STEP STARTUPs

European Open-Source AI Landscape

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Startup Europe REGIONS NETWORK

V2.1

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European Open-Source AI Landscape

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Understanding Open-Source AI

The AI landscape is swiftly evolving. Open-source AI is emerging as a transformative force that democratises access to advanced AI technologies

Defining Open-Source AI

What is considered open-source AI

Taking into consideration the definition by Open Source Initiative (OSI)*, open-source AI is and AI system made available under terms that grant the freedoms to: (1) use the system for any purpose and without having to ask for permission; (2) study how the system works and inspect its components; (3) modify the system for any purpose including to change its output; and (4) share the system for others to use with or without modification, for any purpose.

Open-source AI vs Open-weights AI

Open-weights models grant access to the trained parameters required to operate the system, although they withhold the training data and source code. In contrast, open-source AI must release the full suite of components, guaranteeing the user's right to use, study, modify and share the system.

Fulfilling the open-source criteria

The Open Source Initiative definition adopts a maximalist approach (all or nothing) that seeks to prevent open washing, but balancing risks and innovation should also be considered.

How does Open-Source AI help Europe's AI ecosystem?

Open-source lowers entry barriers, allowing universities, startups, and public institutions to experiment with and deploy AI without needing huge levels of capital.

*Source: Open Source Initiative

What are key components of Open-Source AI Systems?

01 **Source Code:** The algorithms and implementation details must be publicly accessible

02 **Model Weights:** Pre-trained parameters that define the model's learned knowledge

03 **Training Data:** Information about datasets used to train the model

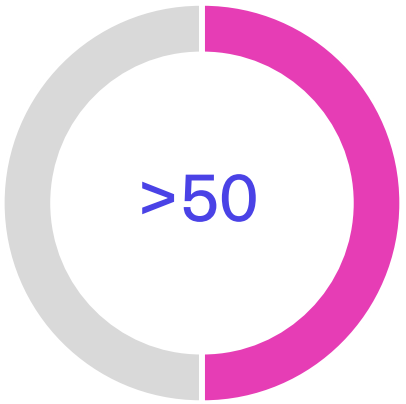
04 **Documentation:** Comprehensive guides explaining how to use and modify the system

05 **Licensing:** Clear terms allowing redistribution and modification

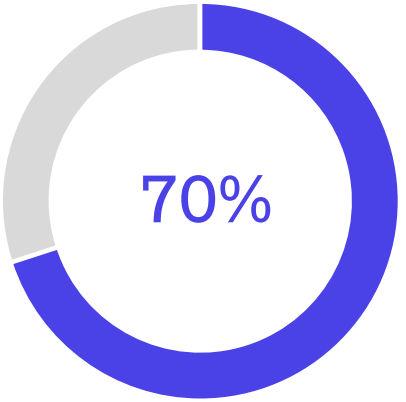
While Open-Source AI should not require publishing the entire training dataset, it does mandate a high level of transparency about the data.

- **Data description:** A complete description of all data used in training, including data that cannot be openly shared.
- **Public data references:** A list of any portions of the training data that are publicly available, and where to obtain them.
- **Third-party data sources:** A listing of training data that came from third parties (including those available for purchase or via permission) and information on how to access them.

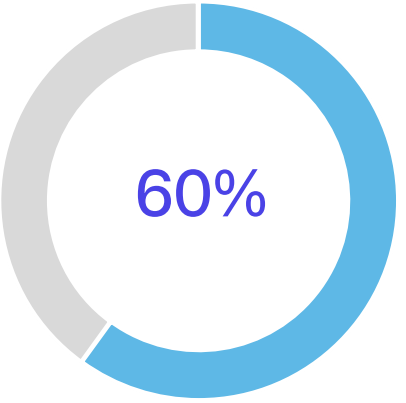
Open-Source AI use is already widespread among users and industries



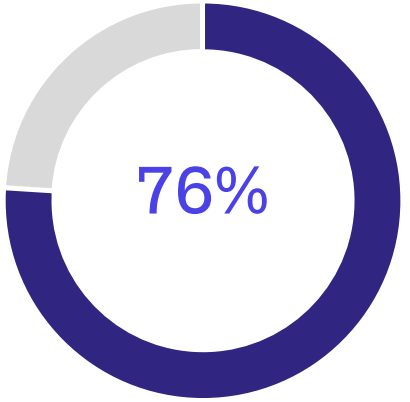
More than **50 per cent** of technology decision-makers and senior developers report **using Open-Source AI in the data, models, and tools** areas of the tech stack.



The technology, media, telecom and advanced industries sectors are leading the way in the use of Open-Source AI (70 per cent).



60 per cent of decision-makers using Open-Source AI reported **lower implementation costs** compared to similar proprietary technologies, and **46%** see **lower maintenance costs**, while 22% consider proprietary AI has lower maintenance costs, and 32% does not see a difference.



76 per cent of technology decision-makers expect their organisations **to increase use of Open-Source AI** technologies over the next several years.

Source: McKinsey, the Mozilla Foundation, and the Patrick J. McGovern Foundation. Open source technology in the age of AI, 2025.

Use of Open-Source AI is substantial across the tech stack, with the highest share in models and tools

