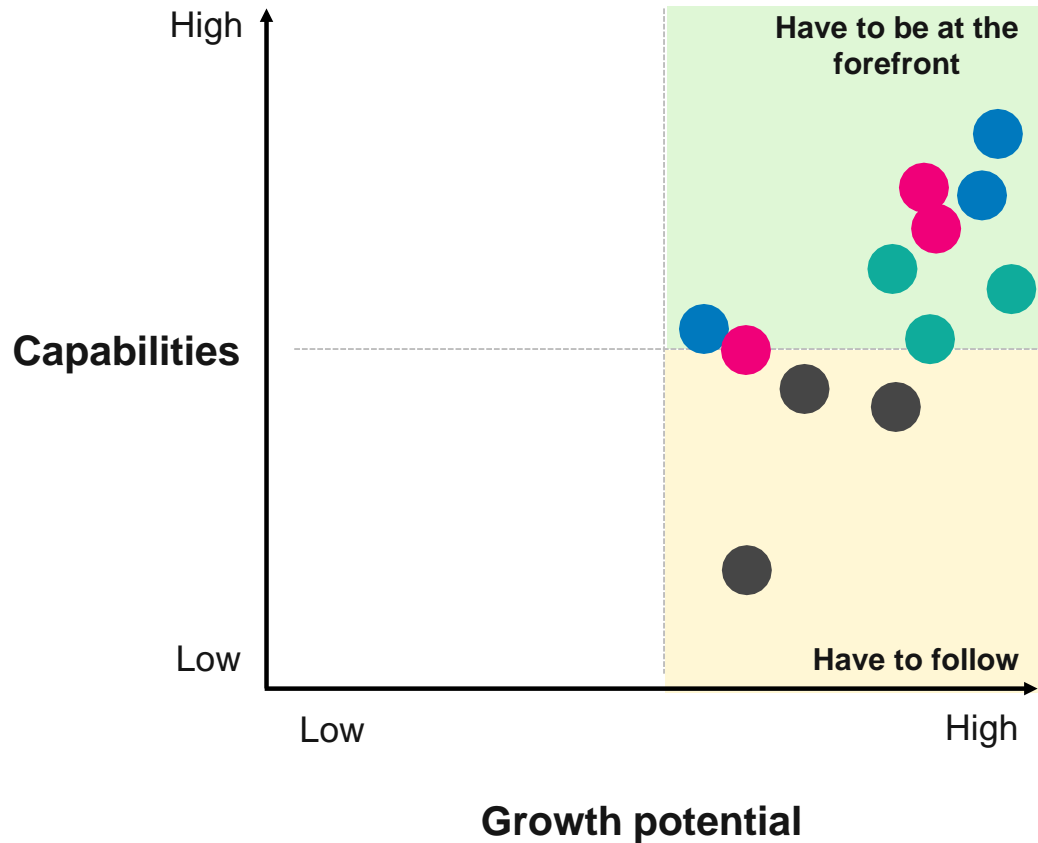
Development of Science Parks

9

Making **Hungarian higher educational institutions in the Carpathian Basin** eligible for R&D funding



4 Focusing domestic RDI resources: 3+1 focus areas



1. Digital transformation on economy and society

- Artificial intelligence, big data and network analysis
- Autonomous vehicles
- Quantum technology

2. Healthy living

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

3. Green transition

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

+1 Safety and security

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

6 Measures to increase the number of doctoral students



	Measures	Details
1.	We provide additional scholarships for participants in doctoral training	<ul style="list-style-type: none">▪ Continuing the New National Excellence Program (3.5 billion HUF in 2023)
2.	We connect universities and companies through doctoral trainings	<ul style="list-style-type: none">▪ „Patent is worth a Ph.D”▪ Continuing the Cooperative Doctoral Program▪ Expanding social contribution tax („szochó”) discount for the employment of doctoral students▪ In case of enrolment of an employee in a doctoral programme, 50% of the cost of the course is reimbursed by the state (NKFIH)
3.	Expanding doctoral courses	
4.	Provision of pension entitlement	<ul style="list-style-type: none">▪ 50% subsidy for the cost of the assumption by the higher education institution of the contribution of doctoral students (through NRDIO)
5.	Doctoral training even after a bachelor's degree	



We have launched 2023's Programme Strategy – approx. HUF 80 billion for R&D&I activities



Highlights:

Supporting innovation projects in the defined focus areas – HUF 35 billion

Within the framework of this tender scheme, we are allocating HUF 10 billion for digital, especially for AI, developments





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4

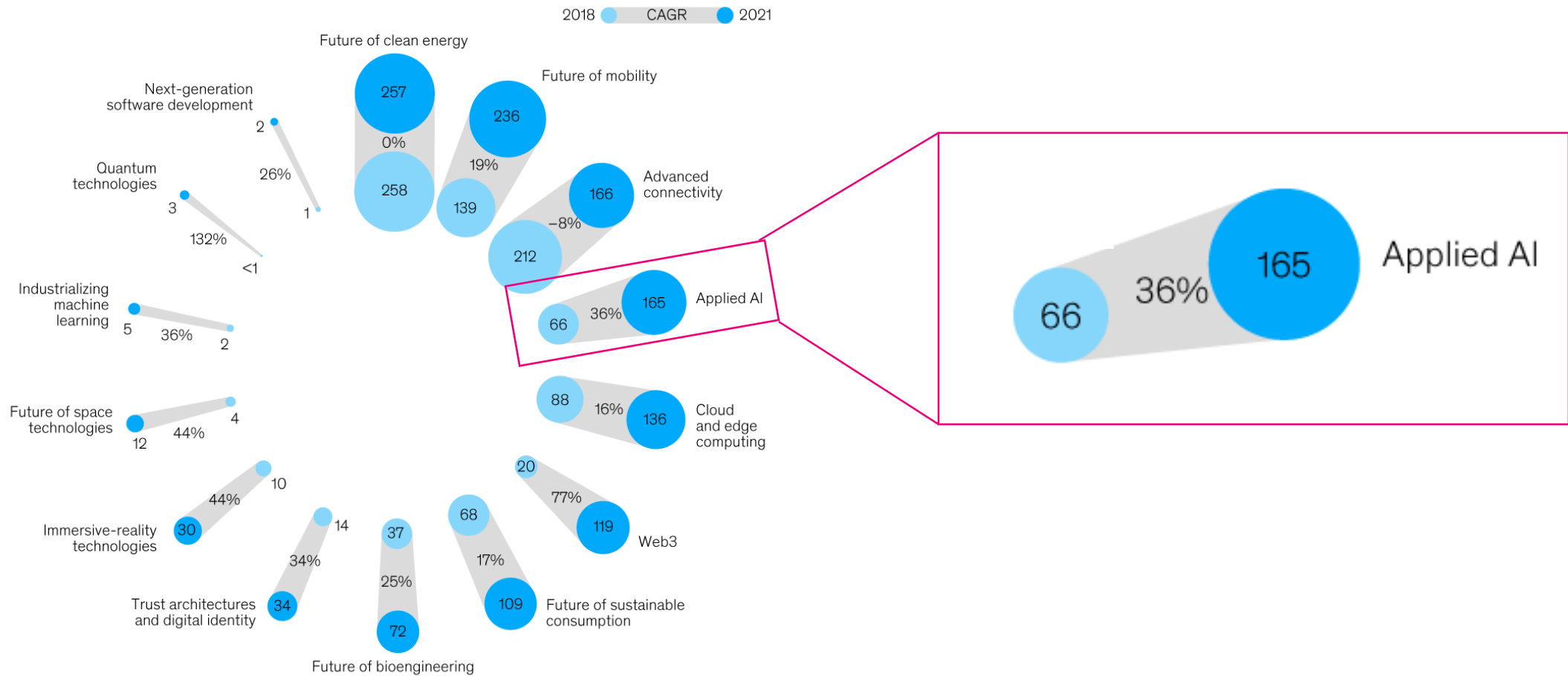
Developments in the field of AI

1

Artificial Intelligence (AI) is a global megatrend: AI is one of today's fastest growing transversal technologies



