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HUN-REN SZTAKI

21 November 2024

Research.
Innovation.
Impact.

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Hungarian Research Network

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HUN-REN AI 4 SCIENCE PROGRAMME

Enhancing the use of artificial intelligence
in the Hungarian Research Network

https://hun-ren.hu/en

Largest publicly financed research organisation

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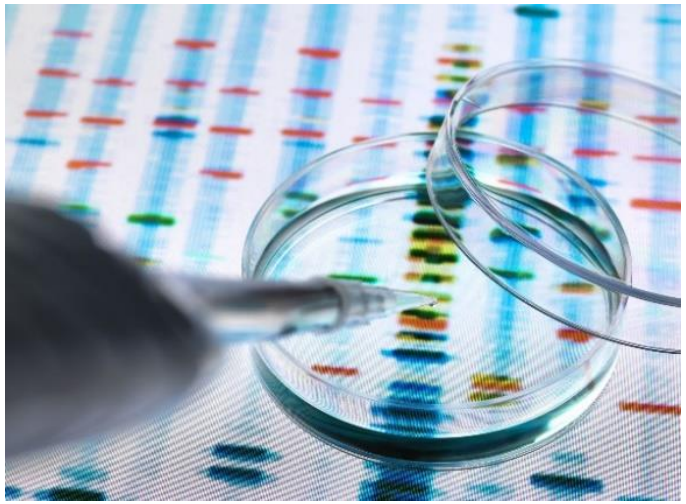
The Hungarian Research Network (HUN-REN) is the largest publicly financed research organisation in Hungary.

Its scientific scope **covers almost every field of scientific research from archaeology to space science and covers the three classical branches of science:**

- Humanities and Social Sciences
- Life Sciences
- Natural Sciences

HUN-REN is an integral part of the national research and innovation ecosystem and works in close cooperation with stakeholders such as government agencies, universities and private research organisations (e.g., pharmaceutical or IT companies).



Key facts

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- **233** – total number of project participations in the HORIZON framework programmes (2014-2023)
- **93 M €** – net EU contribution in projects under the HORIZON framework programmes (2014-2023)
- **419.1 M €** – HUN-REN's annual budget (2022)
- **87** employees at the HUN-REN Secretariat (headcount quota)
- **3,417** researchers out of **5,236** employees of the research network (average headcount in 2022)
- **6,815** scientific publications
- **39** industrial property protections claimed in 2022
- **10** industrial property protections granted in 2022

National AI Coalition, National Strategy, National Laboratories Timeline with HUN-REN Initiatives