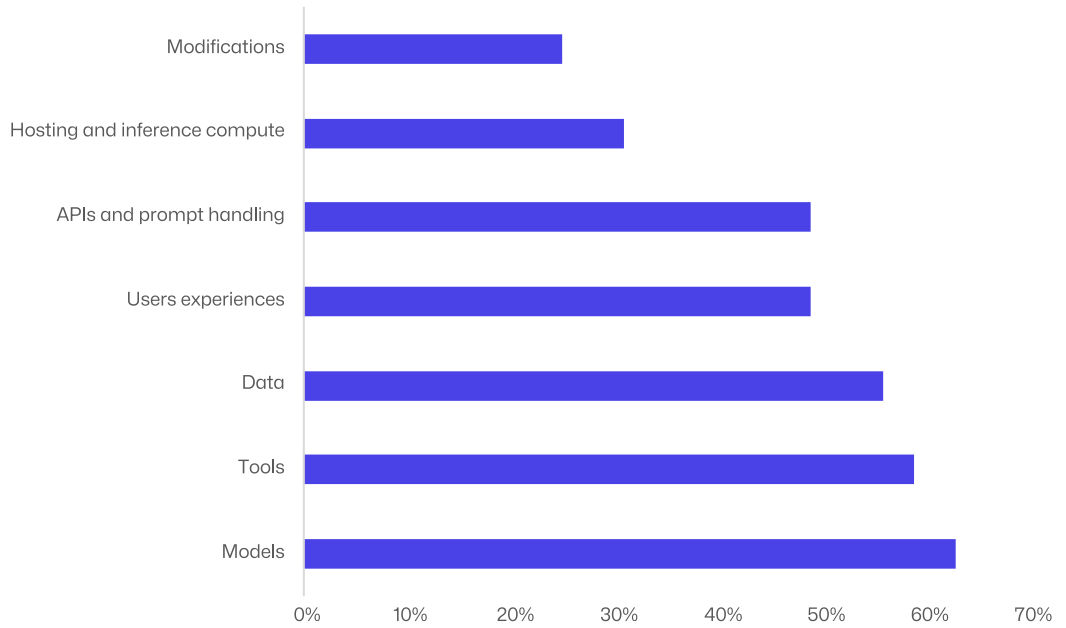
The rise of Open-Source AI

The current AI landscape is being shaped by a growing trend: enterprises are increasingly adopting open-source technologies to develop and deploy AI-driven solutions. This shift is driven by a rapidly expanding ecosystem of powerful open-source models, which are swiftly catching up to their proprietary counterparts in performance. Key players in this space include Mistral with Mistral 7B, Meta with the Llama family, Google with the Gemma family, the Allen Institute for AI with the OLMo family, DeepSeek with DeepSeek-R1, and Alibaba with Qwen 2.5-Max.

Open-source AI is extensively utilised, especially in parts of the technology stack that smoothly integrate with existing enterprise systems and security protocols.

- **Over 50% of decision-makers and senior developers utilise open-source AI for data, models, and tools.**
- Open-source is less common in modifications (such as fine-tuning and adapters) and hosting/inference compute. This may be due to the relative novelty of open-source inference projects (for example, vLLM from Berkeley's Sky Computing Lab, released in 2023). It could also indicate that users prefer to modify models with proprietary data for specific cases.

Organizations' regular use of Open-Source AI solutions, % of respondents



Source: McKinsey Open Source AI Survey, 703 participants with experience in working with AI tech systems, Dec 9, 2024- Jan 24, 2025

Strategic benefits of Open-Source AI tools

Transparency and Accountability

Open-source AI offers access to the source code and model weights, enabling teams to understand how decisions are made. This transparency assists in detecting biases, facilitating regulatory compliance, and building stakeholder trust, which is vital in high-stakes fields such as healthcare and finance.

Community Collaboration

Open-source AI benefits from a global network of contributors. This collaboration results in quicker bug fixes, faster feature development, and shared best practices, leading to more resilient and innovative solutions than any single company could develop alone.

Customization and Flexibility

Unlike proprietary systems, open-source models delivers customisation at every layer. Decoding, guardrails, and alignment policies; modification of architecture; and optimisation of runtime for hardware. Such end to end control gives a higher ceiling for flexibility.

Cost Efficiency

Beyond eliminating licensing fees, open-source AI lowers operational costs. Organisations can avoid vendor lock-in, secure better cloud deals, and optimise infrastructure. The ability to run models locally also considerably reduces ongoing service expenses.

Safety in AI and the role of open-source

There are risks related to misuse from open-source models which are harder to mitigate than for closed-source models. At the same time, open-source models provide valuable information to researchers to study the safety of these models in detail.

Benefits & barriers of Open-Source AI adoption

Preference for Open-Source AI

Organisations are drawn to Open-Source AI for several key reasons:

- **Cost-Effectiveness:** 60% of decision-makers report lower implementation costs compared to proprietary tools.
- **Transparency and Control:** The open nature of these models offers a deeper understanding, which is especially useful when specialised modifications are needed.
- **Developer Community:** 81% of developers and technologists surveyed reported that experience with open-source tools is highly valued in their fields.

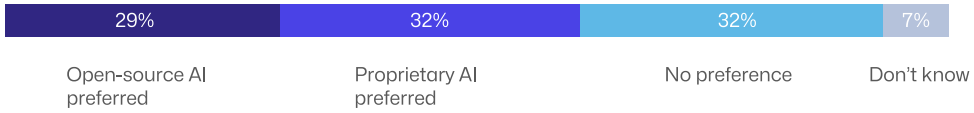
Trade-offs in Open-Source AI

Despite the benefits, organisations are also mindful of the trade-offs:

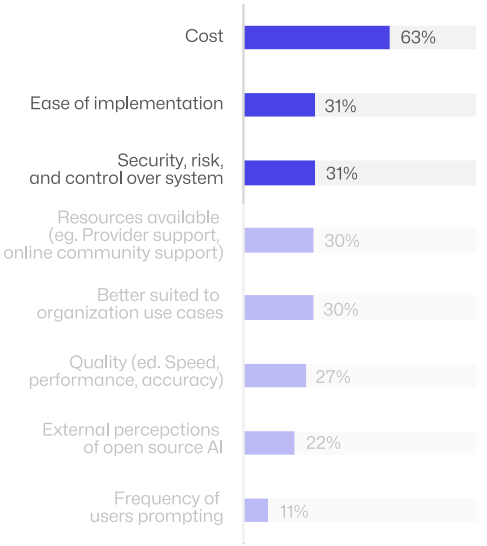
- **Security Concerns:** "Security and compliance" is the main obstacle to adoption, cited by 56% of respondents.
- **Support Uncertainty:** 45% of respondents are concerned about the absence of assured long-term support and updates.
- **Perceived Limitations:** Decision-makers often find that proprietary AI provides a quicker return on investment and easier usability. For those who deliberately favour proprietary tools, "security, risk, and control over system" remains the most cited reason 72% of the time.

Source: McKinsey, Open Source in the age of AI

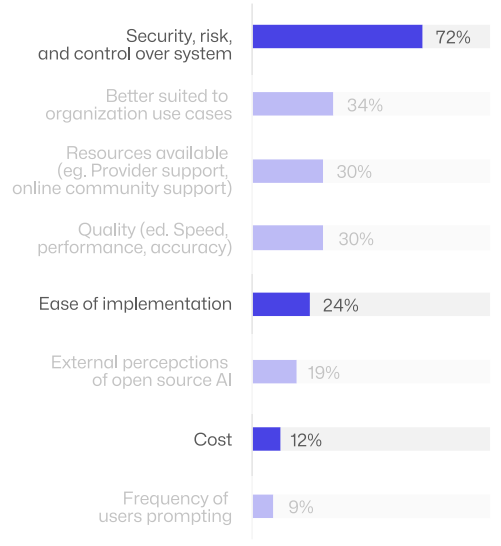
Preferences for Open-Source AI, % of respondents



Reasons for preference for open-source AI



Reasons for preference for proprietary AI, % of respondents



Note: Open Source AI Survey, 703 participants with experience in working with AI tech systems, Dec 9, 2024- Jan 24, 2025. Open source Ai preference, n=206; proprietary AI preference, n=227)

Source: McKinsey, Open Source in the age of AI

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The global Open-Source AI landscape

Open-source AI as an alternative to commercial models can boost AI adoption across the EU

