PRESENT AND FUTURE OF THE HUNGARIAN RI ECOSYSTEM

Research Infrastructure Monitoring Workshop

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Budapest - 27 May, 2019

NATIONAL RESEARCH, DEVELOPMENT AND INNOVATION OFFICE
HUNGARY

Tasks of National Research, Development and Innovation Office

- strategic planning of **calls for proposals**, coordinated **management** of the application procedure, programme **evaluation** and **monitoring** system;
- managing the **National Research, Development and Innovation Fund** and being responsible for the strategic planning of research development and innovation calls financed from EU funds;
- governmental coordination of RDI issues and **representation of Hungary in international organizations (in cooperation with the MIT);**
- establishment of **innovation services** and collaboration **platforms**, maintenance of **databases**, preparation of **strategic analyses**.

HUNGARIAN RDI SYSTEM IN BRIEF

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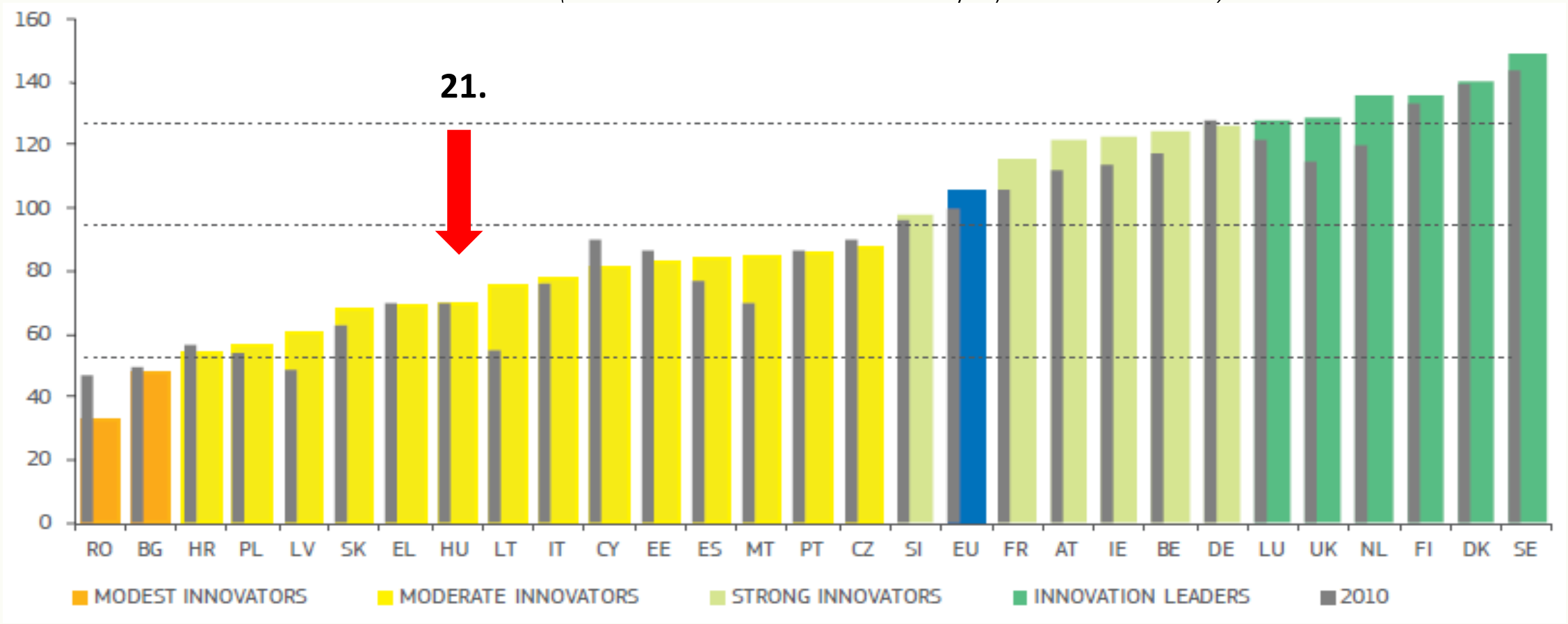
Performance of EU Member States' innovation systems

European Innovation Scoreboard 2018

(Columns show Member States' performance in 2017)

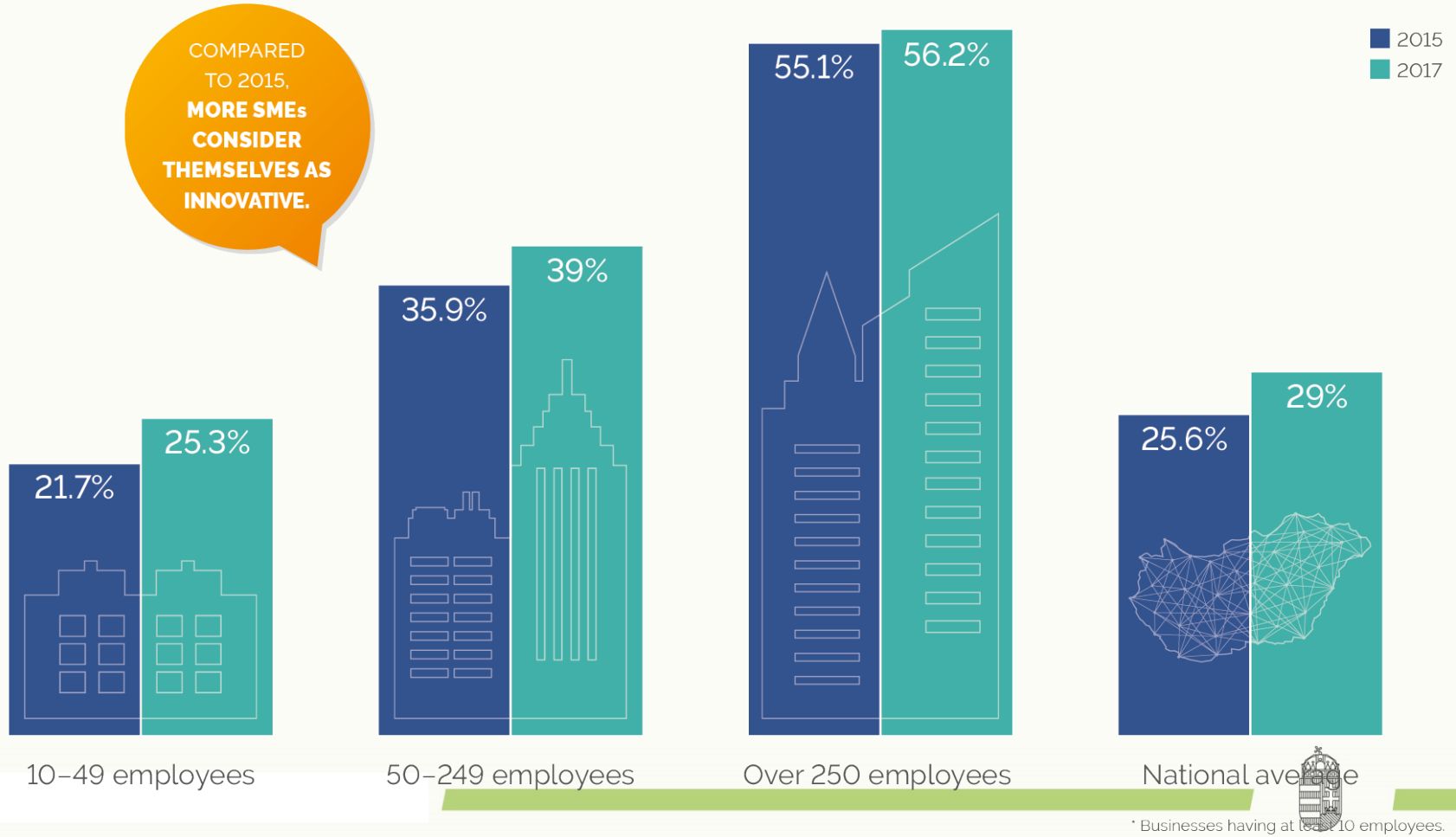


Source: European Innovation Scoreboard 2018

Share of innovative businesses

The share of innovative businesses in Hungary*

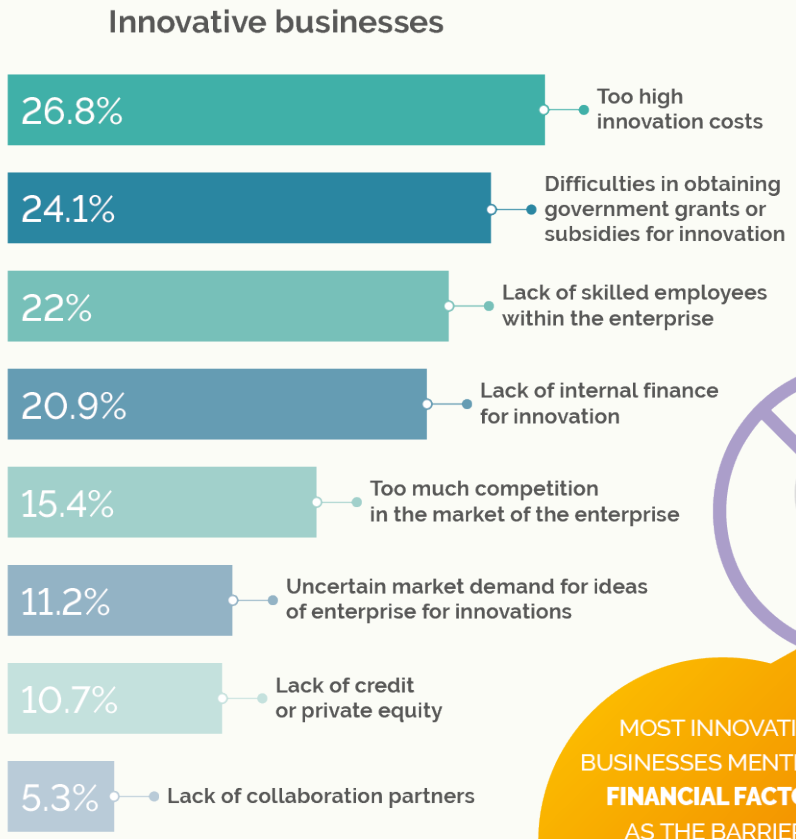
INNOVATIVE BUSINESSES BY SIZE CLASS



* Businesses having at least 10 employees.

