

Pioneering the Future of Al Innovation in Europe

Markus Koskela, Development manager, LUMI AI Factory Service Center

May 22, 2025

EU promotes AI innovation



- European Commission launched the Al Innovation Package in January 2024 to support European startups, and SMEs in the development of trustworthy Al
- A series of competitive calls for AI Factory proposals first seven announced in December 2024 and further six in March 2025
- Al Factory = compute + data + talent
- Al Factories focus on certain **Al ecosystems and communities in** alignment with **national Al strategies**





The EuroHPC AI Factories initiative

- a one-stop shop to offer Al startups, SMEs, and researchers comprehensive support, including access to Al-optimised highperformance computing (HPC) resources, training, and technical expertise.

Empowering Europe's Al ecosystem



Our vision; To create a comprehensive and accessible service infrastructure that empowers AI start-ups, SMEs, academic researchers, and other public and private users to develop innovative AI models and applications.



Leverage the established LUMI system, install a new AI-optimized supercomputer, and an experimental quantum computing platform for quantum-accelerated AI workloads.



Create a world-class computing environment and access to completely new data sources, together with a service center and talent pool to support the development of new AI solutions.





LUMI is an HPE Cray EX Supercomputer #8 in TOP500; #3 in Europe

Hewlett Packard Enterprise

Al adoption showcases on LUMI

LUMI Al Factory





MACHINE VISION | MACHINE LEARNING

Al technoloay for people counting

SUPERSIGNT developed its machine vision model with total privacy reptaction. The solution is a mobile phone, a supercomputer, and a working Al model. A large-scale processing of visual datasets and development of advanced artificial intelligence models require the simultaneous processing of huge amounts of data. Parallel computing speeds up the training of neural networks to develop on Al model.

IMPACE Supervisibilitionally accelerated the testing and modification of its Al model and achieved 99% accuracy for people counting. The Al model is now the most accurate in its industry worldwide.

Read whole story behind the QR code

Everyone in this field needs to look ahead to maintain and further develop competitiveness. So do we by utilising LUMI.

This project has received funding the European High-Performance Compo-to Direct Undertaking UNI under grant.

99 Kimmo Pentikäinen, CEO:

SUPERSIGHT is turning smartphones into easy-toinstall smart sensors. The solution provides the highest level of precision.

cyber security and privacy They developed an Al model with 99% accuracy in people counting and

SUPERSIGHT





99 Ksenila Khakala. Lead Data Scientist Everything went smoothly,

LUMI exceeded expectations in terms of functionality and ease of use. The documentation was a great resource.

IMPACT: Many computationally demanding tasks were outsourced to the LUMI supercomputer and successfully created a human body trajectory dataset that is utilized in the AISA project. LUMI is ideal for performing multiple parallel tasks on GPUs





TCP data

TOP DATA SCIENCE is a artificial intelligence achine learning and related software engineering services.

The company develops and implements solutions based especially on computer vision technologies that use video or imoge data



Developing the future of engineered wood products with AI 99 Joons Kallinen, Head of Marketing and

RAUTE helps its customers to make the most efficient and effective use of wood raw materials, so that the industry LUMI is a natural fit for us, as can make better use of renewable and carbon-storing we share the same values and wood-based materials. They use machine vision to identify goals that contribute to our the properties of wood materials. Teaching machine vision is computationally intensive work. common climate work.



IMPACT: Fast calculation results - one calculation round on the LUMI was performed ten times faster than with normal methods. Raute's high-level research on a world-class LUMI supercomputer, and the results can be used by their customers around the world, increasing competitiveness worldwide

Read whole story behind the QR code



RAUTE

Raute is the market leader in veneer, plywood, and LVL manufacturing technology and the only company in the world able to offer customers a complete mill-level solution.

LUMI AI Factory



• The three pillars of LUMI AI Factory

- Al-optimised supercomputer LUMI-AI
- Al Factory Service Center
- Experimental quantum-computing platform LUMI-IQ
- CSC (Finland) coordinates consortium with participation from Czechia, Denmark, Estonia, Norway and Poland
 - Other Finnish partners are FCAI (Aalto University, University of Helsinki) and AI Finland (Technology industries)
 - Total budget over 612 million euros
 - . EU 306.4 M€
 - largest public computing ecosystem investment in Finland,
 - among the largest in Europe
 - largest EuroHPC AI Factory investment
- Significant investment in talent and competence development

Key industrial sectors and focus areas





Timeline for the LUMI AI Factory





LAIF Services to unlock

research, development and innovation potential in AI

• • • • • •

. . . .