There is a surge in Open-Source AI models, but the EU lags in volume

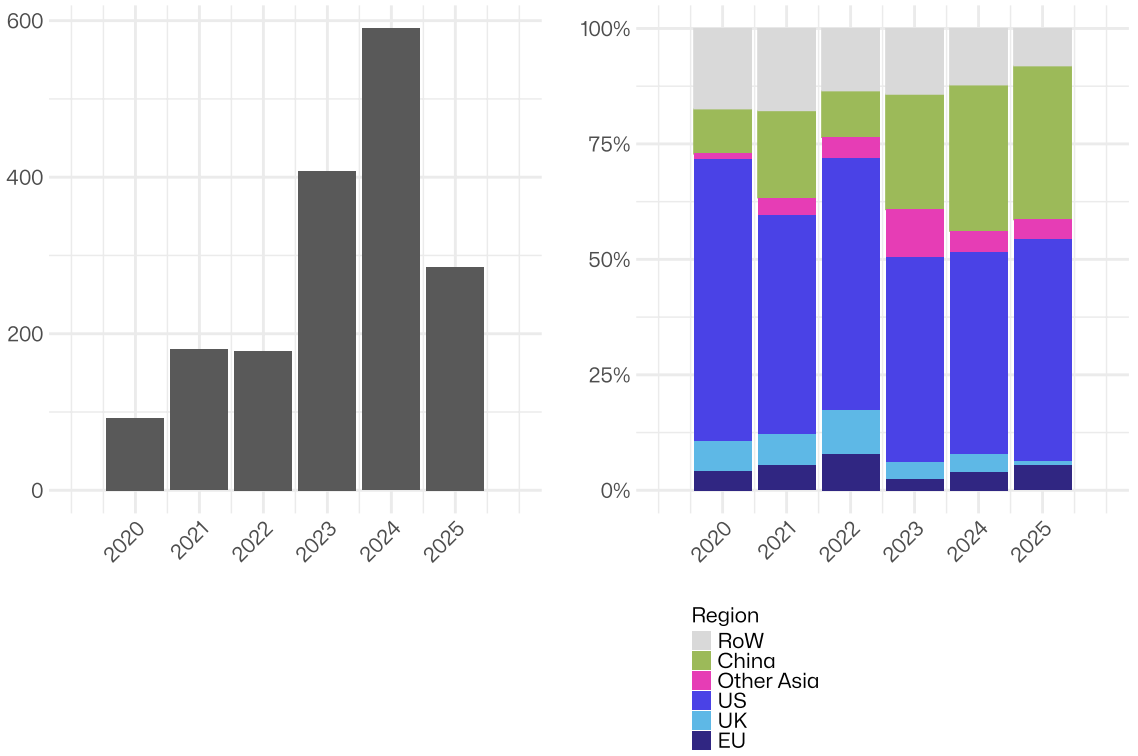
The floodgates are open

The field of artificial intelligence is experiencing rapid growth, marked by the significant rise in publicly released AI models. The number of new models more than doubled between 2022 and 2023, with 2024 continuing this strong upward trend. This surge clearly indicates a vibrant and highly active global research landscape.

However, a closer look at the geographical distribution reveals a significant concentration. The United States is the undisputed leader, consistently accounting for the largest share of new models, representing approximately 50% of the global total in 2025. In stark contrast, the EU's contribution, although stable, remains marginal at approximately **5-10% of the total releases**.

This disparity exposes a strategic weakness and an increasing reliance on a limited number of non-European ecosystems for vital AI technology. The low production of EU native AI models results in a strategic dependence on foreign technologies in another dominant digital sector paradigm.

AI models released per year and region (proprietary and open-source)



Source: Epoch AI Dataset on notable AI models

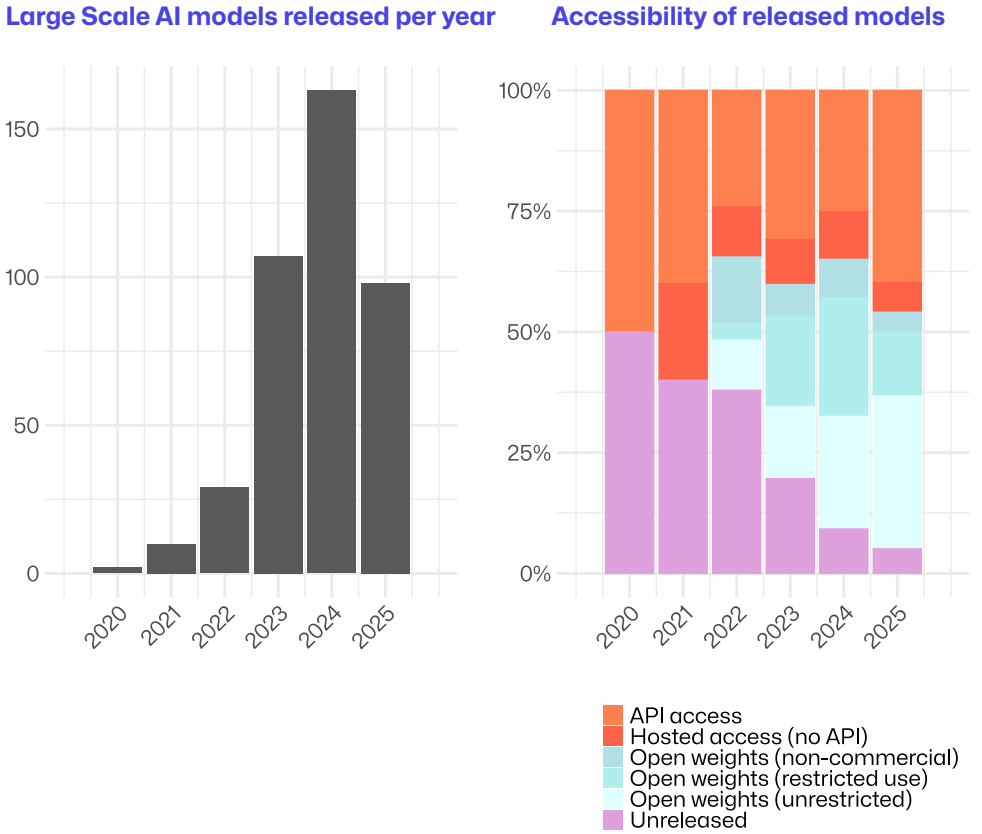
A growing shift towards greater accessibility with open-weight models

From black box to building block

Alongside the increase in volume, the nature of AI model accessibility has fundamentally evolved. The trend is shifting away from closed, proprietary systems (offered via restricted APIs or kept unreleased) and moving decisively towards more transparent and accessible "open-weight" models. In recent years, models released with their full weights have become common, democratizing access to cutting-edge technology. This enables researchers and startups to freely build upon, examine, and customise powerful AI systems, fostering a more level playing field innovation.