Source: KSH / *Data source: Hungarian Central Statistical Office*

Firm innovation

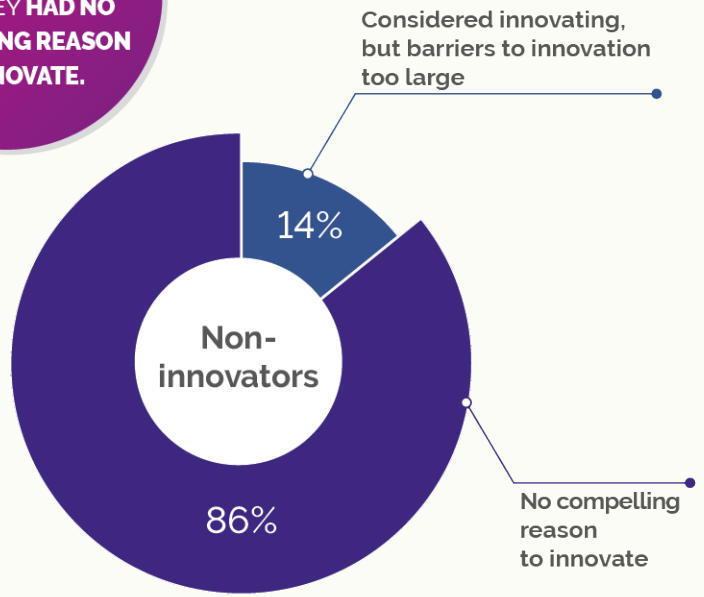


Barriers to innovation at innovative businesses**

MOST INNOVATIVE BUSINESSES MENTIONED **FINANCIAL FACTORS** AS THE BARRIERS TO INNOVATION, BUT THE SHORTAGE OF SKILLED EMPLOYEES IS ALSO A PROBLEM.

BARRIES TO INNOVATION 2017

86% OF NON-INNOVATIVE BUSINESSES STATED THAT THEY **HAD NO COMPELLING REASON TO INNOVATE.**

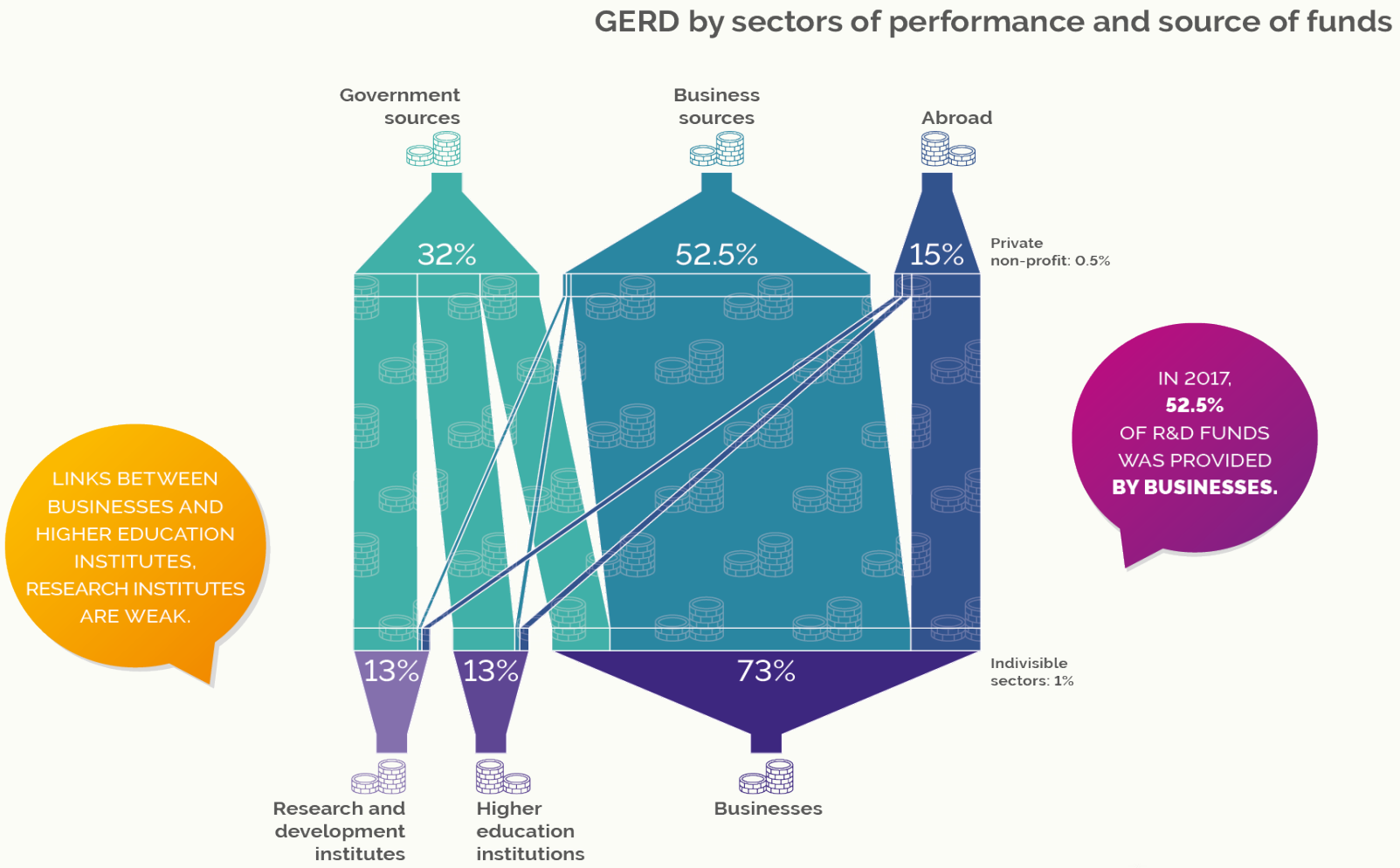


Answers for no innovation at non-innovators

* Based on the results of the innovation questionnaire prepared by the HCSO. ** More than one answer could be given in the questionnaire.

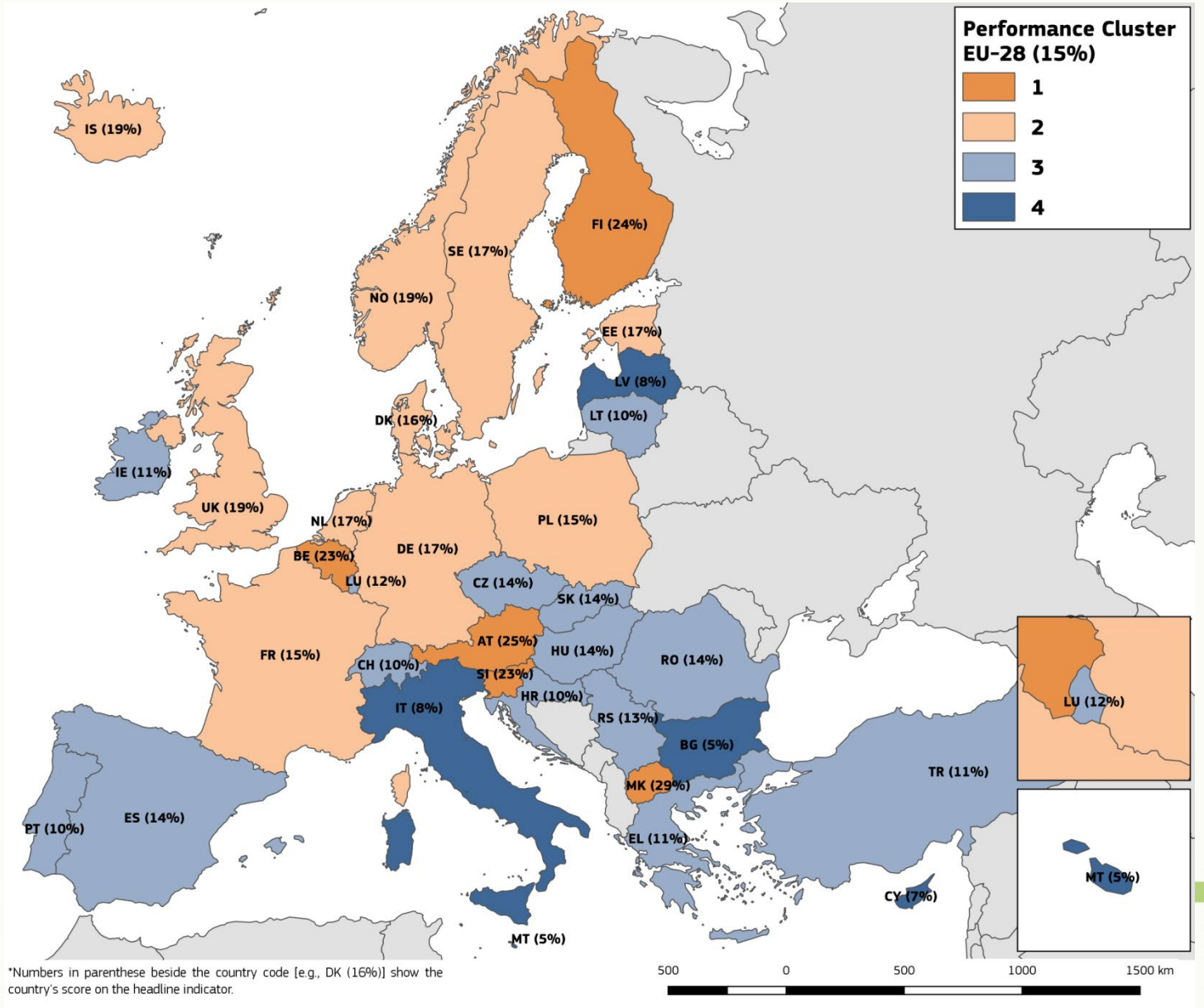
Source: KSH / *Data source: Hungarian Central Statistical Office*

GERD by sectors of performance and sources of funds



Source: RESEARCH, DEVELOPMENT AND INNOVATION IN HUNGARY, by NRDIO

Cooperation among the RDI sectors



*Numbers in parenthese beside the country code [e.g., DK (16%)] show the country's score on the headline indicator.