.

Services: TALENT

LUMI Al Factory



Training the latest skills & technology

- Co-create with AI centers
- Provide structured training paths for AI and HPC
- Tailor training for different domains



Consultation with company focus

- Remove friction with starter pack & feasibility analysis
- Weave Al Factory into existing networks and ecosystems
- Al compliance and regulatory sandboxes



- Offer **time-limited interventions** to step up Al adoption in companies' RDI
- Long-term access to the platform, support and training
- Support in applying for large resources & providing fast lanes



Al Factory Hub: engage the next-generation talent

- Co-working hub on grounds of Aalto University & ELLIS Institute
- Network of satellite hubs & virtual co-working space
- Running & supporting hackathons, challenges and accelerators

Services: **COMPUTE**



Computing capacity never seen before

- Globally leading AI training with massive GPU capacity and fast & large data storage (shared & dedicated)
- Al model serving at scale for "every open model out there"
- **Customisable environments** with virtual clusters to match every need
- API-based access and recipes for **automation** and public cloud integration
- Quantum capacity for next-level QC-AI

LUMI Al Factory



Expert support all the way

- Friendly human support for getting started and all the way to deep AI methods and scalability
- Accelerated adoption with self-service environment, thorough documentation and Al assistants
- Supported MLOps environment and recipes

Services: **DATA**





Data access is the priority

- Make data manageable with cloud-like data environment
- Datasets-as-a-Service: previously
 unaccessible datasets made available
- Remove data access barries with sensitive data services and access authorisation mechanisms
- Direct connections to data spaces and data repositories

Data support that goes the extra mile

- Data team for sourcing, negotiating and curating high-value datasets
- Help with the necessities: data wrangling & data engineering
- Support **streaming data** into the supercomputer

DaaS in LUMI AI Factory



Datasets-as-a-Service will be the primary data offering of the LUMI AI Factory



Objective: unlocking access to data and supporting data management for AI services and workflows through a Dataset as a Service



D5.2: Datasets as a Service is opened to users to make available datasets that require specific support from the system, either due to their size or challenging access conditions. As part of the service, also connectors for data repositories are made available in case some data sources are better served with such mechanism.



Dataset as a Service (DaaS) is a cloud-based data management mode that provides on-demand access to data, allowing users to store, manage, and retrieve data from various sources, without needing extensive resources or infrastructure of their own



DaaS service components

Data storage and management

Data access and transfer Data integration and interoperability

Data handling and analytics

Security and compliance

Productization and user management

Requirements for DaaS

LUMIAI Factor





Technical Requirements:

Hardware: Specifications for servers, storage devices, networking equipment, etc.

Software: Necessary applications, operating systems, and middleware.

Network:

Bandwidth, connectivity, and security protocols.

Functional Requirements:

Performance:

Expected speed, reliability, and scalability of the service.

Usability: Ease of use for end-users and administrators.

Compatibility:

Integration with existing systems and software.

Security Requirements:

Data Protection:

Encryption, access controls, and backup solutions.

Compliance: Adherence to relevant regulations and standards (e.g., GDPR, HIPAA).

Operational Requirements:

</>>

Maintenance:

Regular updates, patches, and support.

Monitoring: Tools and processes for tracking performance and detecting issues.

Disaster Recovery: Plans and systems for data recovery and business continuity.

×-

Business Requirements:

Cost: Budget constraints and cost-effectiveness.

Service Level Agreements (SLAs): Defined metrics for service quality and availability.

User Support: Helpdesk services, training, and documentation.

Data Labs

LUMI Al Factory



Showcases of unique datasets





Same and a second	
nunununun an	Mananananananananananananananananananan
	nump.



TiB crawled per day

1



WARC Datasets

4.02

185 different languages

17.48

147

TiB Size of Open Web

28.83 TiB Size of WARC Datasets

28

Million Hosts

755.00 Total TiB crawled

346

Public Datasets

Destination Earth



A central repository of digital pathology slides to boost the development of artificial intelligence



How are LAIF services offered?