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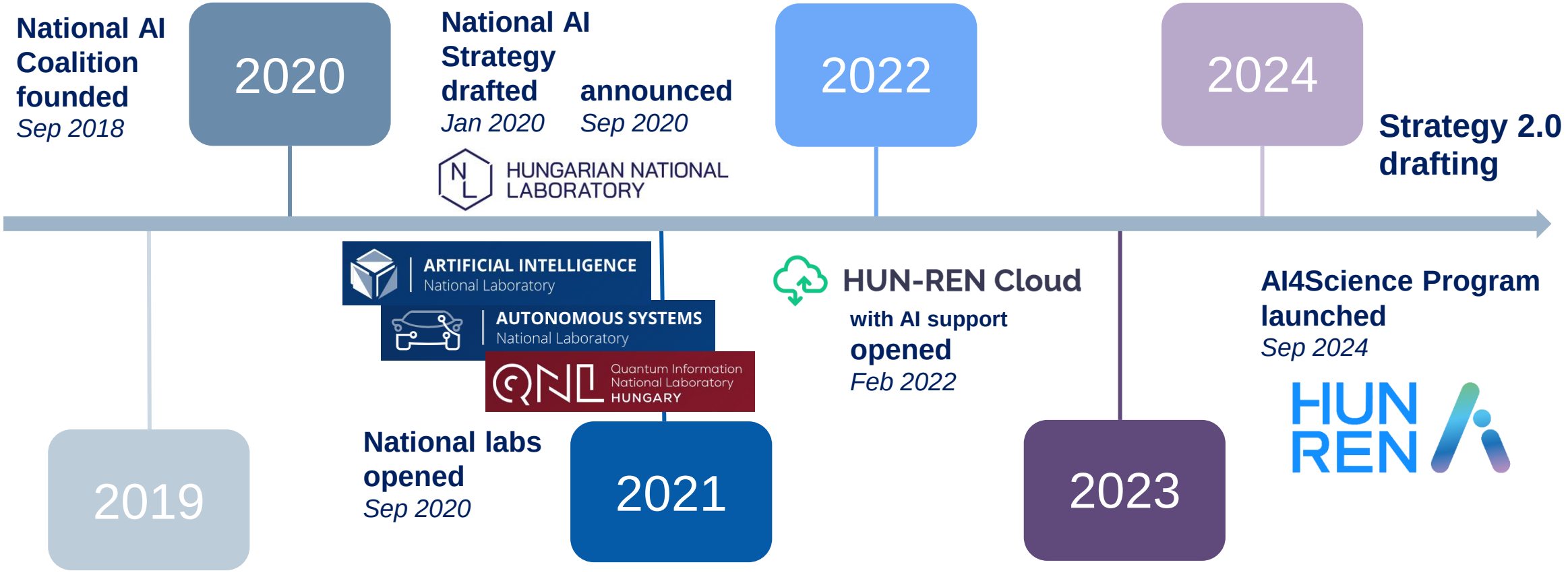

Role of HUN-REN and the AI & Aut Labs in the Hungarian AI Strategy

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Transformative projects

- Implementing autonomous transportation
- Health and Climate driven agriculture
- Data Valet
- Hungarian voice assistant in customer service
- AI supported education system
- Renewable energy

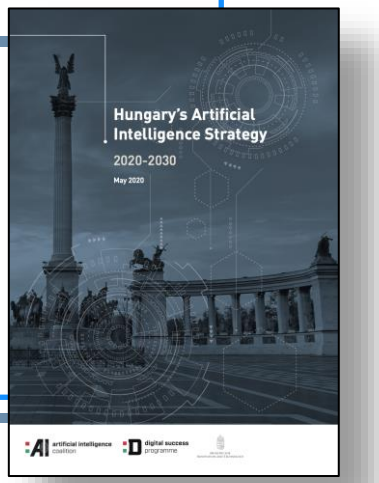
Industry and technology focus

AI technology development

- Computer vision
  Human Language
  Anonymisation
  Mathematical foundations
- Agriculture
  Healthcare
  Manufacturing
  Government

Improving industry efficiency

- Transportation
  Logistics
  Energy



Grounding in business and society

- **Developing competencies**
- **Research-development-innovation**
- **Cross-industry applications**
- **Ethical and regulatory framework**
- **Infrastructure development**
- **Accelerating the data economy**

value chain

frameworks

The Goal of HUN-REN HQ's Service Activities

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ENHANCING THE EFFICIENCY OF RESEARCH

Innovation value chain - increasing the societal impact of research and innovations.

STRENGTHENING DOMESTIC AND INTERNATIONAL COLLABORATIONS, INTEGRATING INTO THE GLOBAL NETWORK

Objective: Promote knowledge sharing and multidisciplinary collaborations.

SUPPORTING THE USE OF THE LATEST TECHNOLOGIES

Objective: Continuous development of available technologies.

The flagship of service function development: the AI 4 Science Program
Launched: 23rd September 2024

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Goal of the AI 4 Science Program

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INTEGRATING AI TOOLS INTO RESEARCH

Example:
One of the goals of **HUN-REN Wigner FK**'s new project is to *integrate key areas of quantum technology and AI* — such as quantum computing and quantum sensing — and *develop a software package* using machine learning and AI algorithms to enhance the efficiency of quantum computers.