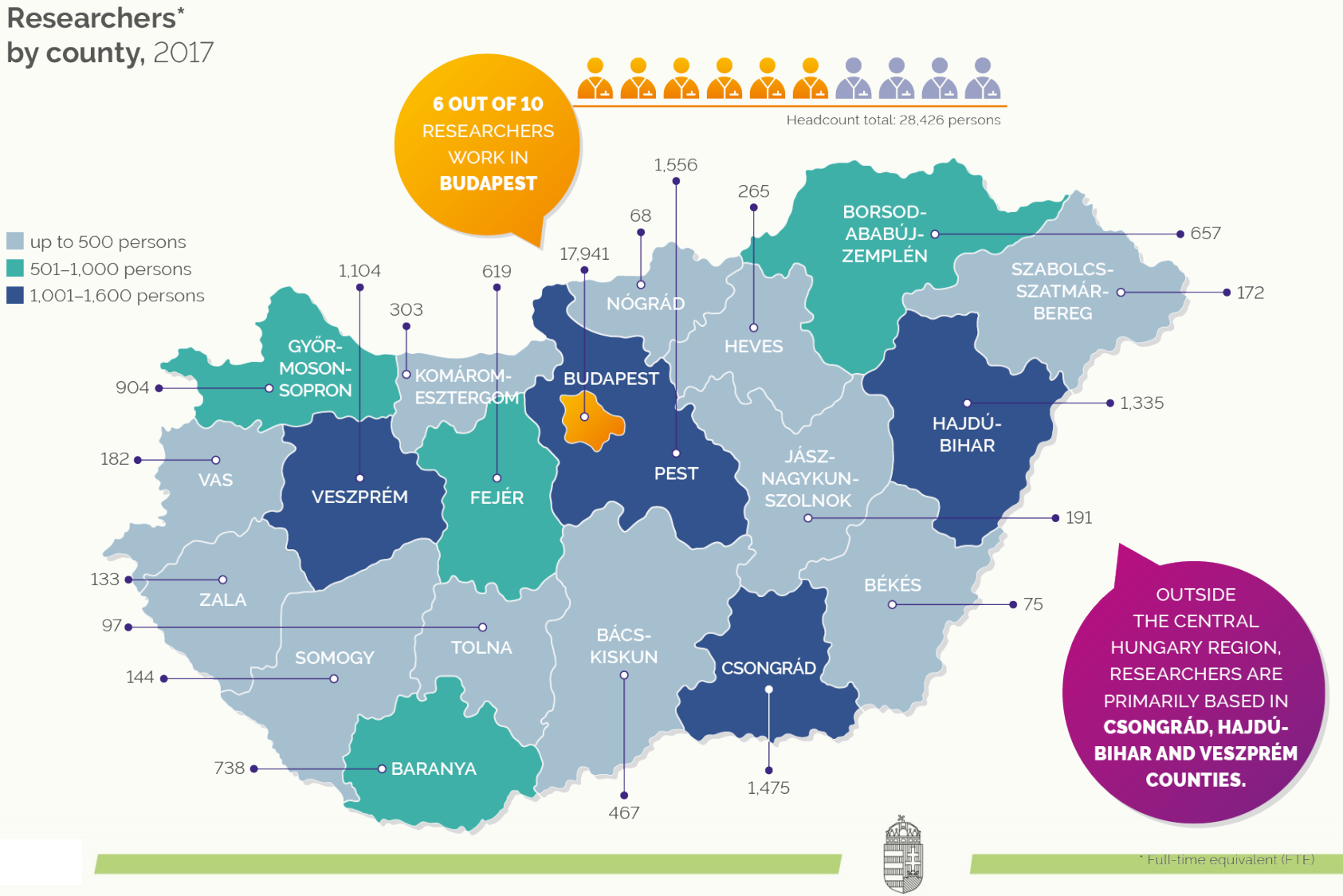
Share of product and/or process innovative firms cooperating with universities, government, public or private research institutes

EU-28:	15,0%
HU	13,6%

Source: ERA Progress report 2018
(Computed by Science-Metrix using Eurostat data)

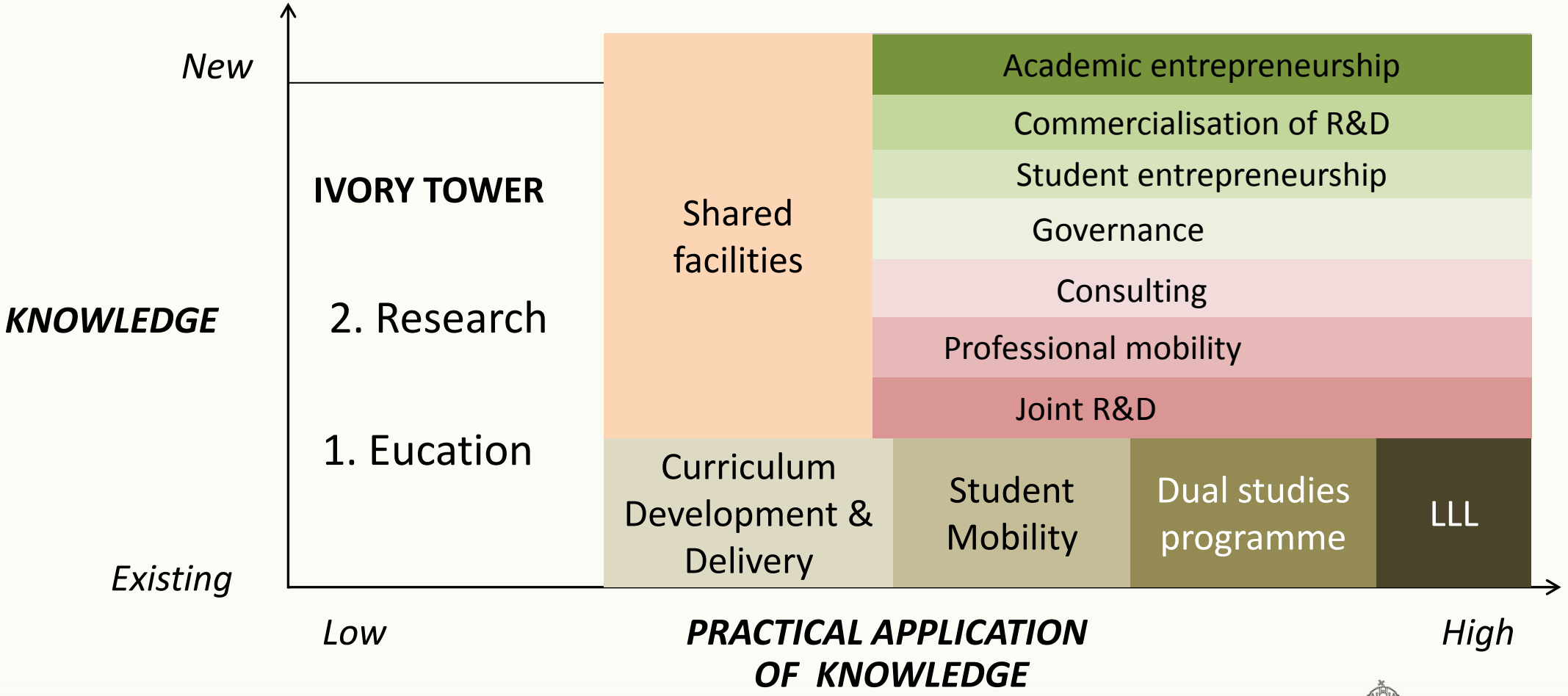
Regional differences in R&D

- Significant spatial concentration
  - Budapest as a primate city
  - Regional university/industry poles
- Goal: smart specialisation, regional networking based on local capacities