- API Access / Hosted Access: Users can send inputs and receive outputs from the model but cannot access the underlying code or weights.
- Open-weights (Non-Commercial): The model's weights are public, but use is restricted to research or non-profit activities.
- Open-weights (Restricted Use): The weights are public, but subject to certain conditions, such as an acceptable use policy.
- Open-weights (Unrestricted): The weights are fully public and can be used, modified, and redistributed for any purpose, including commercial use.

Large Scale AI models released per year and accessibility



Source: Epoch AI Dataset on notable AI models

The open-weight models are closing the performance gap

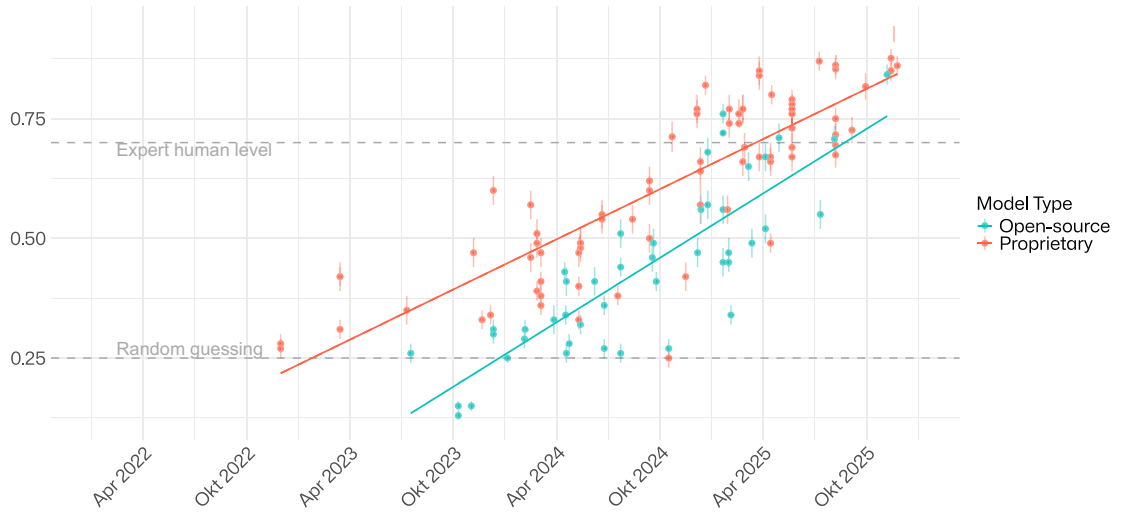
Open-source catches up

The argument that proprietary models are inherently superior is quickly becoming outdated. Open-weight models are not only becoming more accessible but are closing the performance gap with their closed-source counterparts. The GPQA (Graduate-Level Google-Proof Q&A) diamond benchmark, which assesses performance on complex graduate-level questions, clearly demonstrates this trend.

While proprietary models (red dots) traditionally led, the performance of open-weight models (blue dots) has improved significantly since late 2023. Leading open models are now consistently scoring within the same range as proprietary ones, and in several cases, are reaching or surpassing the "expert human-level" performance threshold.

This shows that adopting an open-source approach does not mean compromising quality; it offers a viable, competitive, and cutting-edge pathway for technological leadership. Moving forward, the trend indicates that open-source is set to become the main catalyst for frontier AI development, making leadership in this area essential for playing a relevant role in the age of AI.

GPQA diamond benchmark scores of Open-weight AÍ models



Source: Epoch AI Benchmarking Hub

US and China dominate the volume of funding rounds for open-weight startups

Where the money flows

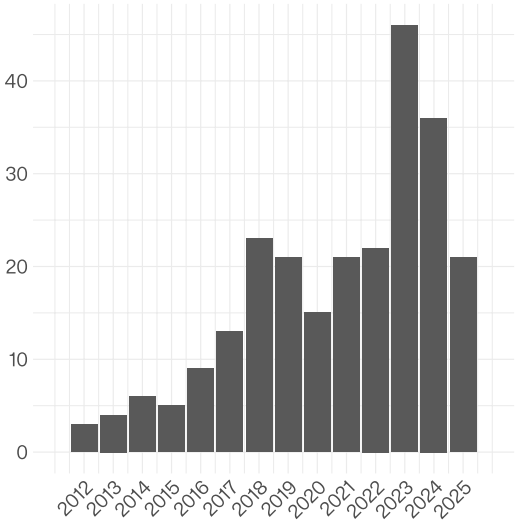
The global appetite for open-weight AI startups in venture capital has increased considerably, as seen in the growing number of funding rounds each year. However, this investment activity remains heavily concentrated geographically. The United States secures the vast majority of these individual investment deals, highlighting the maturity and vibrancy of its venture capital market, although its share has declined since 2012.

In contrast, the volume of funding rounds in the EU, while displaying steady year-on-year activity, is significantly smaller than that of the US, while UK and China have been gaining global share. This reflects a less developed and more risk-averse VC ecosystem for AI in the EU. The result is that fewer startups can secure the essential early-stage and growth funding needed to compete, creating a bottleneck that hampers the entire innovation process pipeline.

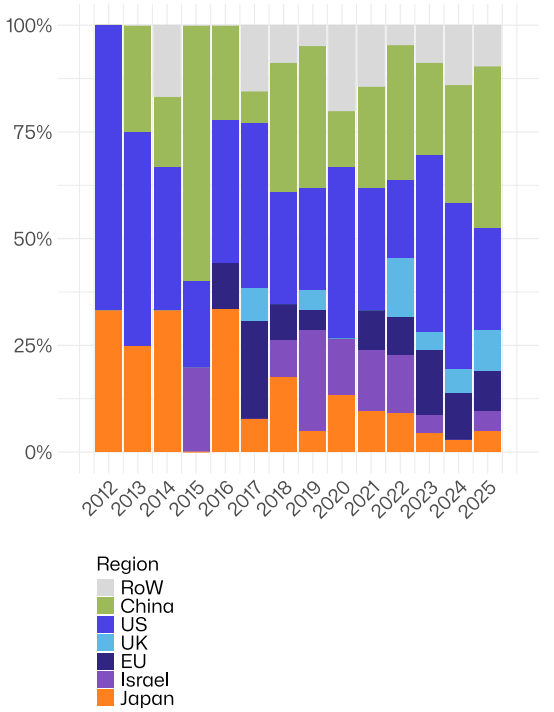
- China's "AI+" Initiative is a 10-year plan to integrate artificial intelligence across all sectors of its economy and society to boost productivity and modernization. Launched by the State Council in August 2025, the initiative aims to increase AI adoption rate in key sectors by 2027 and a fully intelligent economy by 2035. The initiative focuses on six pillars: science and technology, industry, consumption, public welfare, governance, and global cooperation.
- U.S. AI Action Plan (2025) outlines a strategy to secure U.S. global dominance by prioritising rapid private-sector innovation, massive energy and infrastructure expansion, and the deregulation of AI development. The framework focuses on three pillars: accelerating innovation, building American AI infrastructure, and leading international diplomacy and security. Regarding open-source AI, the Plan explicitly mentions that "Federal Government should create a supportive environment for Open Models".