EXPLOITING NEW RESEARCH OPPORTUNITIES ENABLED BY AI

Example:
Monitoring the vital functions of premature babies with AI-developed systems in the **HUN-REN SZTAKI** product line, providing treatment and support at the most suitable time. Our researchers are also working on developing an AI-based system that assesses the level of an infant's pain by analysing their facial expressions, along with the tension in their back and hands.

ENHANCING RESEARCH EFFICIENCY WITH AI TOOLS

Example:
A software developed through the collaboration of **Ulyssys Ltd.** and **SZTAKI** at **Semmelweis University** for lung cancer diagnostics enables the automatic and swift analysis of chest CT scans, supporting the diagnostic process. This *makes it possible to evaluate a far greater number of CT scans* while easing the workload on doctors.

DEVELOPING RESEARCHERS' AI COMPETENCIES

Example:
Some institutes, e.g. **HUN-REN TK**, are already *offering AI training* with the goal of making AI accessible to all researchers across the institute, ensuring that those who need to use artificial intelligence in their research can effectively apply it.

AI 4 Science Program Service Map

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INSTITUTIONAL AI AMBASSADOR NETWORK

What topics can researchers bring to the AI Ambassador?

Each research site has a dedicated AI Ambassador to help researchers integrate AI into their research. The Ambassadors offer inspiration for using AI, help researchers explore new methods, and provide support in identifying the greatest potential benefits AI can bring to their research.

AI EDUCATION AND INSPIRATION

In what AI areas can researchers deepen their knowledge?

Foundational training
The goal is to acquire general basics to progress towards their own specific topics.

Specialist training
Internal courses focusing on the unique issues of specific scientific fields.

PERSONAL AI SUPPORT

Where can you turn with AI-driven research ideas?

HUN-REN HQ AI expert team
1. Research idea validation and planning support
2. Infrastructure support
3. Application support

External expert team
Neuron Solutions as an external contractual partner

AI Research Partner Finder
Researchers with AI competencies who are open to other research fields + Researchers with ideas for AI applications

AVAILABLE AI TECHNOLOGIES

What secure AI technologies are available for sensitive research areas?

Computing Infrastructure
1. Secure GenAI operation, even in your own environment
2. Machine learning support with distributed multi-GPU cards

Own AI framework on
1. HUN-REN Cloud
2. Komondor (HPC)