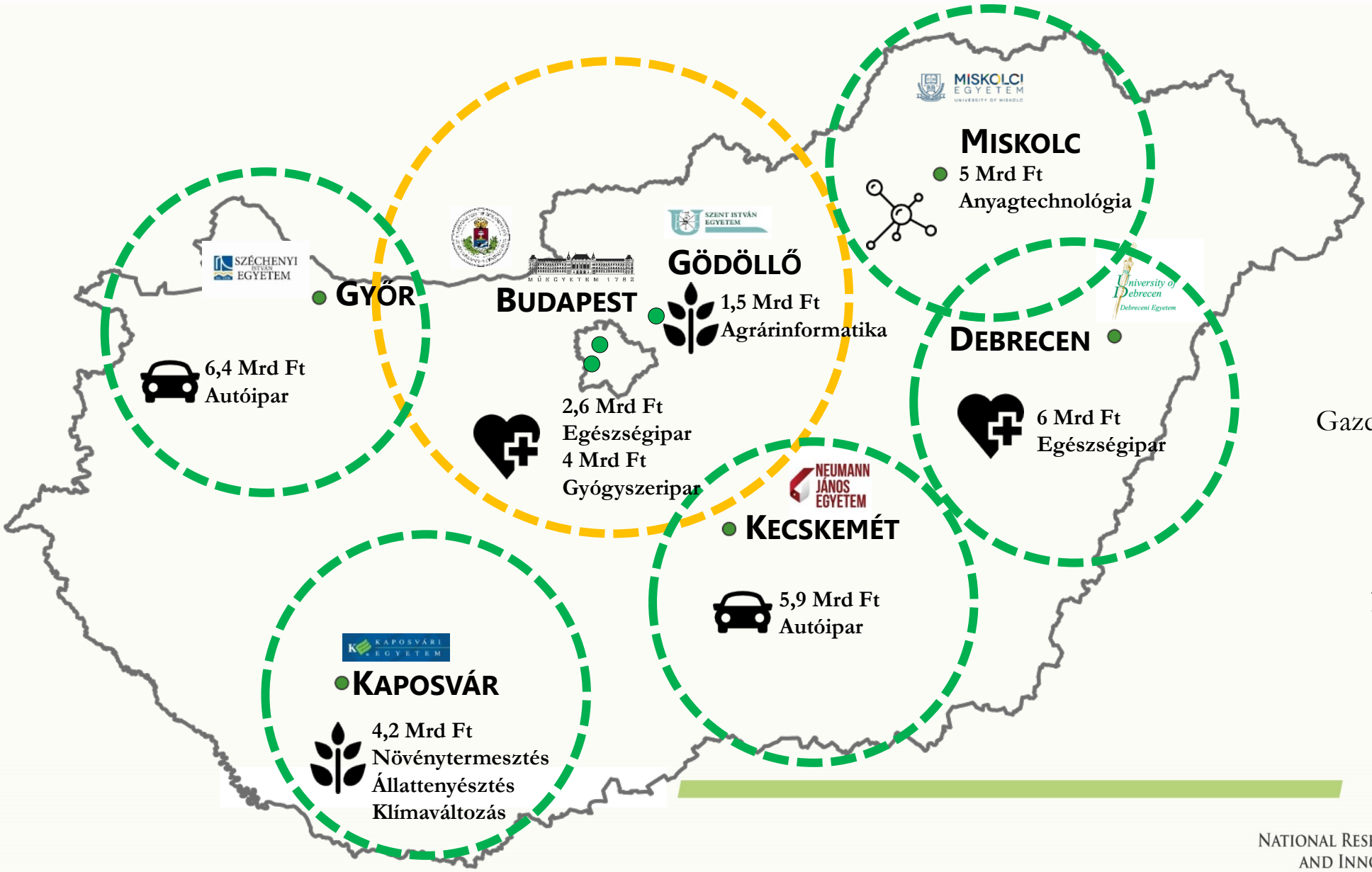


Source: KSH / *Data source: Hungarian Central Statistical Office*

Universities Cooperation for "Third Generation University"



Higher Education and Industry Cooperation Centres



GINOP

Gazdaságfejlesztési és Innovációs Operatív Program

NKFI Alap

Nemzeti Kutatási, Fejlesztési és Innovációs Alap

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Higher Education and Industry Cooperation Centres

The centres develop an infrastructure background for industrial development projects based on current market needs, in collaboration with the excellent research institutions of the discipline(s) concerned.

The centres develop the domestic research infrastructure in the form of cooperation between industry and higher education. The developed RDI capacity generates new competitive products and services.

35 billion HUF was allocated in 2016 for establishing RD centres.

The support program enables the establishment of centres based on corporate RD needs and the use of university RD capacities.

New National RDI Strategy 2021 – 2030

Vision

HIGH VALUE ADDING, KNOWLEDGE-BASED, BALANCED, SUSTAINABLE ECONOMY AND SOCIETY

Mission

RDI policy:

- Contributes to the fulfillment of the vision to great social challenges through the establishment of a stable and supportive environment
- Promotes a deeper international, first and foremost European embeddedness
- Promotes public sector innovation
- Supports excellence-based research and development, along with horizontal, non-technological innovation and attitude-shaping

The target system of the RDI Strategy

HORIZONTAL OBJECTIVES

KNOWLEDGE GENERATON

COOPERATION AND KNOWLEDGE TRANSFER

KNOWLEDGE EXPLOITATION AND BUSINESS INNOVATION

Specific objectives of the RDI Strategy: Knowledge production

- Securing the critical mass of young researchers in the long run
- Practice-oriented higher education and RDI programmes, following the local needs
- Introduction of doctoral programmes better responding to market needs, e.g. industrial PhD scheme
- Knowledge co-creation activities of higher education institutions and public research institutions involving non-state RDI actors
- Development and more efficient exploitation of human capacities and research infrastructures of public research institutions
- Promotion of business RDI
- Enhancement of knowledge-based services

Specific objectives of the RDI Strategy: Cooperation and knowledge transfer

- Promotion of active knowledge transfer between the stakeholders of the innovation ecosystem
- Support of open innovation and open access
- Establishment of research career models enabling to move between the academic and business sectors
- Encouragement of international researcher mobility
- Facilitation of access to RDI infrastructure
- Reinforcement of RDI cooperations between firms
- Motivation of international RDI cooperations

Specific objectives of the RDI Strategy: knowledge exploitation and business innovation

- Management and exploitation of intellectual property
- Development of the startup ecosystem and fostering the founding of spin-offs
- Strengthening the innovativity of companies
- Promotion of technological and non-technological (organisational, marketing) innovation
- Investment in next generation innovation infrastructure
- Support of the third mission activities of higher education institutions

Horizontal objectives of the RDI Strategy

- Motivation for innovation, openness, creative thinking and value creation
- Providing an up-to-date regulatory and business environment supporting RDI activities
- Reinforcement of territorial, social and economic cohesion along with the measures of the RDI policy
- Establishment of a stable and motivating financial support system
- Promotion of mission-oriented innovation
- Achievement of gender equality within the stakeholders of the RDI system

Planned financial framework

Call	Planned framework	Support per project	Approximate number of beneficiaries	Type of beneficiary
SME START Innovation	HUF 10 Bn	HUF 10-20 M	650-700	SMEs
Market-led RDI	HUF 45 Bn	HUF 50-700 M	160-200	SMEs, large companies, universities/research and knowledge transfer organisations
Open Innovation	HUF 1,5 Bn	HUF 10-150 M	15-20	large companies & SMEs
University-industry cooperation	HUF 20 Bn	HUF 1 - 6 M	4-8	large companies, research and knowledge transfer organisations, SMEs
Intellectual property rights	HUF 0,05 Bn	HUF 0,1-7,1 M	20-40	SMEs, large companies, research and knowledge transfer organisations, state bodies, nonprofit organisations, natural persons

Cooperation with international RIs

NATIONAL RESEARCH INFRASTRUCTURE ROADMAP

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Participation in International Cooperation

Memberships fees of International Research Infrastructures
Contribution payed by the National Research, Development and Innovation Office

SUM: ~3,3 Mrd Ft/year (~10 M€/2018)

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HUNGARY'S MEMBERSHIPS IN INTERNATIONAL RESEARCH INFRASTRUCTURES

Physical Sciences and Engineering	
CERIC-ERIC	Central European Research Infrastructure Consortium
CERN	The European Organization for Nuclear Research
CERN HL-LHC (ALICE, CMS)	High-Luminosity Large Hadron Collider (CERN)
ELI-ERIC	Extreme Light Infrastructure
ESA	European Space Agency
ESRF UPGRADES	European Synchrotron Radiation Facility (ESRF), Phase II: Extremely Brilliant Source
ESS-ERIC	European Spallation Source
European XFEL	European X-Ray Free-Electron Laser Facility
ITER/EUROfusion	International Thermonuclear Experimental Reactor
E-infrastructure	
GÉANT	Pan-European data network for the research and education community
PRACE	Partnership for Advanced Computing in Europe

Health and Food	
ECRIN-ERIC	European Clinical Research Infrastructure
ELIXIR	A distributed infrastructure for life-science information
EMBL	European Molecular Biology Laboratory
ERINHA	European Research Infrastructure on Highly Pathogenic Agents
EuBI ERIC	European Research Infrastructure for Imaging Technologies in Biological and Medical Sciences
ICGEB	International Centre for Genetic Engineering and Biotechnology
Social & Cultural Innovation	
CESSDA-ERIC	Consortium of European Social Science Data Archives
CLARIN-ERIC	Common Language Resources and Technology
ESS-ERIC	European Social Survey
SHARE-ERIC	Survey of Health, Ageing and Retirement in Europe

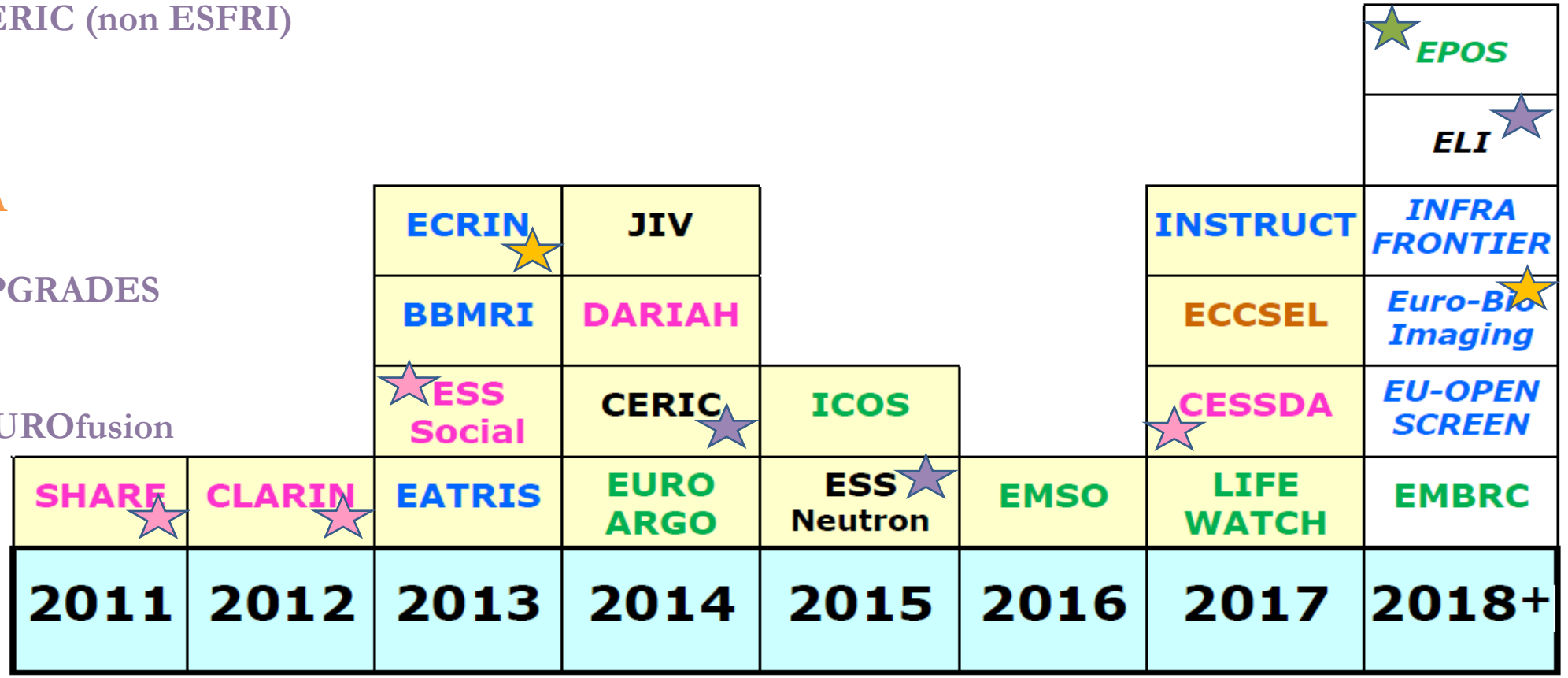
Source: RESEARCH, DEVELOPMENT AND INNOVATION IN HUNGARY, by NRDIO