Funding rounds for open source startups by region

Funding rounds for open source startups per year



Regional split of funding rounds



Source: Dealroom, sample based on startups and scale-ups that have published open source ai models

Europe's Investment gap widens in total funding amounts

Mind the gap

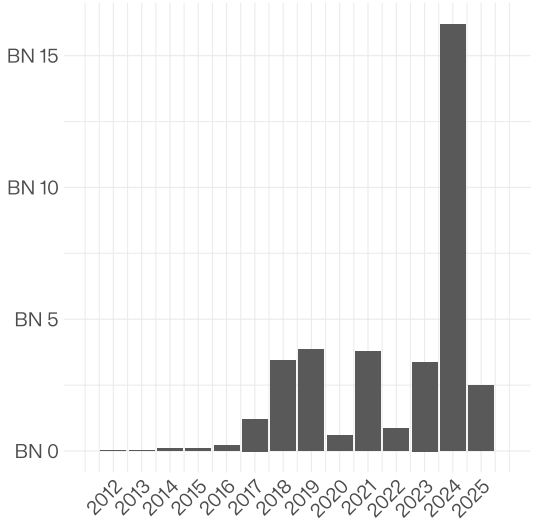
The disparity in the AI funding landscape becomes even more evident when examining the total capital invested. The recent surge in funding, particularly in 2023 and 2024, has predominantly benefited US-based companies, which have secured the vast majority of investments in open-weight startups. The EU's share of this capital is critically small, accounting for only about 5% of US funding in 2024. This lack of substantial investment remains a significant barrier to establishing a globally competitive open-source AI industry in the EU.

However, this challenge also presents an opportunity. A notable trend in open-source AI is the involvement of corporations in developing and releasing powerful open-weight models (Google's Gemma series, Alibaba Qwen ecosystem, xAI's Grok 2.5 or Meta's Llama series). This path of industry-driven, large-scale R&D openly shared offers a potential strategic pathway for the EU. By fostering deeper collaborations between its leading industrial giants (in sectors such as automotive, pharmaceuticals, and engineering) and its agile AI startups, the EU could leverage its existing corporate strength as a source of funding and innovation.

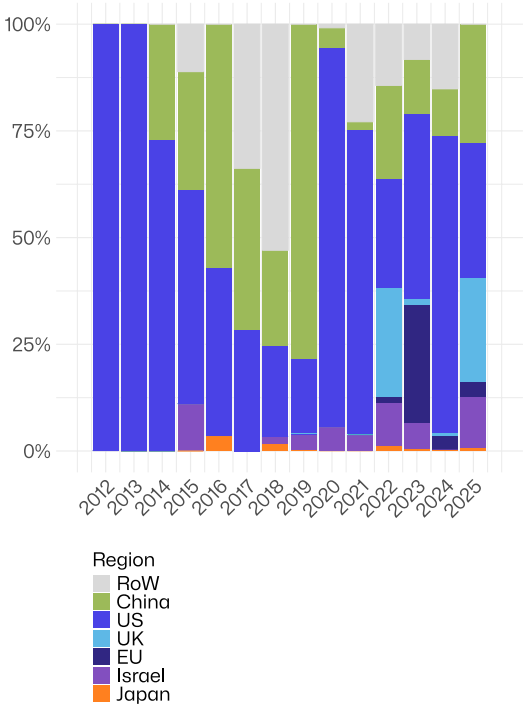
This approach could help develop a strong, alternative European path for building sovereign AI—one that addresses the venture capital shortfall by capitalising on its robust industrial base.

Funding amounts for open source startups by region in BN EUR

Funding amounts for open source startups per year



Regional split of funding



Source: Dealroom, sample based on startups and scale-ups that have published open source ai models

3 The EU's ambition in the global AI era

In the capital-intensive race for AI, the EU must carefully position itself. By leveraging its core values, the EU can establish a unique competitive advantage to become a leader.

With smart policy and coordinated investment, Europe can lead globally in trusted, open, and inclusive AI

The untapped potential of European open-source community

While the global race for AI leadership sees the United States and China at the forefront, Europe is now leveraging its unique strengths. The EU is focusing on an open-source approach to foster a competitive edge and champion a new era of AI development.

As demonstrated by global VC investments in AI, while the EU is currently third, this strategic, collaborative, and ethical approach to open-source AI positions Europe to become a leader in the next phase of global AI development.

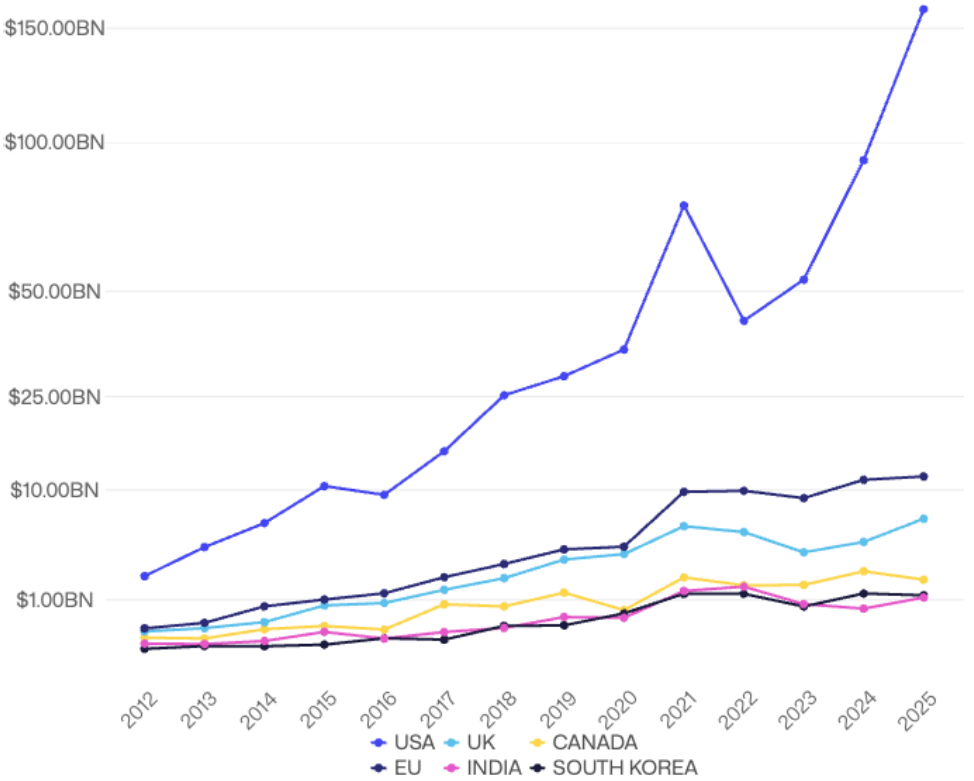
The European Plan for Open-Source AI:

- **Policy and Regulation:** With a focus on trust and ethics, Europe has introduced landmark legislation such as the Cyber Resilience Act, AI Act, Data Act. This regulatory framework aims to ensure AI development is transparent and compliant.
- **Collaborative Initiatives:** Instead of a single, massive model, Europe is promoting smaller, more sustainable open-source solutions. The launch of OpenEuroLLM, a consortium of 20 European research institutions and companies, is a prime example.
- **Leveraging Existing Strengths:** Europe's strategy involves harnessing its powerful AI Factories network, strong research institutions, and digital infrastructures.