AI Ambassadors in action

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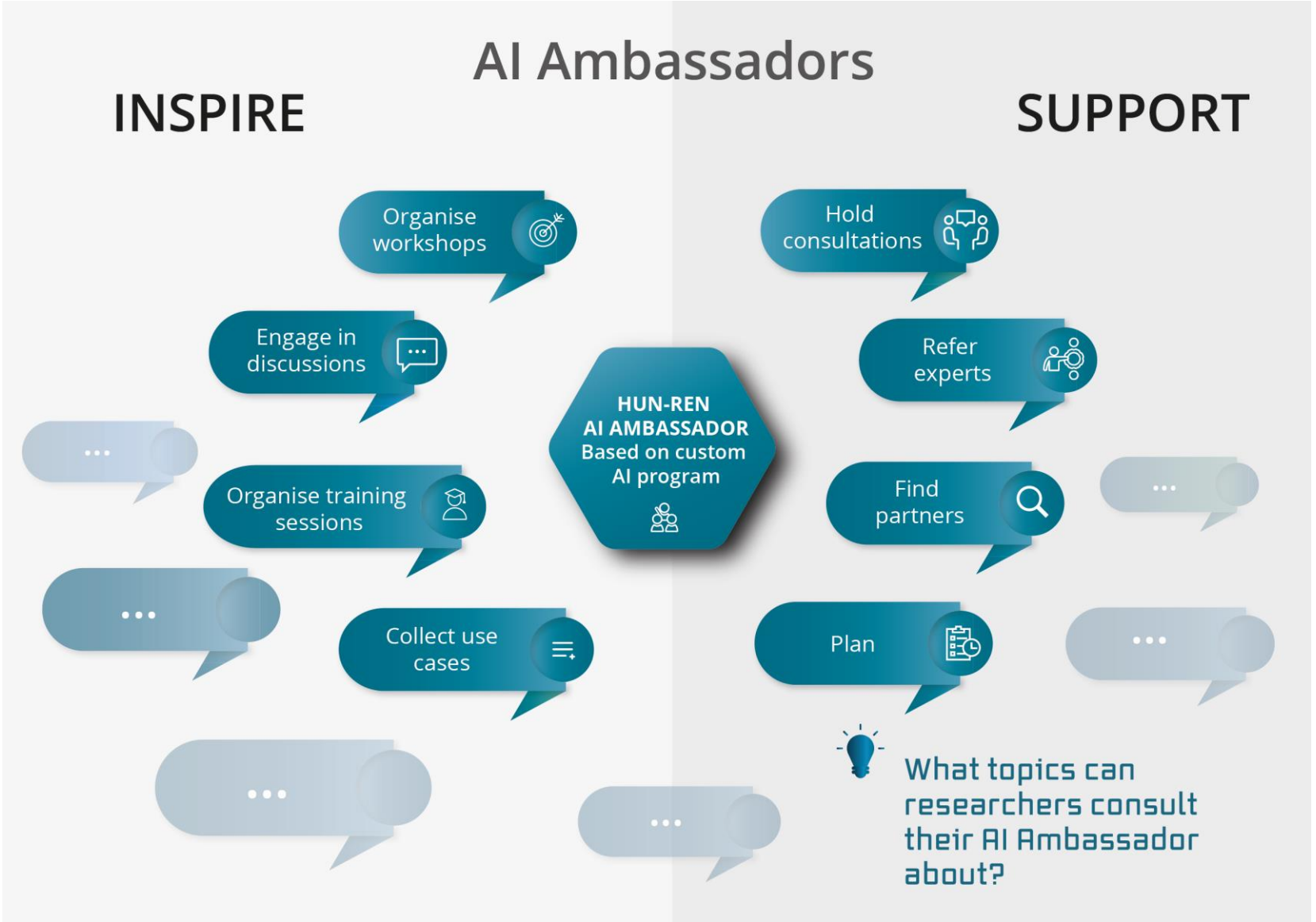

