

ANTWERP

TO EXASCALE AND BEYOND

UNLEASHING THE POWER OF EUROPEAN HPC AND QUANTUM COMPÙTING

Where industrial Al and HPC meet: benefits, requirements, barriers

Ana García Robles Secretary General BDVA



Antwerp, 19/3/2024





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Tuesday 19/3/2024 at 11h30 CET



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Roberta Turra, CINECA



Laszlo Friedmann, Fraunhofer IAIS

European AI Innovation Package

Evangelia Markidou Head of Sector - Artificial Intelligence Technology, Development and Impact Directorate General CONNECT, European Commission



Relevance of Generative Al

- Generative AI models (such as large language models) are a new wave of AI models adaptable to various domains and tasks.
- . These models have immense **potential** to revolutionise multiple sectors.
- . Despite their advantages, generative AI models, have **capabilities and risks** that are still being uncovered.
- . Mastery of this technology is of **strategic importance for Europe** to reduce dependency on non-European companies and ensure **sovereignty**.





INNOVATION PACKAGE

#DigitalEU

Main elements:

- AI startup and innovation
 Communication
- Amended EuroHPC regulation
- CitiVERSE EDIC
- ALT EDIC
- AI Office





The AI Package

EuroHPC Amendment: AI Factories

Al Office



Al Start-up and Innovation Communication

Key Ingredients for AI

- **Data Access**
- Algorithms
- Investment
- Skills
- **Processors**

ALT-EDIC





Strategic Framework

















GenAl4EU Initiative

- **GenAI4EU** initiative to stimulate the widespread uptake of generative AI across the Union's *strategic industrial ecosystems*.
- Startups and innovators can work closely with industrial users, attract investments in the Union and have access to the key ingredients of AI *data, computing, algorithms and talent.*









Example GenAl Applications | Healthcare

Medical Imaging and Diagnostics



LLMs as healthcare assistants



Drug Discovery and Development



Personalised Medicine





European Commission



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Example GenAl Applications | Climate Change and Environmental Sustainability





Generative AI for weather forecasting

- Enhanced data integration
- Faster and more accurate weather forecasting
- More efficient use of resources
- Ability to detect extreme weather events





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Example GenAl Applications | Cybersecurity

Enhanced Threat Detection and Prediction



Sophisticated Phishing and Social Engineering



Vulnerability Identification



LLMs as cybersecurity assistants





European Commission



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CitiVerse-EDIC

Local Digital Twin European Digital Infrastructure Consortium





ALT-EDIC

Alliance for Language Technologies European Digital Infrastructure Consortium

Objectives

Preserve linguistic and cultural diversity in Europe

Technological leadership and strategic autonomy

Respect European rules and values

Cooperation

Raising awareness

Linguistic diversity

Actions Plan





Key ingredient: Access to Data



European **single** market for data

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- **Pooling European** data in key sectors
- Enabling a **data**driven economy





Key ingredient: Algorithms



Large AI Grand Challenge

- ALT-EDIC funding for open-source EU model addressing all European languages
- Testing and Experimentation facilities (TEFs)
- Setup of AI regulatory sandboxes
- Financial instruments to support European start-ups (EIC accelerator, investEU)



Key ingredients: Skills & Processors



Support training, up- and reskilling activities through dedicated initiatives

- **Digital Europe** ullet
- **Networks of Excellence in Al** lacksquare
- **European Digital Innovation Hubs**
- **European Research Council** lacksquare





Reduce reliance on specialised AI chips designed and developed outside the Union

- **Follow-up Major European Processor Initiative** lacksquarein 2024 under the EuroHPC JU:
- **1.** First European post-exascale supercomputer
- 2. Embedding of processors







AI Office: Mission and tasks

Context:

- Clear need for EU-level governance * system for AI (SotEU 2023)
- Political agreement on AI Act from * 8 December introduces role of AI Office
- Part of DG CNECT *



- Responsibility to implement and enforce the AI Act, in particular rules on general-purpose AI models and systems
- Cooperate with all relevant EU bodies and Member States
- Collaboration with stakeholder community

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- Cross-sectoral cooperation within the Commission
- Promote uptake of and innovation in AI with societal benefits
- Coordinate and promote international cooperation on AI