Examples of European open-source AI

European Open-source AI providers include Mistral who, as of December 2025, has 65 open-source models (Apache 2.0 license) on Hugging Face. Equally, Black Forest Labs have an open-source model on the same platform.

VC investments in AI in USD millions by country over time



Source: OECD.AI (2025), data from Preqin, last updated 2025-06-25.

Open source is Europe's fastest path from 14% to 75% AI adoption

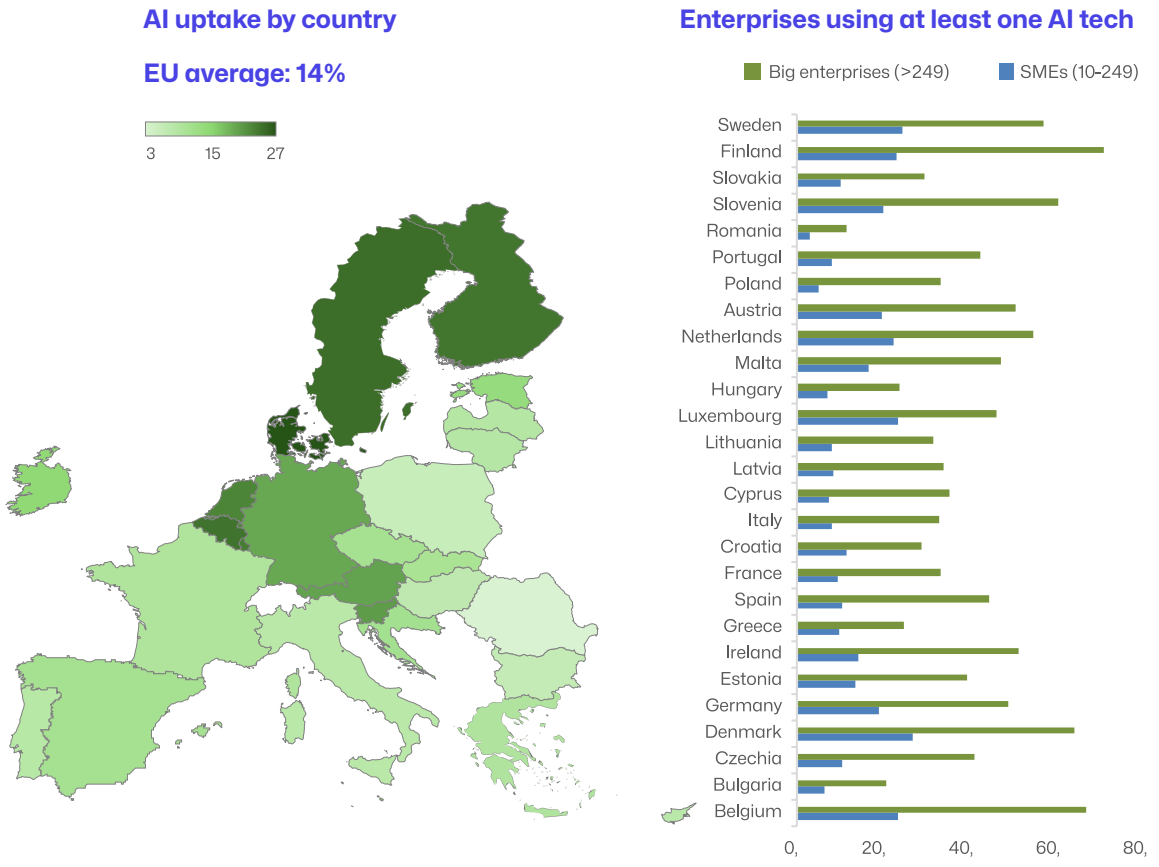
Closing the gap by 2030

The adoption of AI solutions is on the rise across the EU, but there is still a significant gap to close to meet the bloc's ambitious goals. The EU has a target of **75% of firms using AI by 2030**, yet the EU average was only **14% in 2024**. High licensing costs, vendor lock-in and compliance obligations particularly constrain SMEs. **Open-source AI can reduce these barriers by lowering costs, enabling deployment on sovereign infrastructure and providing reusable, transparent components**.

- **Varying Adoption Rates:** The use of AI technologies varies considerably across EU countries. Denmark, Sweden, Benelux and Finland lead the way with rates above 24%. These frontrunners typically combine strong digital infrastructure with active open-source communities. By scaling **open, reusable AI solutions** across borders, the EU can help lagging countries catch up without each having to reinvent the wheel.

- **Enterprise Size Matters:** Large enterprises are much more likely to utilise AI than SMEs. For example, in Finland nearly 70% of large enterprises use AI, compared to only 23% of SMEs. SMEs often face substantial financial constraints, lack bargaining power with large vendors and have limited access to in-house compliance expertise. **Open-source AI stacks—using open-weights, open APIs and portable formats—can cut licence and integration costs and allow SMEs to deploy compliant solutions on infrastructure they control.**

Share of businesses using AI in the EU by country, 2024



Source: Eurostat

The EU must strengthen its Open-Source AI ecosystem by reinforcing its key components

Europe's Open-Source AI developer community is a solid foundation for global leadership

Developer community and open-source talent

Europe has a robust and vibrant AI talent pool*, rooted in its history of open innovation, including foundational open-source projects such as the web, Linux, and key scientific software. This tradition now carries over into **open-source AI**, where European researchers and engineers are among the most active contributors worldwide.

Europe is a leader in the global open-source AI community, with many of the most popular model creators on **Hugging Face Hub** originating from the continent. Startups such as **Mistral AI, Aleph Alpha, and Black Forest Labs** are releasing open-weight models that others can build on. Europe's open-source developer communities have also provided invaluable frameworks and libraries such as **scikit-learn, spaCy and core contributions to PyTorch**, which underpin thousands of commercial AI systems globally.

These communities act as **critical infrastructure** for open-source AI. To remain a leader, Europe must invest in the long-term sustainability of maintainers, fund open-source tooling for evaluation and safety, and ensure that academic careers and funding programmes recognise open-source contributions on par with publications and patents.