Support for validation, planning and implementation

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DOMAIN RESEARCHER

AI idea validation form

AI research plan form

Application with research idea for validation or planning

AI/ML expert

Joint research intent form

AI/ML research competency and capacity proposition

HUN-REN AI 4 Science Program

AI / ML technical support for research

Joint research based on mutual interest

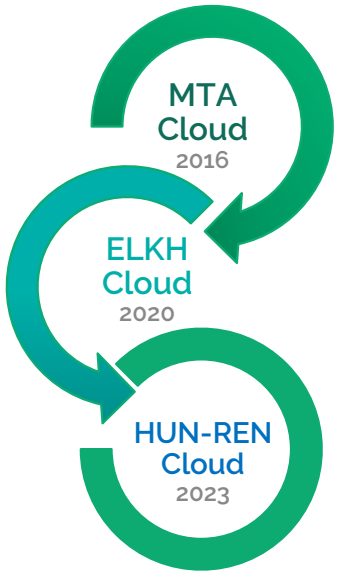
Joint research and publications

Research infrastructure development

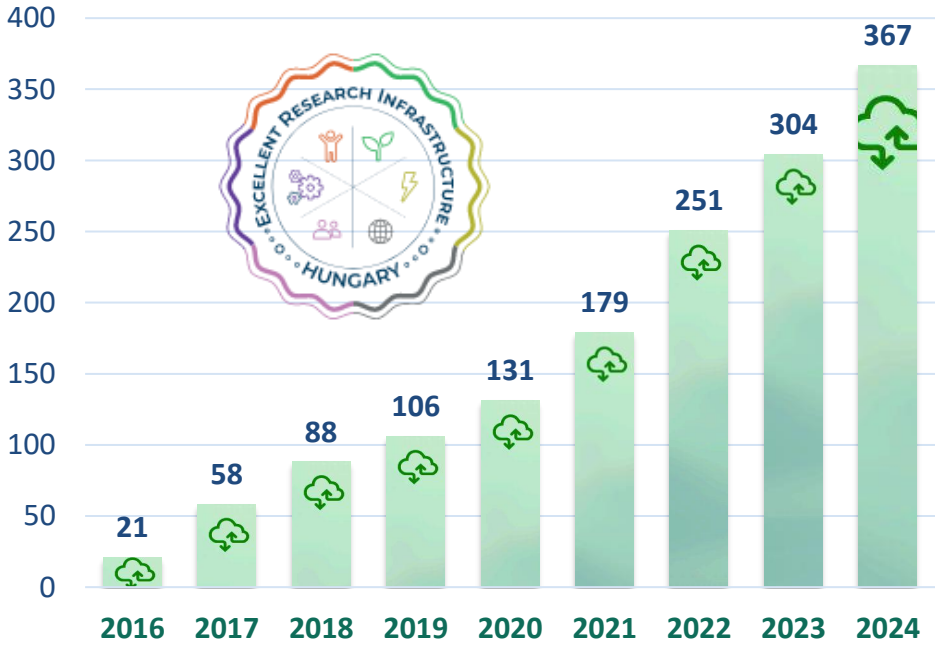
HUN-REN Cloud

HUN-REN Hungarian Research Network

- Build a ***European-level*** computing infrastructure
- Open the existing cloud not only for the ***researcher network*** but also for ***university research*** groups
- Provide advanced support for ***AI research + platforms (GenAI4Science)***
- Assist researchers to adapt their applications to HUN-REN Cloud by providing ***reference architectures***
- Engage in the ecosystem of the ***European e-infrastructure*** developments



Aggregated number of supported projects



EUROPEAN OPEN SCIENCE CLOUD

slices RI

ESFRI European Strategy Forum on Research Infrastructures

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Dissemination and exploitation

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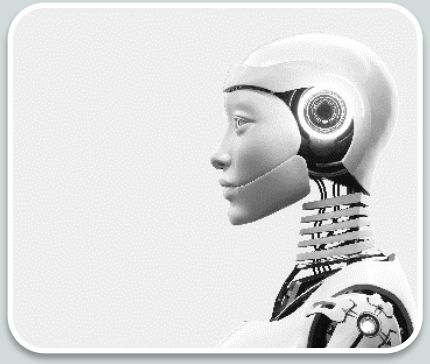

252
Scientific publications
2021-24: **150+**

22
Online training events
1200+ trainees

31
Supported research organisations
350+ projects

9
Supported universities
BME ÓE SE
DE PE SZE
ELTE PTE SZTE

3
Supported national labs
MILAB ARNL
DH-LAB

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HUN REN Wigner

Cloud-based Big Data & AI platform for Autonomous Systems

AUTONOMOUS SYSTEMS National Laboratory

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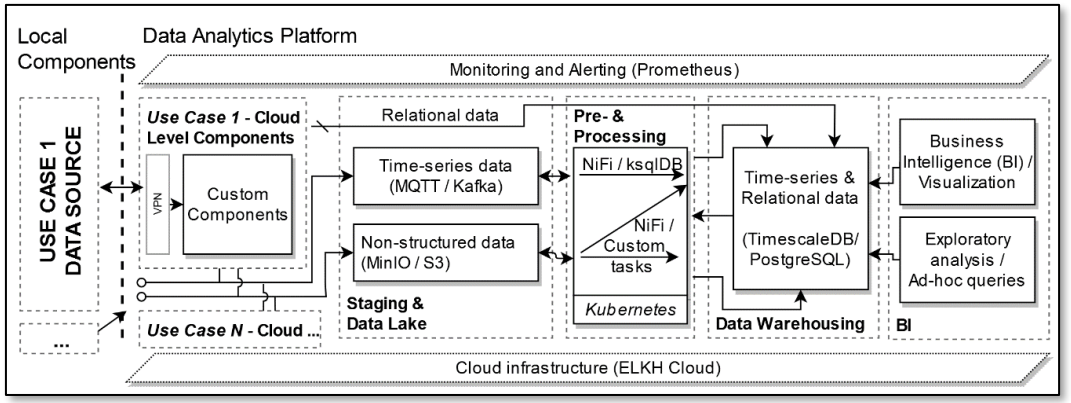