Total investment in transversal technologies, \$ billion

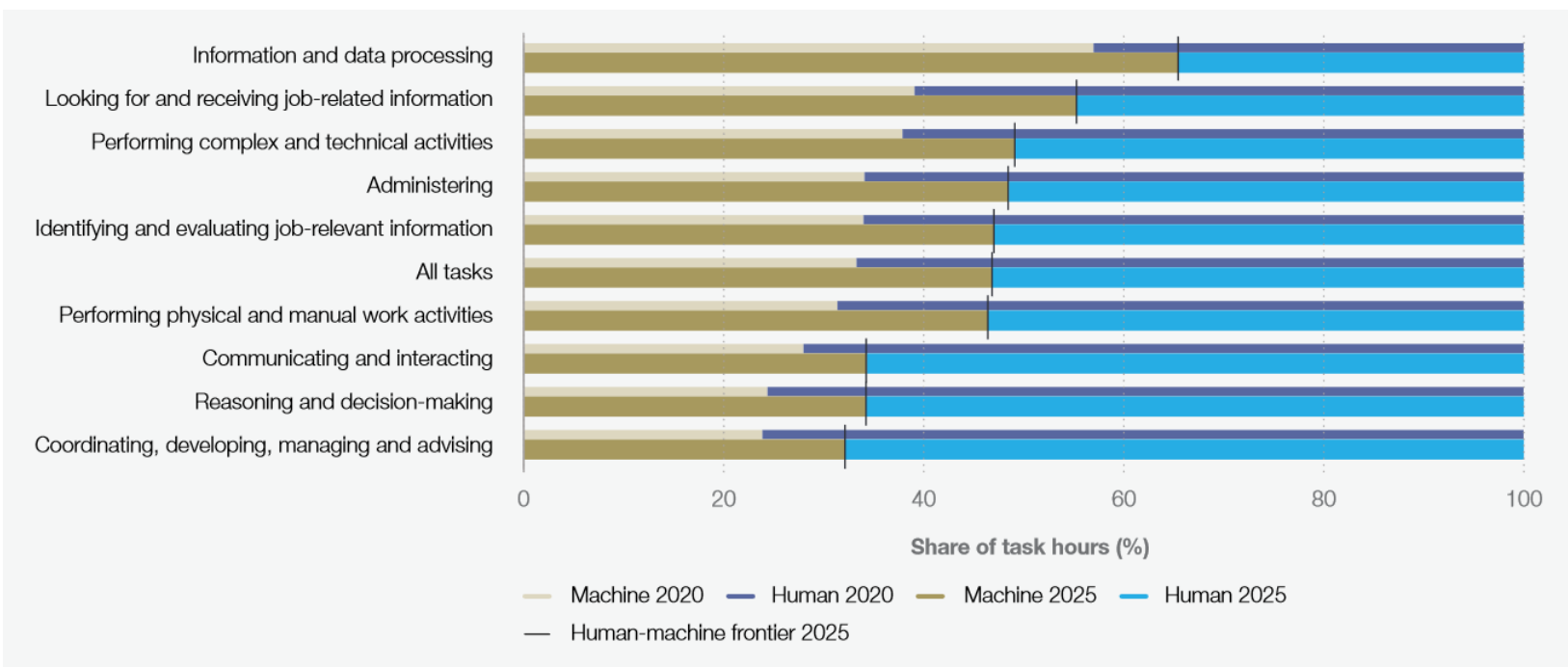


AI already has and will have even more impact on our daily life



By 2025 the average estimated time spent by humans and machines at work will be at parity based on today's tasks. Algorithms and machines will be primarily focused on the tasks of information and data processing and retrieval, administrative tasks and some aspects of traditional manual labour.

Share of tasks performed by humans vs machines, 2020 and 2025 (expected)



According to the results of the Hungarian Labour Market Survey carried out in the framework of the AI Coalition, up to **900,000 jobs in Hungary could be affected by the spread of AI-based technologies by 2030.**



3

Hungary has good foundations: Hungarian scientists are historically good at mathematics and network science



János Bolyai
Mathematician, creator of Non-Euclidean geometry



György Pólya
Known as the father of problem solving in math



Pál Erdős
Mathematician, graph theory



János Neumann
Mathematician, created the theoretical foundations of the digital computer



Alfréd Rényi
Mathematician, graph theory

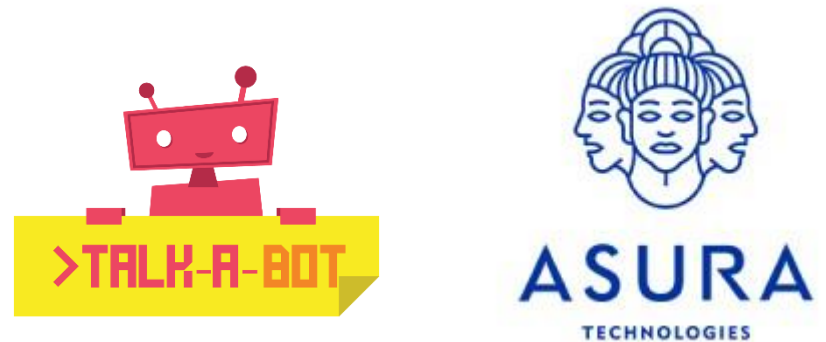


Albert László Barabási
Physicist, network researcher



4

We have a number of 1) successful startups operating in the field of AI and 2) large companies whose business models can be affected by AI