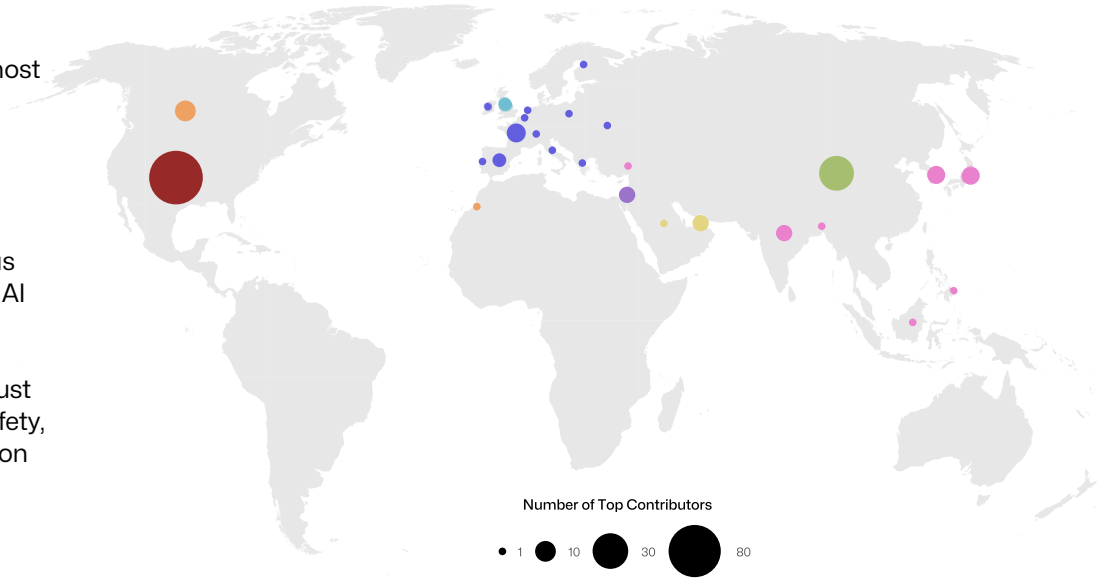
The Challenges of Scaling

Europe's challenge is not talent, but scale. In the U.S., frontier AI growth is driven by **very large private-sector investment**, while in China this is reinforced by **major state-backed programmes** for compute, chips, and AI firms. U.S. public support exists mainly through federal procurement, but most high-end compute remains privately financed. Europe, by contrast, faces a **private-investment gap**, which forces public programmes such as EuroHPC and the AI Factories to provide much of the shared infrastructure. This results in a distinct model: **public-purpose compute built for open-source access, broad reuse, and sovereignty**, rather than proprietary concentration.

Recent initiatives such as the **UK AI Safety Institute's Inspect, ETH Zurich's Compl-AI**, and the **ROOST initiative** show how open-source safety and evaluation tools can become shared assets. Europe should back similar efforts at EU scale to turn its open-source strengths into scalable products.

*Related report: Shaping the Future of AI Talent in Europe: Strategies for Growth and Retention.

The global top model creators on Hugging Face Hub



Source: Hugging Face

The EU's Apply AI Strategy promotes open-source AI to foster European technological sovereignty and competitiveness by encouraging transparency, adaptability, and shared innovation. Given the impact that AI can have on public sector and thereby citizens, it is critical to assess and maintain security as well as operational autonomy and sovereignty in close coordination with Member States.

Europe's AI research base is a launchpad for open-source leadership

Global research standing

The EU is a major contributor to global AI research, ranking **second globally in 2024 with 13% of all AI publications**. This consistent output underpins a rich pipeline of algorithms, datasets, and benchmarks that can be turned into **open-source models and tools**, giving Europe a structural advantage in transparent and trustworthy AI.

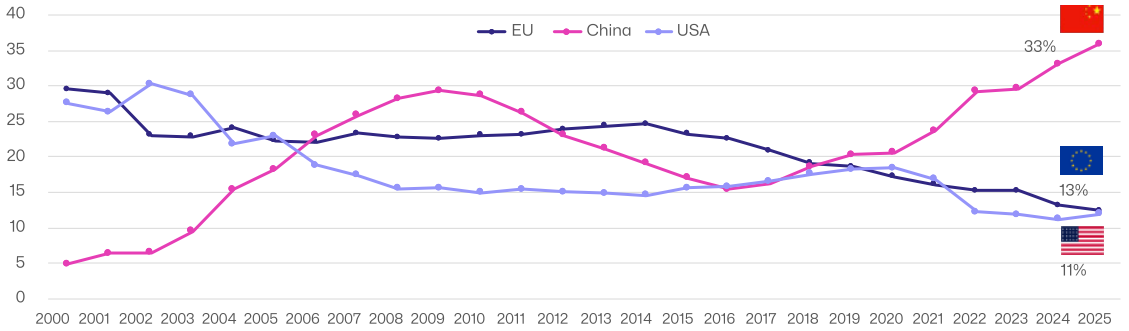
Top-tier institutions and open research networks

- **Research Centres:** Institutions like Germany's **Fraunhofer-Gesellschaft and DFKI,** France's **CNRS and Inria,** Belgium's **IMEC,** Spain's **CSIC, or** Bulgaria's **INSAIT,** and **IDEAS NCBR** in Poland are at the forefront of AI research and innovation. Many of their projects already release **open-source software, datasets, and benchmarks,** which are reused globally and form the backbone of numerous open-source AI stacks.

- **Universities:** Prominent universities, including **KU Leuven** in Belgium, the **Technical University of Munich** in Germany, and the **University of Amsterdam** in the Netherlands, along with **Czech Technical University** in Prague home to the Czech Institute of Informatics, Robotics and Cybernetics (CIIRC), are crucial for developing the next generation of AI talent. Their strong culture of **open publications, code repositories and reproducible research** feeds directly into Europe's open-source AI ecosystem.