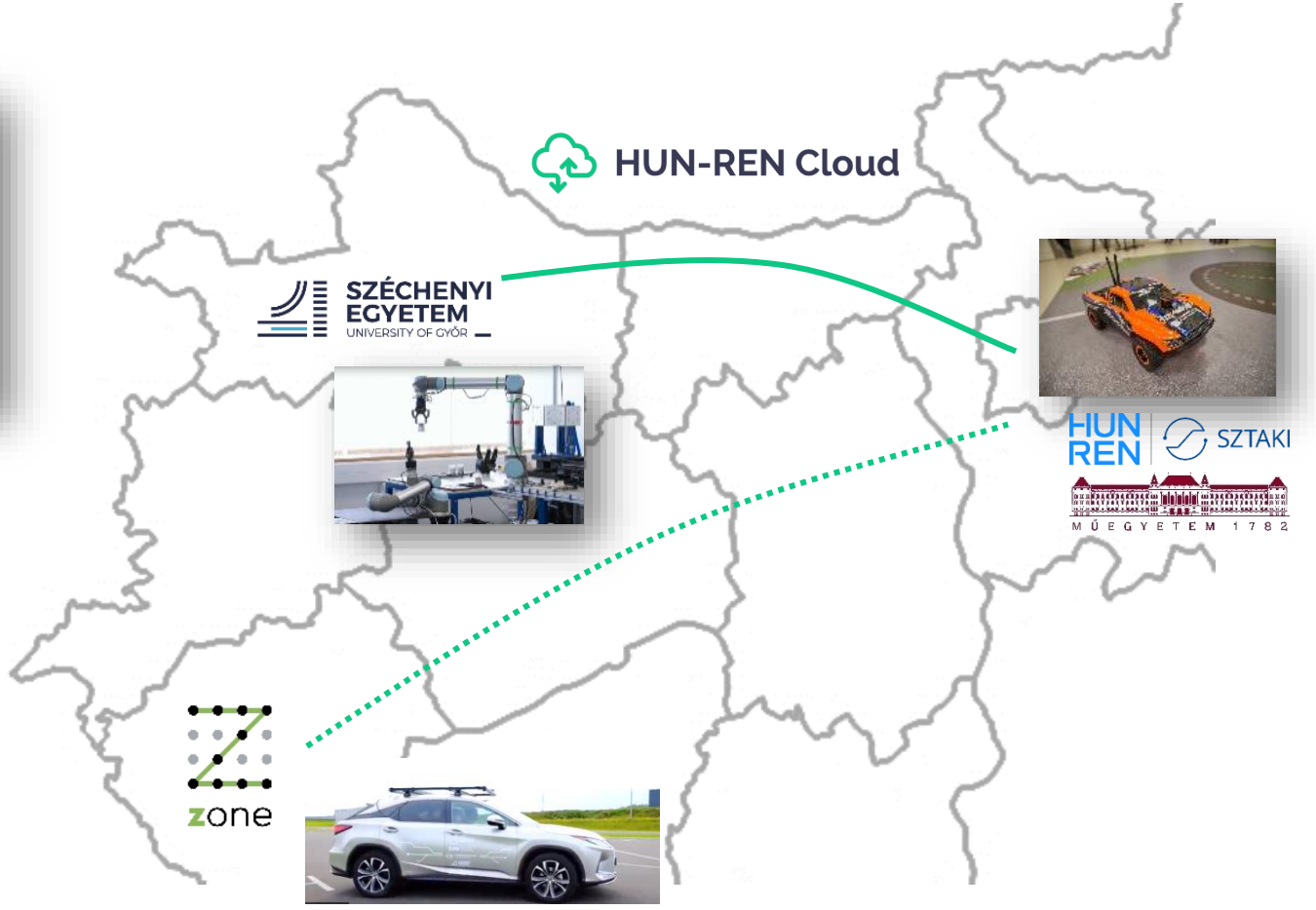

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Virtual Quantum Science Gateway