AI innovation ecosystem : from the Lab to the Market



Putting EU in the map of Generative AI Innovation: From the lab to the market

- Advancing Large Al Models: Integration of New Data Modalities & Expansion of Capabilities €43 million
- Explainable and **Robust Al** €12 million

Opening 29/02/2024 **Deadline** 29/05/2024

Key Actions of Al Innovation Package

Launch specific activities, through Horizon Europe and the Digital Europe Programme to:

- Support the setup of "AI Factories", through the amendment of the EuroHPC Regulation;
 Accelerate the development and deployment of the Common European Data Spaces and make it available for the AI community;
 - Support the development of large AI models and systems,
 - Support "GenAI4EU" for developing novel use cases and emerging applications in several industrial and societal sectors;
 - Support initiatives to strengthen EU's generative AI talent pool.

Will provide innovative financial instruments through the **EIC accelerator Programme** and the **InvestEU guarantee** and encourage Member States and private investors to undertake similar investments for AI start-ups.

MS will establish the ALT-EDIC and the CITIVERSE EDICs with the support of the Commission.

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SILO_{AI}

EUROPE'S OPEN LANGUAGE MODEL PORO: A MILESTONE FOR EUROPEAN AI AND LOW-RESOURCE LANGUAGES

Europe's open language model Poro: A milestone for European Al and low-resource languages

LARGE LANGUAGE MODELS GENERATIVE AI

SILOGEN

Together with the University of Turku and HPLT, Silo AI, the largest private AI lab in Europe, has reached a significant milestone with the successful completion of training the Poro model. This marks an important step for SiloGen, the company's generative AI arm, and its efforts to strengthen European digital sovereignty and democratize access to large language models (LLMs) for all European languages. The model is evidence of the successful application of a novel

WORK NEWS & EVENTS OFFERING 🗸

Machine Learning Weather Prediction (MLWP): The AI General Circulation Model

- A ML-weather prediction model for Italy, with a horizontal resolution of 2.2km (hourly)
- To be employed for an accurate prediction of renewable energies on both the production and demand side
- The advantage is a (very) fast runtime and significant savings in computational resources

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Data: historical data on atmospheric behavior in the last 40 years reconstructed by means of reanalysis products (ERA5 downscaled) – volume 3TB Moldel: UNet with 29 million parameters

Cineca role:

parallelization of training data on 10 nodes (1 GPU for each year, monthly batches) - 20 epochs in 7 hours,

testing alternative approaches such as Transformer and Generative Diffusion models with Spatio Temporal Learning tools

• validation on observational data and standard numerical model predictions

Where Industrial AI and HPC Meet: Benefits, Requirements, Barriers Manufacturing-X: Make Data Work

Goal

Manufacturing-X is an initiative to digitalize the entire manufacturing and supply chains in industry. The goal is to enable digital innovations for greater resilience, sustainability and competitiveness.

Approach

Companies jointly work together on use cases and share services to enable data exchange across companies and products of different vendors. It builds on common standards. Data is used to create value and impact.

Customer value

Creates customer value for concrete use cases Opportunities for SMEs to gain access to technology and infrastructure as basis to provide their digital offerings

Where Industrial AI and HPC Meet: Benefits, Requirements, Barriers Manufacturing-X: Make Data Work

Upload the CAD file of your product and the training process is started **automatically**. Once the training is done, you can **download** the trained model to test and deploy.

"AI is on the spot":

(Generative) AI is revolutionizing the digital economy Automation of know-how activities New usage paradigms Translating between (formal) languages

Challenges:

Easy access to knowledge and HPC infrastructure Training of own AI models AI across company and vertical boundaries Security and trust Scalabilty

HCACESS SPPRI TRANG

- Meetings on a weekly basis with new potential EuroHPC users
- What is available? Which system is best for me and my group? How do we apply? What are the requirements? How can we get started? Is it really free?
- One-stop shop if ENCCS can't help you, we hopefully know someone who can

TRUSTLLM – DEMOCRATIZING TRUSTWORTHY AND EFFICIENT LARGE LANGUAGE MODEL TECHNOLOGY FOR EUROPE

Excellent Research Open Data Open European LLM Nucleus Large-scale Training Framework for Trustworthy LLM Training: Access **Development of LLMs Aligned to European Values** Oscar OPUS B Wikipedia N The Pile MC4 ÷ Multilingual Model Model Data Curation **Pre-Training Data Sources** Alignment

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trustllm.eu

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