ERICS in the EU from 2011

HU participation in ERICs (10) ☆

Other related HU memberships:

- CERIC-ERIC (non ESFRI)
- CERN
- ELIXIR
- EMBL
- ERINHA
- ESA
- ESRF UPGRADES
- GEANT
- ICGEB
- ITER/EUROfusion
- PRACE
- XFEL



Source: EC DG RTD Directorate B, B.4 – Research infrastructure, Feb 9, 2018

Support of research infrastructures (RI) in Hungary

Expenditures:

1. **International RI membership fees** : **~10 M€/2018**
   (3,3 billion HUF/2018)

2. **RI development projects** financed by
   - Cohesion Policy Instruments (SF)
   - National Research, Development and Innovation Fund (NRDI Fund)

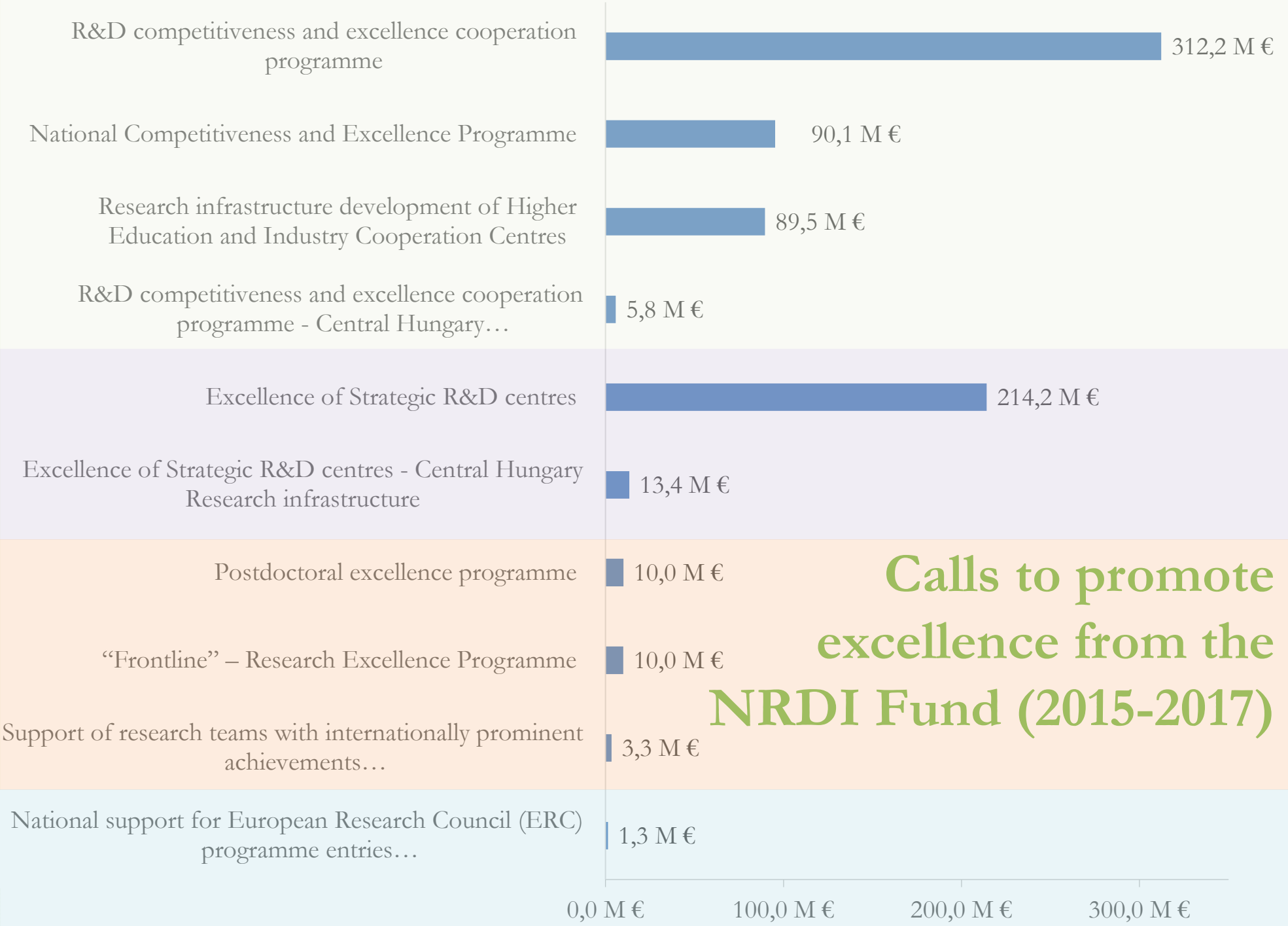
   > 615 M€/2015-2017 (> 200 billion HUF/2015-2017)

Knowledge Transfer

Research Infrastructures

Discovery research and Postdoctoral Programmes

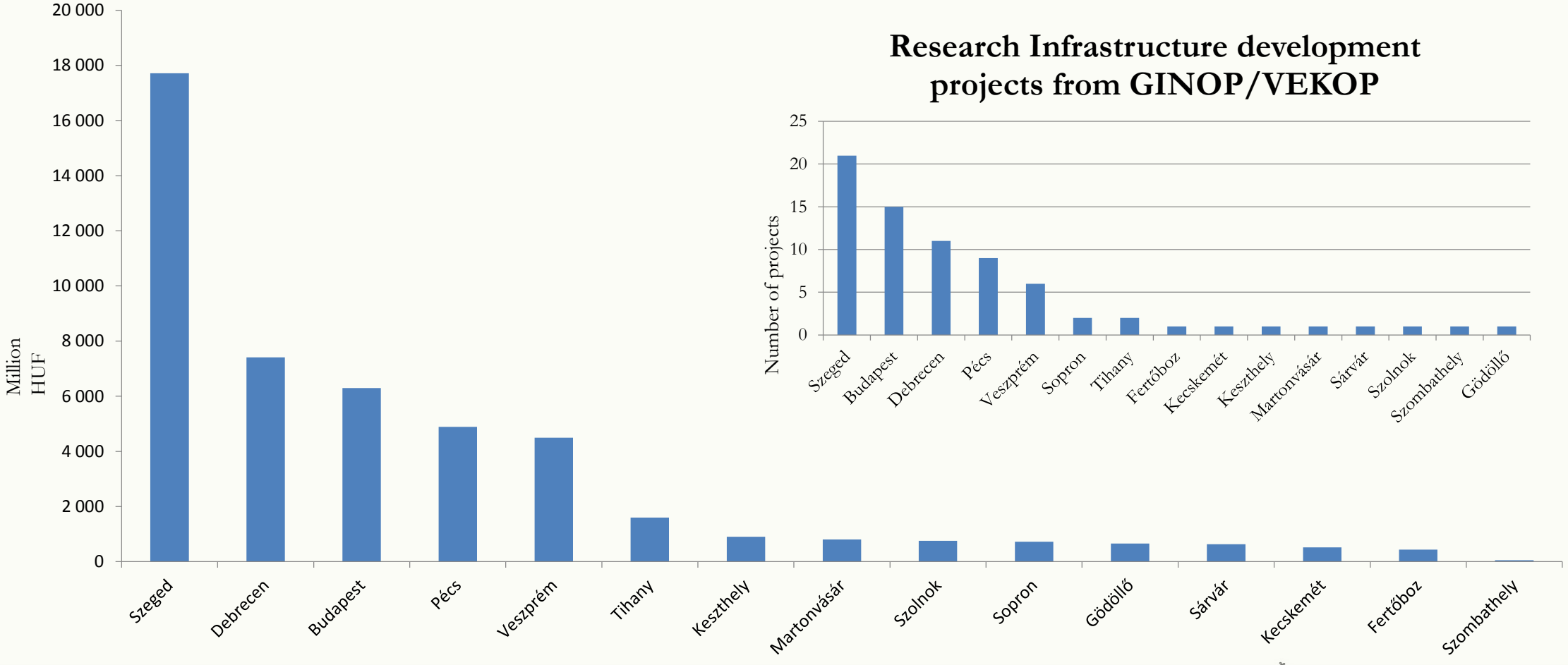
International RDI Cooperation



Calls to promote excellence from the NRDI Fund (2015-2017)

RI upgrades from the Structural Funds

Spent on new infrastructure projects (without ELI)