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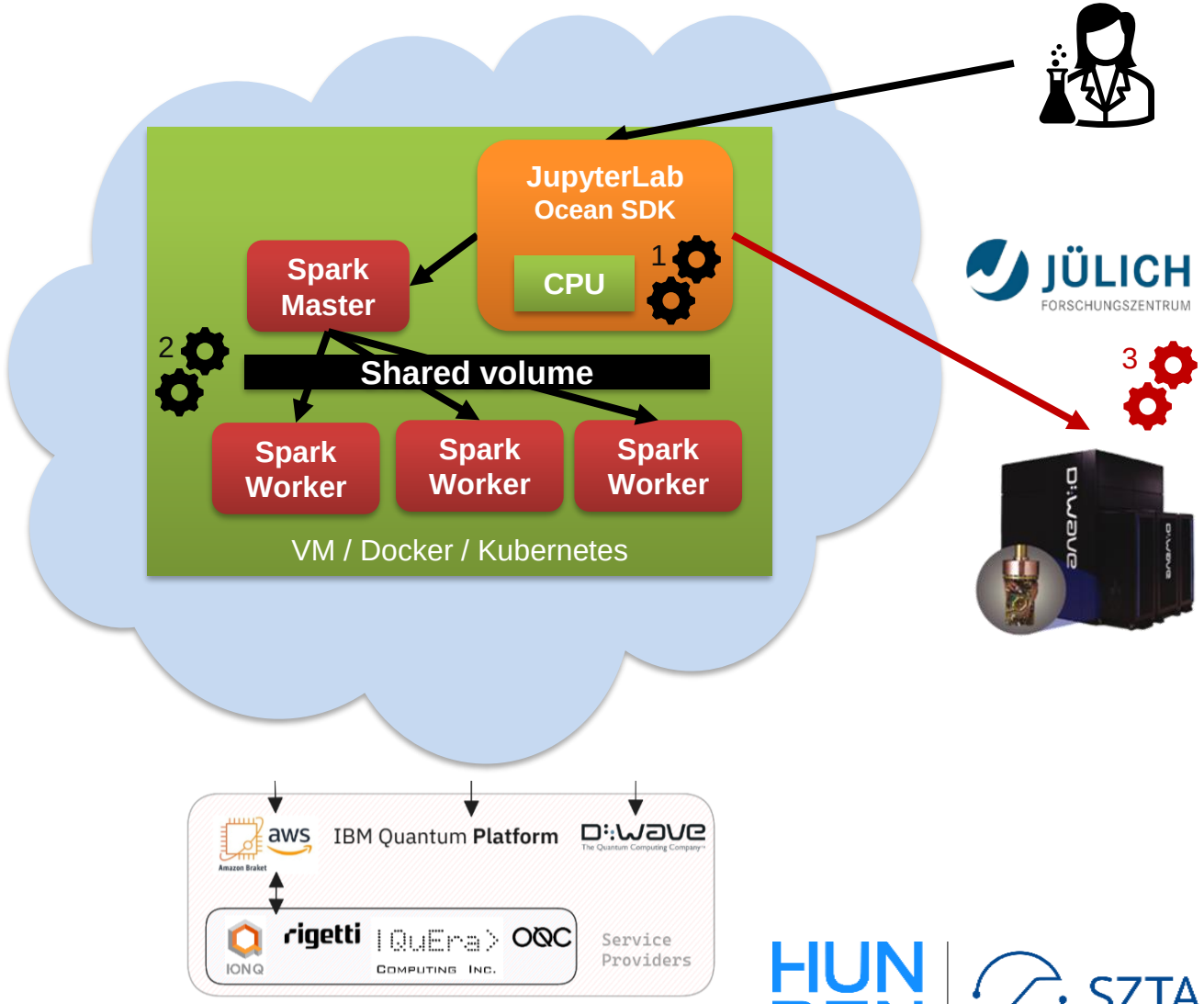
- An **increasing number** of experimental academic and commercial services provide computing capacities based on **quantum** principles
  - but their underlying technologies, availability and interfaces differ significantly
- ***New reference architecture*** significantly lowers the entry barrier for quantum programming for future users