Emerging Hungarian startups dealing with artificial intelligence

Highlighted companies whose business models will be impacted by AI





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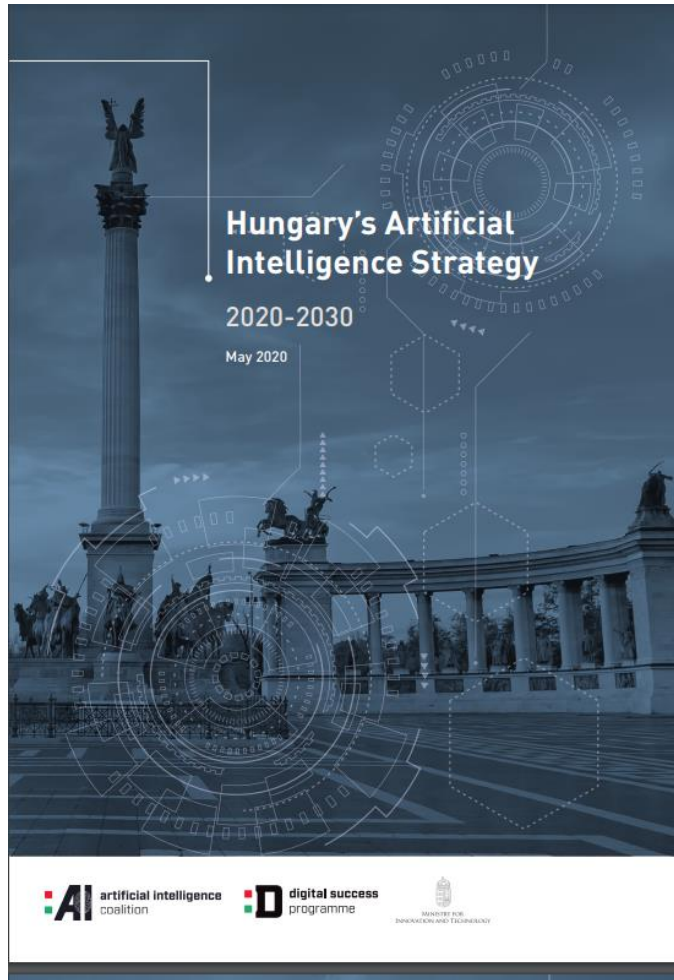
Why is Artificial Intelligence important for Hungary?



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Developments in the field of AI

The National AI Coalition has created Hungary's Artificial Intelligence Strategy in 2019



Vision: Together we learn, effectively develop and use AI technologies, responsibly, within a framework, as a global partner, in the service of everyday life.

Target indicators

1. **15% AI-induced GDP increase** and AI adaptation exceeding the regional average
2. **26% average productivity increase** in the Hungarian corporate sector compared to 2020
3. **1 million citizens perform new, higher added-value work** in AI subsidized jobs as a result of a job or job position change



R&D in the field of AI: National Laboratory of Artificial Intelligence (MILAB)



The purpose of the National Laboratory of Artificial Intelligence is to strengthen Hungary's role in the field of artificial intelligence. The focus of MILAB's research activities include **theoretical mathematics, machine learning, machine vision and perception**. ~30 million EUR funding between 2020-2025

Budapest:

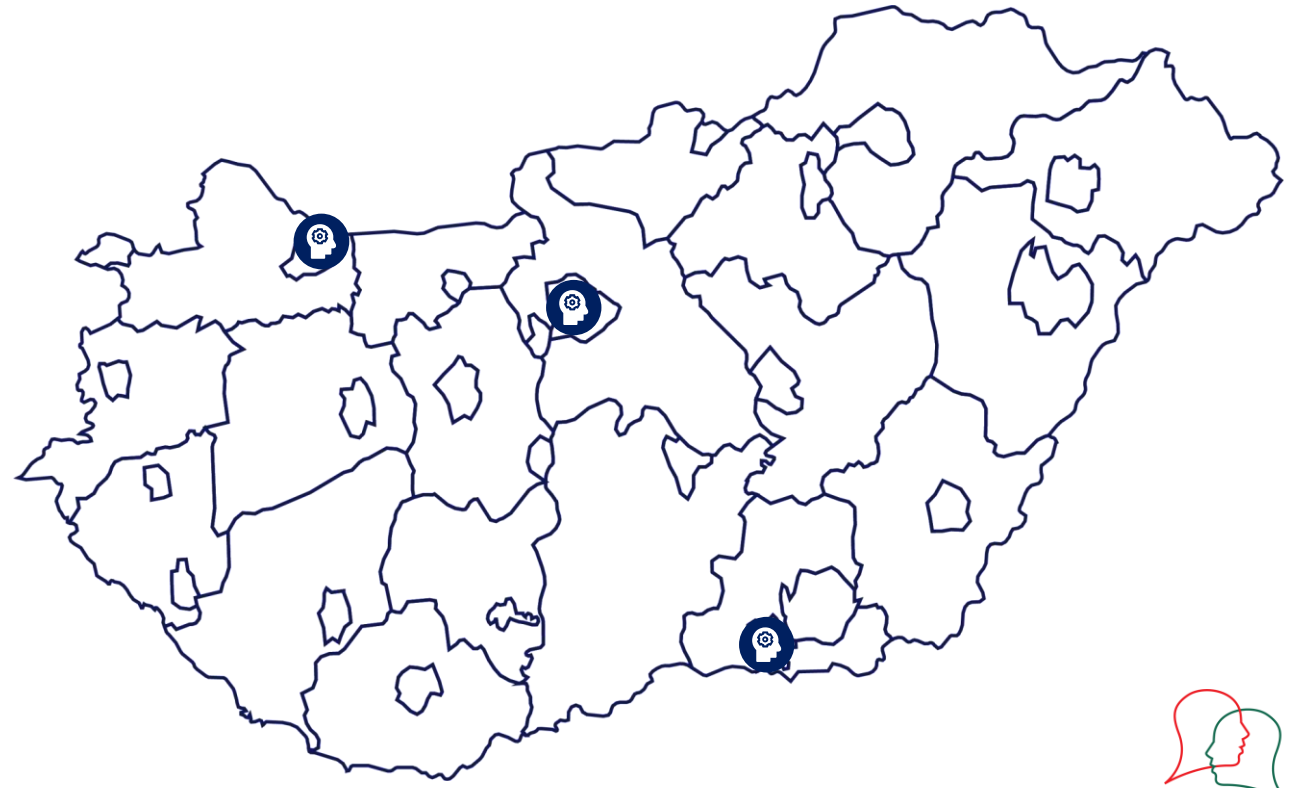
- Budapest University of Technology and Economics
- Eötvös Loránd University
- Institute of Experimental Medicine
- Hungarian State Treasury
- Special Service for National Security
- Alfréd Rényi Institute of Mathematics
- Semmelweis University
- Institute for Computer Science and Control
- Centre for Social Sciences

Győr:

- Széchenyi István University

Szeged:

- University of Szeged

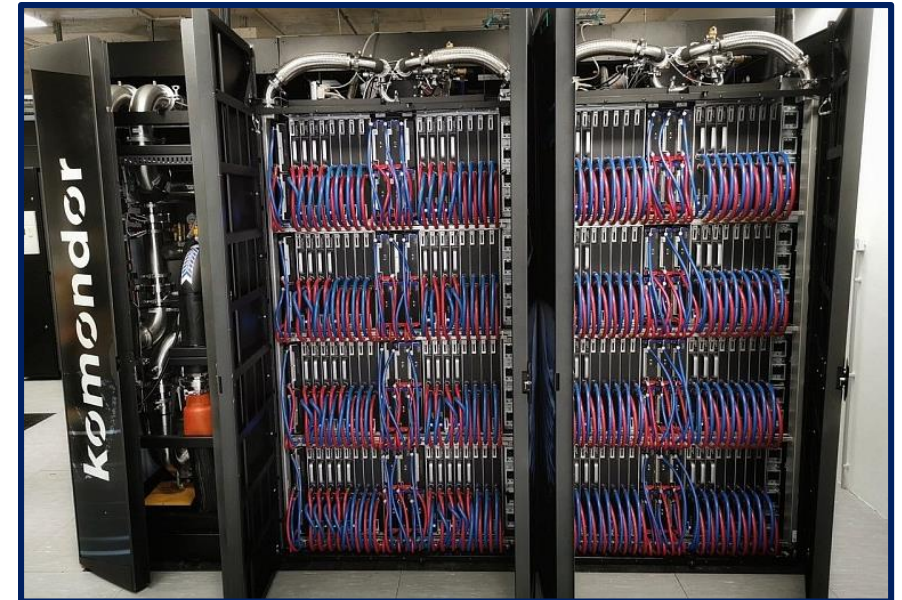


Infrastructure: development of HPC infrastructure required for AI application



Komondor – University of Debrecen

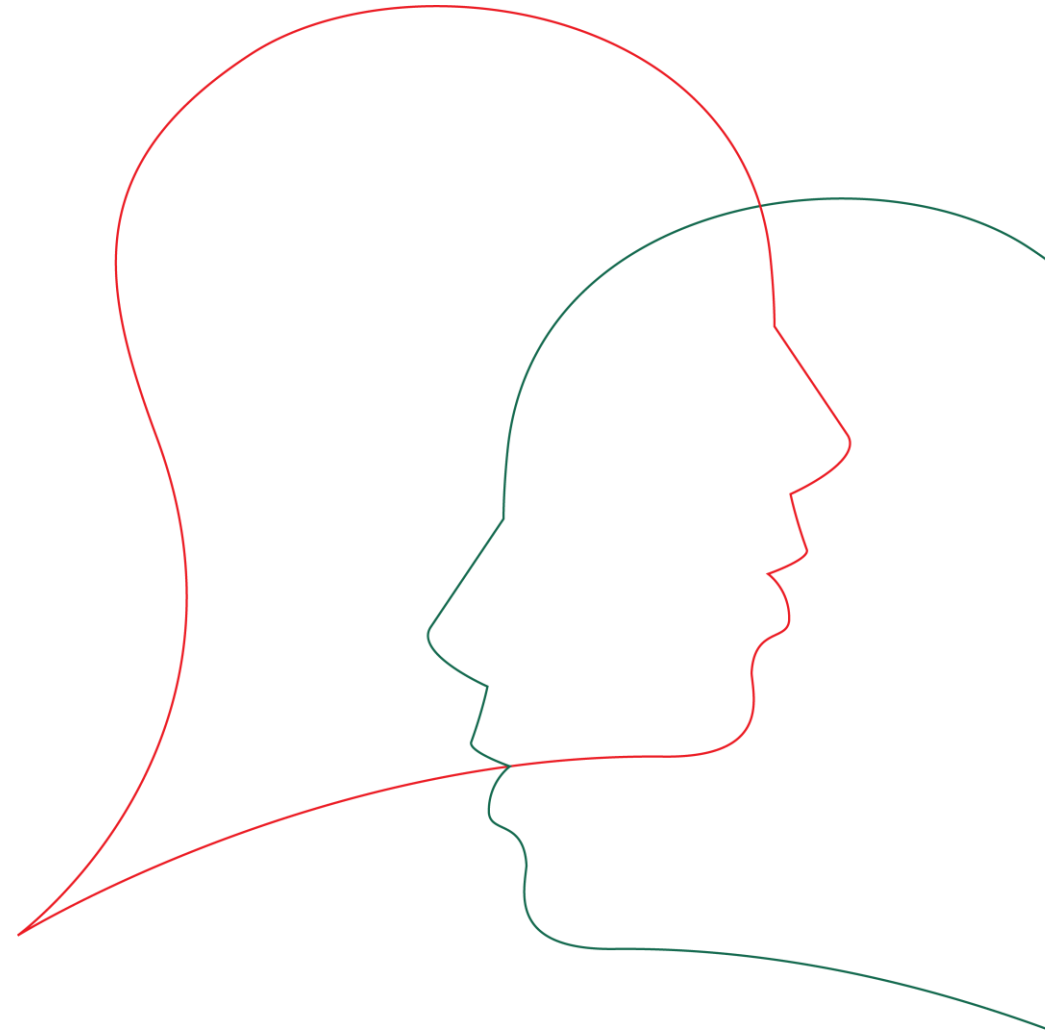
- Hungary's most powerful supercomputer as of now was handed over to the University of Debrecen on January 13, 2023.
- The machine named Komondor will support the Hungarian innovation ecosystem.
- Performance: **5 petaflops**





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Thank you for your attention!



2023 – BÓDIS László deputy state secretary, Budapest, 2023-06-28