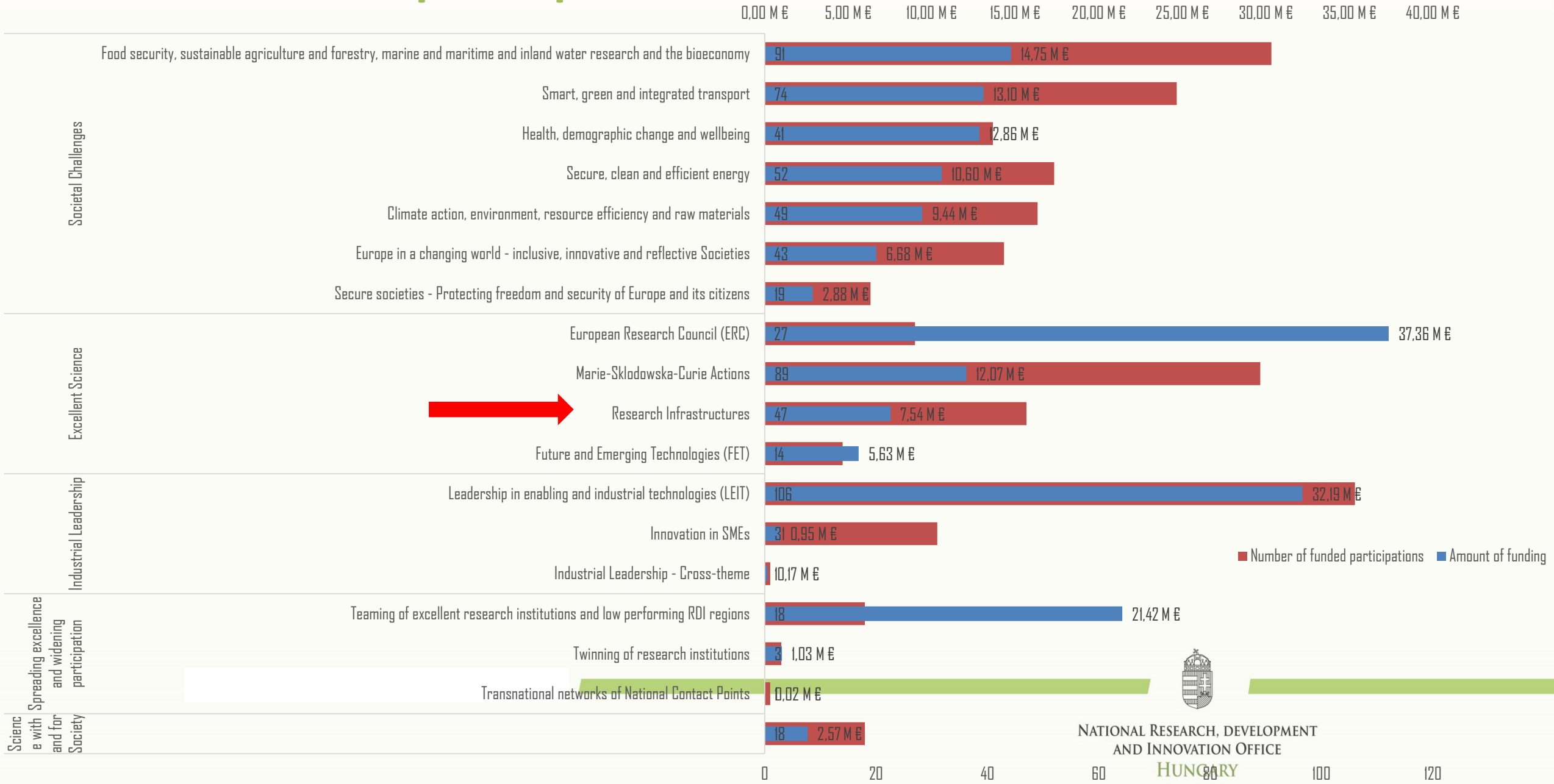
Research Infrastructure development projects from GINOP/VEKOP

Distribution of H2020 RI Grants per scientific field

Scientific Domain	Number of Grants	EU Contribution
Social sciences and Humanities	13	68.302.468,48
Life sciences	25	163.936.185,81
Environmental Sciences	22	142.463.359,87
Material sciences and Analytical Facilities	12	91.889.049,13
Physical Sciences and Astronomy	21	127.308.787,38
Energy and Engineering	7	46.731.007,65
Information Communication Technologies	4	26.153.874,00
Horizontal policy and inco support measures	10	16.032.529,25
Total RTD grants	**114**	**682.817.261,57**

Source: European Commission, DG RTD, March 2017,

HU participation in H2020



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ESFRI's role in the EU RI Ecosystem

THE FIFTH ESFRI ROADMAP AND STRATEGY REPORT

HU Participation in ESFRI Projects & Landmarks

Country	Score (2018)		
	Projects + Landmarks	Projects	Landmarks
EU-28	**35%**	**29%**	**37%**
Cluster 1	60%	54%	64%
Cluster 2	36%	24%	42%
Cluster 3	12%	12%	11%
Cluster 4	0%	1%	0%
Cluster 1			
FR	78%	67%	86%
IT	71%	67%	73%
UK	65%	50%	73%
NL	58%	56%	59%
DE	56%	39%	65%
ES	55%	50%	57%
CZ	53%	44%	57%
EL	47%	61%	41%
Cluster 2			
BE	45%	44%	46%
PT	44%	39%	46%
FI	44%	22%	54%
SE	40%	11%	54%
PL	36%	28%	41%
DK	35%	22%	41%
NO	35%	6%	49%
AT	33%	28%	35%
SI	33%	28%	35%
HU	27%	11%	35%
CH	25%	22%	27%
Cluster 3			
RO	22%	33%	16%
SK	22%	22%	22%