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More information

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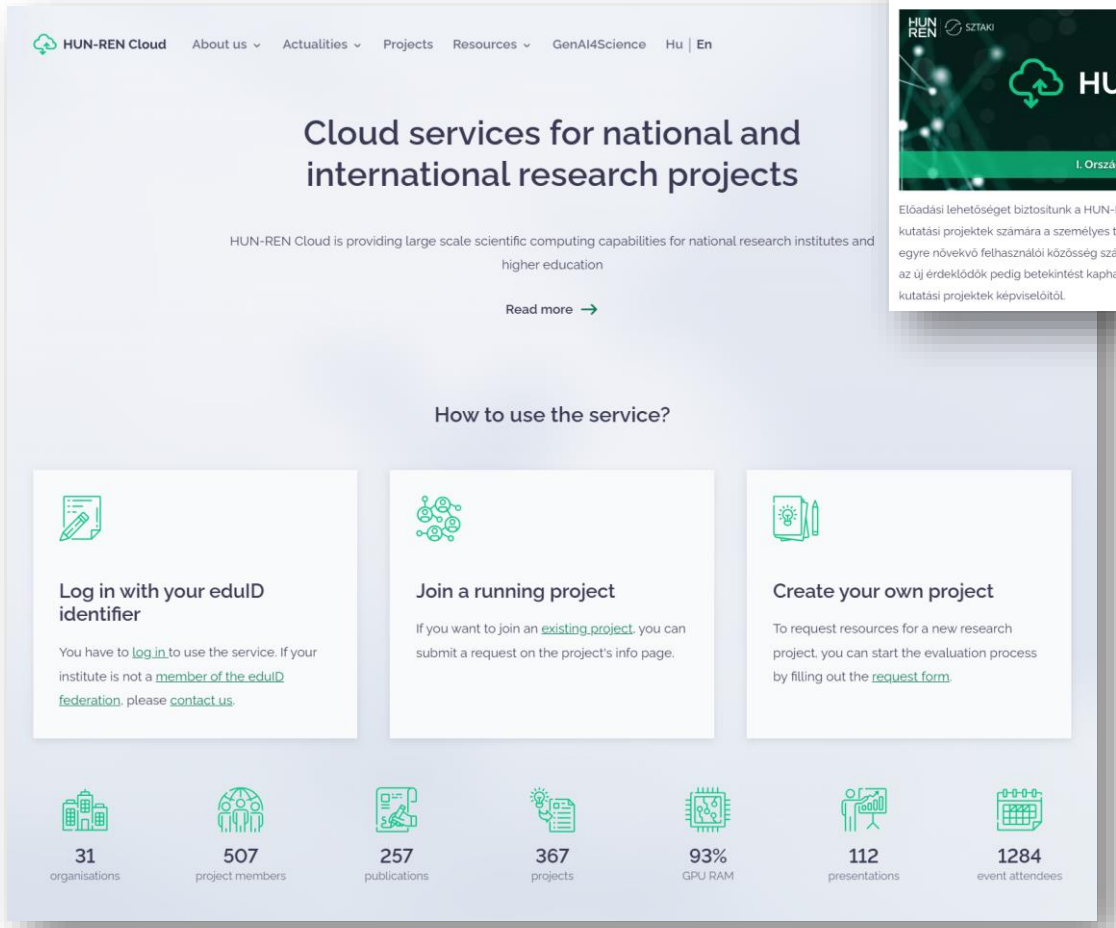
https://hun-ren.hu/en/ai-4-science

https://science-cloud.hu/en



Thank you for your attention!

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https://hun-ren.hu/en