Services primarily for **Research, Development and Innovation** (RDI) purposes.

Basic principle: services (capacity, training, consultation) free of charge for startups, SME's, research and public sector. For large companies services are fee-based.

Using LUMI access rules and adopting new AI Factory access modes: AI for Industrial Innovation and AI for Science and for Collaborative EU Projects.

Large computing resources are granted through **access calls with expedited processing**. Most calls require certain level of opening of results.

 Looking to continue collaboration with Business Finland and corresponding national innovation funding mechanisms for allocations to company use with fully closed results.

Customer journey into one-stop-shop





Customer journey into one-stop-shop



Manufacturing company looking to automate quality control with Al.	SME working on autonomous vehicles identifies collaboration potential with an academic group working on computer vision. Unique dataset of snowy, rainy and slushy dashcam images is collected.	A medical research group is looking to work on sensitive large imaging datasets.	•
Al Factory support: Starting with consultation and crash course on Al methods for key personnel. Following with a support intervention to help launch RDI project.	Al Factory support: Capacity is provided to train world- leading open foundational model for adverse weather photos. Work continues to develop tailored closed models on Al Factory capacity. Finally, application prototyping is supported with model serving platform.	Al Factory support: Providing data, and computing services for developing novel methods. Evaluating them on new datasets (sensitive model serving) for several stages of evaluation and productisation.	

Sometimes AI Factory services are best offered from another one-stop-shop, support center or network

LUMI AI Factory and EOSC

The EOSC-FI Node

- The gateway for researchers in Finland to EOSC and for researchers outside Finland towards us
- Ensure a user-centric approach bridging HPC projects with data and tools together with LUMIAI Factory



LUMI AI Factory

National Research data Thematic research data resources and services resources and services Chipster - a user-friendly Fairdata.fi - national FAIR analysis software for highrepository of research data throughput genomic data Research.fi - information on research conducted in Finland: Thematic data resources from publications, research data, FIRi, national nodes of Ris (e.g. CLARIN) and other national infrastructures, funding, organisations and people stakeholders **EOSC-FI** Node offering Costly / Training restricted resources **Research Data Management** Competence Center for training, services with usage skills development and support restrictions or carrying a cost for end-users (at a later stage)

CSC

EOSC-FI Node in 2025

- Build the EOSC-FI Node user interface / architecture
- Federate with MyAccessID
- Integrate metadata and service catalogues
- Develop the concept of Dataset-as-a-Service: a service that enables publishing data products for research and development in conjunction with tools
- Test federation with other nodes, e.g. SURF, Eudat.
- Onboard resources of other national stakeholders (e.g. FIRI, RI national nodes, universities)







CSC

EOSC-FI node: expected benefits

- The EOSC Federation will provide more visibility to the Finnish resources (data and services) maximizing their use and reuse at European and national level
- The EOSC Federation will also increase the visibility of the Finnish institutions contributing to the EOSC-FI node by increasing the collaboration opportunities on international projects
- At national level, the EOSC node will act as a central reference point where national researchers will easily be able to discover and use the national resources. In addition to the pool of national resources, the users of the EOSC-FI node, will be able to discover resources from other nodes, in particular data but also specific services and resources that could complement the national offer.
- EOSC national node will help advance open science and incentivise the FAIRification of repositories and services from stakeholders across Finland joining the node

LAIF and EOSC

LUMI Al Factory

25

EOSC will be a valuable resource for feeding the LUMI AI factory with high-value research datasets → Connecting the AI factory / EOSC ecosystem is fundamental

The EC is starting to investigate how to link EOSC and EuroHPC
 → Make sure EOSC Federation is interoperable with the EuroFP platform

CSC is already operating national nodes of research infrastructures (e.g. CLARIN, ELIXIR). These RIs are also considering to become EOSC thematic nodes

→ It is important to understand the relation between national and thematic nodes

More thematic nodes to launch: **DestinE could become a thematic node in EOSC**



More information: <u>lumi-supercomputer.eu</u> Contact us: <u>ai-factory@lumi-supercomputer.eu</u>

Markus Koskela, markus.koskela@csc.fi