Source: ERA Progress report 2018

Status of National RI Roadmaps in 2017 november

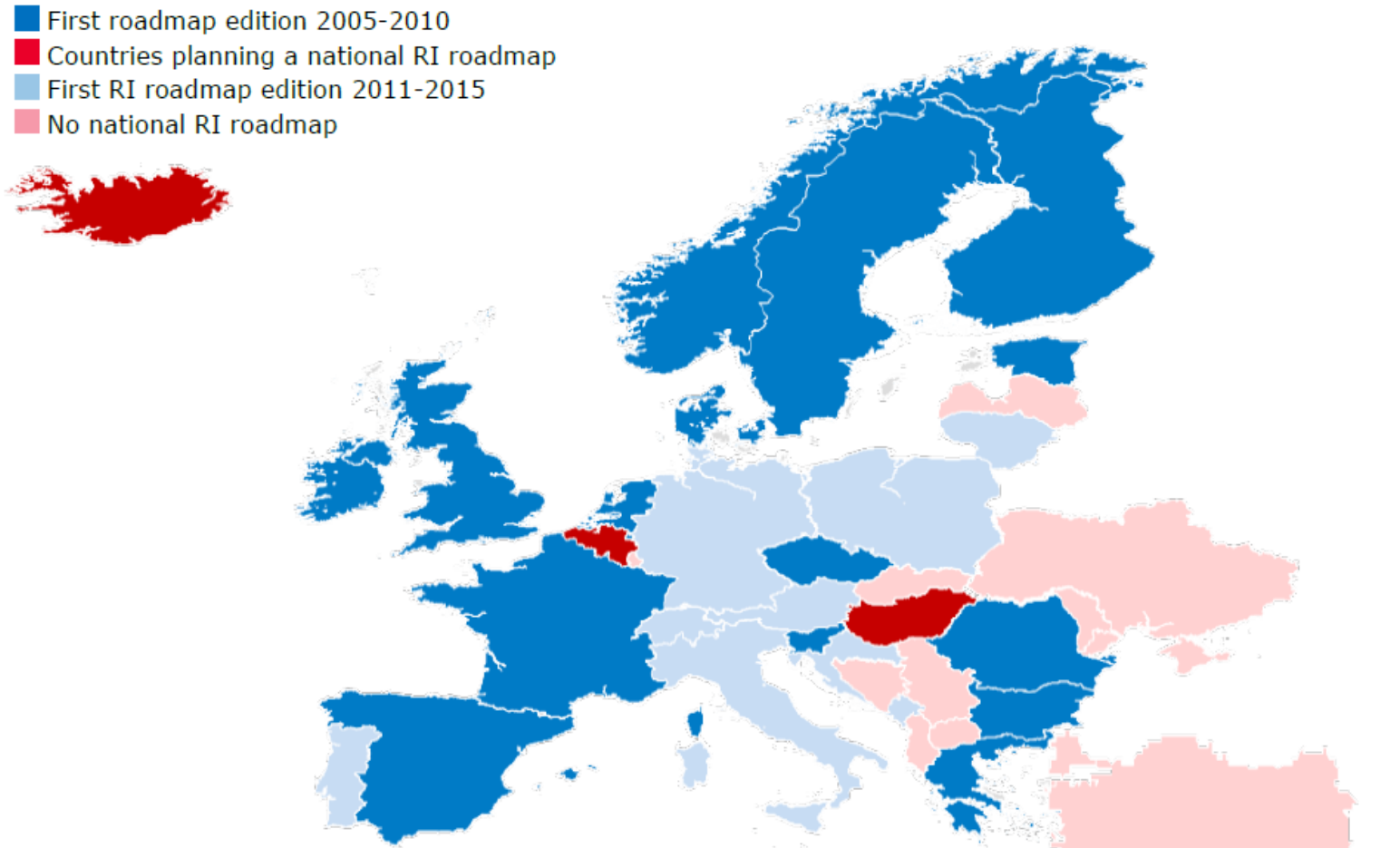


Figure 2:
countries with national RI roadmaps in place

Source: InRoad consultation, November 2017

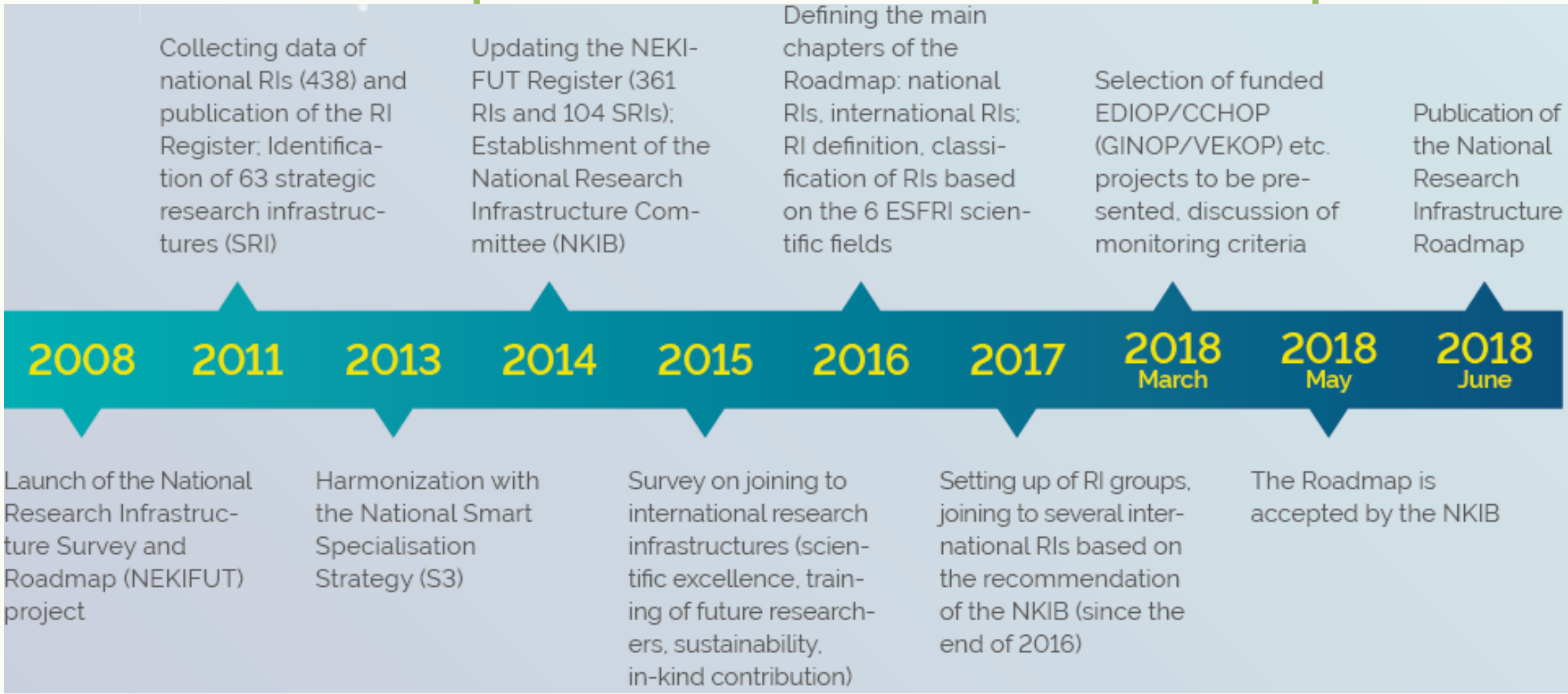
Status of National RI Roadmaps in 2018

Hungary has published the national roadmap in June 2018

Status	Country
Under preparation 	Belgium Cyprus ~~Hungary~~
No roadmap available 	Iceland Latvia Luxembourg Malta Slovak Republic Turkey

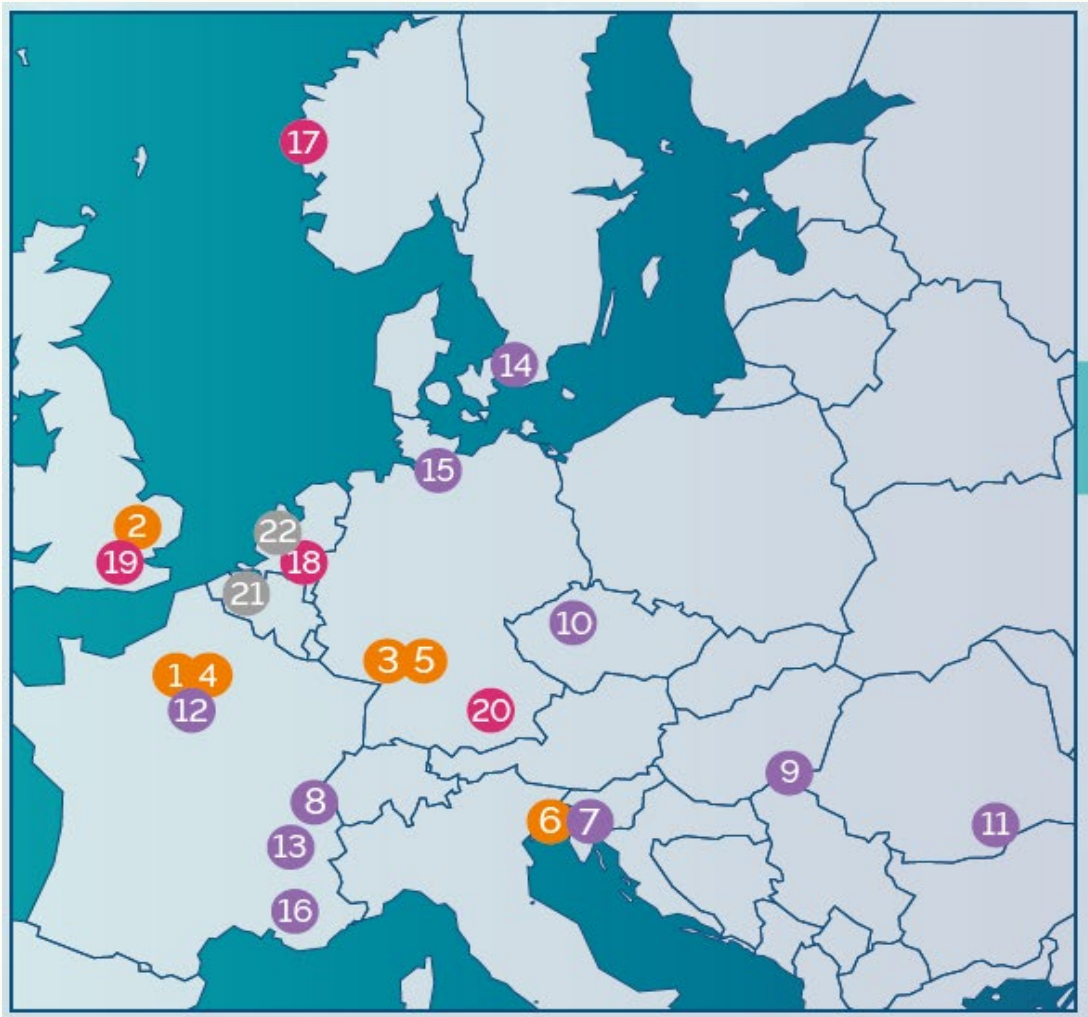
Source: http://www.esfri.eu/national-roadmaps, 2018 May

Development of the National RI Roadmap



Source: National Research Infrastructure Roadmap, by NRDIO

Hungary's membership in European RIs



1. ECRIN-ERIC – Paris, France
2. ELIXIR – Hinxton, the United Kingdom
3. EMBL – Heidelberg, Germany
4. ERINHA – Paris, France
5. EuBi ERIC – Heidelberg, Germany
6. ICGEB – Triest, Italy
7. CERIC-ERIC – Triest, Italy
8. CERN – Geneva, Switzerland
9. **ELI ERIC – Szeged, Hungary**
10. **ELI ERIC – Prague, Czech Republic**
11. **ELI ERIC – Bucharest, Romania**
12. ESA – Paris, France
13. ESRF – Grenoble, France
14. ESS ERIC Spallation – Lund, Sweden
15. European XFEL – Schenefeld, Germany
16. ITER – St. Paul-lez-Durance, France
17. CESSDA ERIC – Bergen, Norway
18. CLARIN ERIC – Utrecht, the Netherlands
19. European Social Survey ESS – London, the United Kingdom
20. SHARE ERIC – Munich, Germany
21. PRACE – Ixelles, Belgium
22. GEANT – Amsterdam, the Netherlands

Source: National Research Infrastructure Roadmap, by NRDIO

The Goal, Role & Function of the National Roadmap

- **map** the major domestic RIs in Hungary
- **present the excellence** of domestic research communities
- **provide guidance** for domestic research communities on professional opportunities & requirements
- **set realistic goals** and formulate recommendations for domestic R&D
- **ensure the professional background** in strategic issues & decisions connecting to RIs
- **facilitate communication** with a wider audience.

The national roadmap provides a comprehensive **insight** for different target groups into the trends of capacities & **actual situations** with regard to prominent RIs, and **create a professional background material** for devising future RI development goals.

Definition & Types of RIs in the Hungarian Roadmap

Definition

- *The set of thematically compatible **equipment, laboratories, databanks, information systems**, as well as associated **human resources** (beyond research resources incl. operation, maintenance & management capacities), expertise, complemented by **services** supporting research activities that form a single unit. These are necessary for conducting high-quality and internationally competitive research activities.*

Types of RIs in Hungary by their physical appearance:

- **large-scale RIs**

  physically operating partly in Hungary (e.g. the ELI-ALPS, a distributed RI)

- **physically operating outside of Hungary with Hungarian users' access**

  in a single establishment, distributed and/or virtual RI (e.g. the HL-LHC, European XFEL, ESS-ERIC, etc.)

- **physically operating in Hungary**
  - single sited or as parts of a network
  - are not unique
  - provide access to domestic and/or foreign researchers

Source: Eurostat

Forming of RI groups

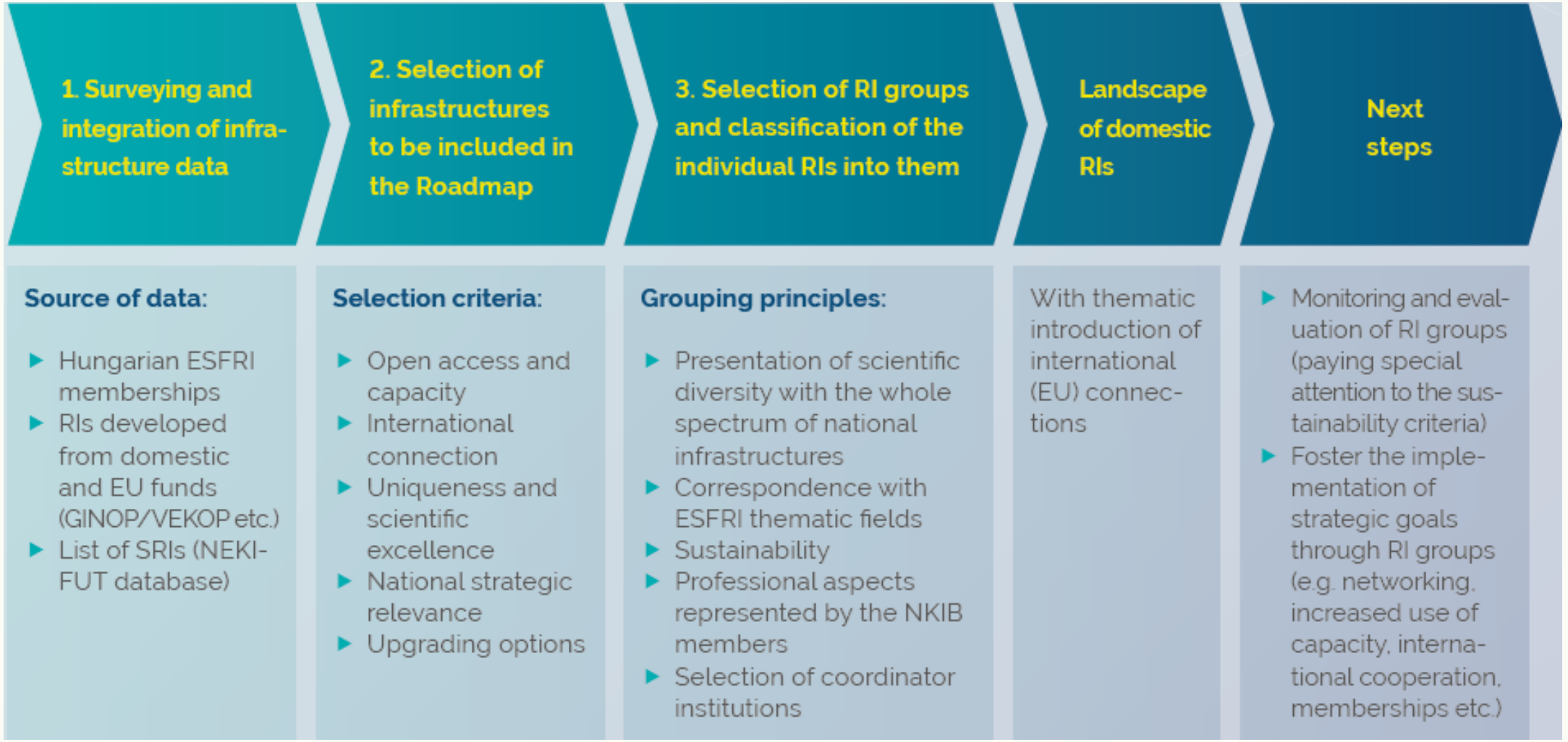
The Hungarian Roadmap presents **groups of RIs** **(not single RIs)** according to the ESFRI thematic areas**.**

Reasons:

- Hungary-based RIs are **mainly non-unique** (similar RIs can be found in Europe).
- The groups of RIs can provide an **essential professional background for Hungary** to become an integral part of the international research community, enabling them to connect to large-scale unique RIs at a European level.
- Forming groups (networks) of RIs **can foster co-operation among Hungary-based RIs**, enhancing the professional efficiency and international prestige and competitiveness of Hungarian research groups in a given area.

Source:
Eurostat, KSH

Methodology of creating the RI groups for the Roadmap



Source: National Research Infrastructure Roadmap, by NRDIO

Source: Eurostat, KSH

NATIONAL RESEARCH INFRASTRUCTURE ROADMAP

23 International RI memberships (16 ESFRI, 10 ERIC)

- Energy (0)
- Environment (2)
- Health & Food (5)
- Physical Science & Engineering (9)
- Social & Cultural Innovation (5)
- E-RI (2)

26 infrastructure groups

- Energy (1)
- Environment & Agriculture (4)
- Health & Food (6)
- Physical Science & Engineering (8 +ELI-ALPS)
- Social & Cultural Innovation (4)
- E-RI (2)

16 recently funded RI development projects

- Energy (2)
- Environment & Agriculture (3)
- Health & Food (4)
- Physical Science & Engineering (3)
- Social & Cultural Innovation (2)
- E-RI (2)

RI Groups - Health & Food (1)

RI short name	Involved institutions
ECRIN ERIC	**University of Debrecen** University of Pécs Semmelweis University University of Szeged National Institute of Clinical Neurosciences Medicine for Children Research Network RCNS Brain Imaging Centre, HAS Svábhegyi Children's Clinic AdWare Research Ltd. Pharmahungary Ltd.
ELIXIR	**Research Centre for Natural Sciences, HAS** University of Debrecen Biological Research Centre, HAS National Agricultural Research and Innovation Center University of Pécs Szentágothai Research Centre

RI Groups - Health & Food (2)

RI short name	Involved institutions
EMBL	**Biological Research Centre, HAS** University of Debrecen Research Centre for Natural Sciences, HAS
Eu-Bi ERIC	**University of Debrecen** Biological Research Centre, HAS Semmelweis University University of Pécs Femtonics Ltd.

RI Groups - Physical Sciences & Engineering (1)

RI short name	Involved institutions
CERN	**Wigner Research Center for Physics, HAS** Eötvös Lóránd University
ESRF	University of Debrecen Eötvös Lóránd University **Wigner Research Center for Physics, HAS** Institute for Nuclear Research, HAS Centre for Energy Research, HAS Research Centre for Natural Sciences, HAS
ESS	**Wigner Research Center for Physics, HAS** Institute for Nuclear Research, HAS Centre for Energy Research, HAS Evopro Ltd.

RI Groups - Physical Sciences & Engineering (2)

RI short name	Involved institutions
XFEL	**Wigner Research Center for Physics, HAS** University of Pécs University of Szeged Biological Research Centre, HAS
CERIC ERIC	**Centre for Energy Research, HAS**
ITER	**Wigner Research Center for Physics, HAS** Budapest University of Technology and Economics

RI Groups - Social &Cultural Innovation

RI short name	Involved institutions
CESSDA ERIC	**Tarki Social Research Institute**
CLARIN ERIC	**Research Institute for Linguistics, HAS** University of Szeged Budapest University of Technology and Economics University of Debrecen Pázmány Péter Catholic University Institute for Computer Science and Control, HAS Morphologic Ltd.
European Social Survey (ESS)	**Centre for Social Sciences, HAS**
SHARE ERIC	**Centre for Economic and Regional Studies, HAS** **Tarki Social Research Institute**

NATIONAL RESEARCH INFRASTRUCTURE ROADMAP

Monitoring & Evaluation

Reasoning

- on-going inventory needed
- follow-up of changes, long term goals
- running coasts and financing
- monitor the national needs and international trends
- **benefits of international RI memberships**

Dimensions

1. ELI
2. **international memberships**
3. national RIs

Policy indicators

international memberships (e.g. co-operation, knowledge building)

national RIs (e.g. sustainability, social & economic impact, innov. pot.)

No detailed set of monitoring indicators given

Monitoring and evaluation of RI memberships

No detailed description of the monitoring system and indicators are given in the National Roadmap! BUT…

Focusing on the international memberships!

International RI membership fees : **~10 M€/2018** (3,3 billion HUF/2018)

Reason for revising the memberships (in every 3-5 years)

- monitor the effectiveness, utilization, measure scientific output
- allow to join existing international RIs as new users
- allow to join newly forming international RIs
- to align with national R&D strategies
- integration into the life of domestic research communities

Monitoring aspects of international RI memberships

Important aspects for the monitoring memberships in international RIs

- the number and name of **institutions and organizations** represented by the researchers using the RI;
- the number of Hungarian **researchers/PhD students** using the RI;
- the number of new **publications** resulting from the use of the RI;
- the number of ongoing international research **collaborations** implemented in the framework of the RI;
- international research cooperation or **projects** established with new actors in the research sector using the RI.

Possible ways to enhance the use of RIs (1)

- Enhance the **role of intermediaries** (e.g. ILOs) to facilitate knowledge and technology transfer and commercial application of RI services
- Support **large scale initiatives and pilots involving RI**, academy and industry through a co-innovation process;
- **Public-private partnership vouchers** to support enterprise involvement in RI
- Stimulate **joint innovative procurement mechanisms**
- Foster the use of RI for **pre-normative research**
- Increase RI engagement with **industry, SMEs and start-ups**, by fostering their direct and early-involvement in RI

Possible ways to enhance the use of RIs (2)

- Develop a set of Key Performance Indicators (**KPIs**), based on Excellence principles
- Require users to systematically acknowledge the contribution of the RI **when publishing** and disseminating their results
- Encourage short to medium term **mobility schemes**
- Increase the visibility of RI services by developing a **service catalogue**
- **Broaden stakeholders' engagement** by developing criteria in defining environmental, social, cultural and political impact
- Support the development and uptake of an internationally accepted model and criteria describing the **socio-economic impact** of RI
- Stimulate a dedicated **budget** for European RI development at national level

Monitoring of socio-economic impacts (1)

- **Economic impacts**

additional jobs for scientists, technicians and administrative staff working within RI, multiplier effect on local economy, increased community services, housing, tourism etc.

- **Societal impacts**

innovative products and services able to improve living conditions, contribute to solving societal challenges (e.g. through medical instruments, active aging assistance, environmental benefits such as the lowering of CO2 emission, etc.)

Monitoring of socio-economic impacts (2)

- **Scientific impacts**

scientific productivity and reputation, increased number of international articles published, patents granted, PhD dissertation completed

Trained through research not trained for research!

- **Human resource impacts**

attract talent and impact on training and skills development, exchange programmes (also between RI and industry), training of young students (summer schools), knowledge transfer

- **Innovation impacts**

joint research collaborations between RI and industry potentially leading to different forms of innovation, such as spin-offs, licences or joint ventures

THANK YOU FOR YOUR ATTENTION!

www.nkfih.gov.hu/english

http://nkfih.gov.hu/national-research-infrastructure-roadmap

http://nkfih.gov.hu/english-2017/publications-materials/publications-about-the