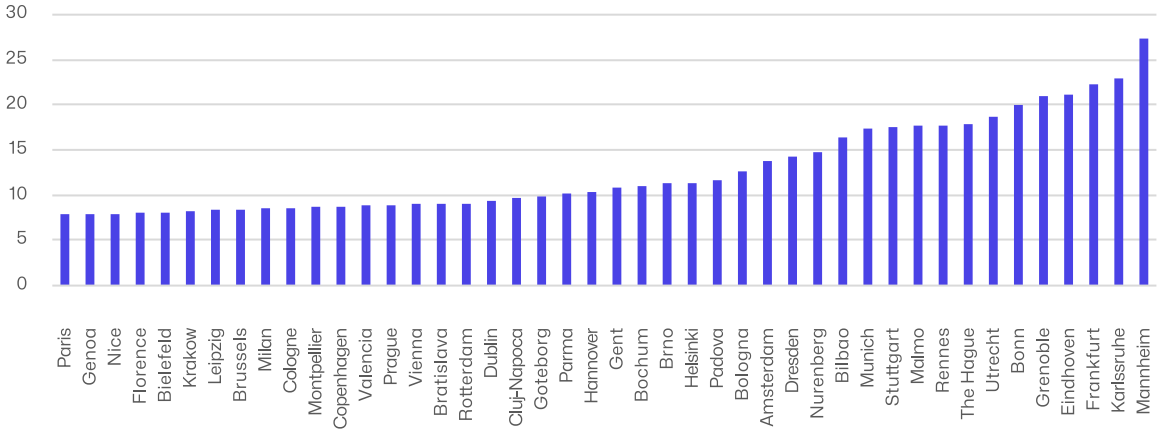
- **Collaborative Networks:** Pan-European networks such as the **European Laboratory for Learning and Intelligent Systems (ELLIS)** and the **AI, Data and Robotics Association (ADRA)** link researchers and industry partners to ensure that cutting-edge research is translated into real-world applications. These networks increasingly promote **open-source releases as default**, enabling startups and SMEs across Europe to build on shared models, tools and datasets rather than starting from scratch.

Percentage of AI publications by country over time



Source: OECD.AI (2025), data from OpenAlex, last updated 2025-07-07

AI research geographical distribution (research activities per 100k inhabitants)



Source: AI world

3

The EU's ambition in the global AI era

Regulatory clarity in addition to development and accessibility of EU infrastructure are essential for the growth of AI and non-AI companies

Key barriers for startups: compute access, funding, even for open-source AI

Compute access remains a critical barrier for European startups – including open-source ones

More than 10% of European startups surveyed identified access to computing power, talent and data as a major challenge*. This applies not only to proprietary GenAI firms but also to open-source AI startups, which still need significant compute to train and serve competitive models—even if they save on licence fees.

Open-source can reduce some costs (licences, vendor lock-in), but compute remains a hard constraint: without access to GPUs and scalable infrastructure, European teams are forced to fine-tune foreign models rather than build and maintain truly European open-weight models.

Another significant problem is access to funding across the startup lifecycle. Tax and compliance burdens disproportionately affect SMEs, and open-source projects tend to start as low-revenue.

Finally, startups and scaleups developing innovative technologies face regulatory fragmentation that impedes growth and competitiveness.

Regarding regulatory issues see the recently released StepUp Startups report "Ease of doing startups in the EU".

TILDE Open LLM
An AI with European values and support

This Latvia based company provides AI models to guarantee the diversity that represents one of EU's main strengths. Their goal is to build a foundational, multilingual LLM that treats European languages as first-class citizens, ensuring high-quality performance for complex tasks like translation, summarization, and content creation across 30+ languages.

- **Multilingual excellence:** Trained on over 34 languages, including all 24 official EU languages plus Ukrainian, Norwegian, Icelandic, and Turkish.
- **Optimized architecture:** Unlike generic models, Tilde Open LLM uses an "equitable tokenizer" that processes smaller European languages more efficiently, making it faster and cheaper to run for local businesses.
- **Sovereign and secure:** Designed for local deployment, allowing governments and enterprises to run the model on their own servers. This ensures that sensitive data does not have to leave the EU, fully complying with European data protection laws

This ambitious project found a turning point in Tilde's victory in the Large AI Grand Challenge, a prestigious competition funded by the European Commission to foster European leadership in AI.

As a winner, Tilde was awarded a transformative 2 million GPU hours on LUMI, Europe's fastest pre-exascale supercomputer located in Finland.

* Source: "Generative Artificial Intelligence: The Competitive Landscape. Copenhagen Economics

Building Europe's computing infrastructure: by 2026 19 AI Factories would be up and running

Europe is actively building its own AI infrastructure to reduce its reliance on foreign technology and foster a homegrown, open-source-friendly AI ecosystem

This initiative responds to a strategic vulnerability: over 80% of Europe's digital infrastructure and technologies are imported, and 70% of foundational AI models are developed outside the EU. The AI Factories are designed not only as supercomputing sites, but also as **shared infrastructure for training and serving European open-source models.** In October 2025, six new AI Factories were announced, being the latest additions based in the Czech Republic, Lithuania, the Netherlands, Romania, Spain, and Poland.

In December 2024, the European High Performance Computing Joint Undertaking (EuroHPC) selected seven consortia to establish the EU's first AI factories. In March 2025, the EuroHPC announced the selection of another six new AI Factories . Backed by a €2.1 billion investment, these factories will deploy AI-optimised supercomputers and microprocessors, provide skills support, and offer dedicated access schemes for **startups, SMEs and Open-Source AI projects.**

- Digital sovereignty through open stacks: The AI Factories will install new AI-optimised supercomputers, upgrade existing systems and develop AI-oriented microprocessors. By allowing European developers to train and host **open-weight models on EU hardware**, they strengthen AI autonomy and reduce dependence on foreign cloud providers and proprietary black-box APIs.

- Supporting local open innovation: The AI Factories are designed to provide equitable access to top-tier computing power for startups and SMEs. Access programmes will prioritise **projects that release models, tools or benchmarks under open licences**, so that public investment in compute translates into reusable open-source assets for the wider European ecosystem.

Source: European Commission

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The EU’s ambition in the global AI era

Making a difference in societal values, training data, and ethical AI

EU rules: a window for truly open AI

Open-Source AI benefits from regulatory flexibility, provided models remain non-high-risk and non-commercial

The AI Act establishes some criteria that allow open-source AI models and systems to benefit from specific exclusions or exemptions.

AI Act does not apply for many open-source AI systems
The AI Act does not apply at all for AI systems released under free and open-source licences. It only applies for such systems placed on the market - or put into service – that are high-risk, prohibited (article 5 of the Act) or have transparency obligations (article 50).

Third-Party Providers exemptions
Developers of open-source tools, services, or components (excluding GPAI models) used by others in high-risk systems are exempted from certain obligations along the AI value chain..

GPAI Model exemptions
Open-source GPAI model providers are exempt from obligations to produce technical documentation if their model does not pose a systemic risk.

EU representation requirement exemptions
The AI Act formally recognises open-source AI, facilitating its adoption in public and regulated sectors. Developers can build with greater confidence, knowing they are part of a compliant, trustworthy ecosystem.

Important note
- To be considered as released as free and open-source, the models and systems should not be monetised.

What this means for Open Source developers

Legitimacy & scaling opportunities
The AI Act formally recognises Open-Source AI, encouraging its adoption in public and regulated sectors. Developers can build with greater confidence, knowing they are part of a compliant, trusted ecosystem.

Shaping the ecosystem
With fewer obligations, open-source actors have a unique chance to lead on responsible design and tooling. Today, open-source providers may establish the de facto standards for others.

Monetisation vs. openness
Exemptions apply solely to genuinely open models. Monetisation (even indirect) activates full compliance obligations.

Compute threshold as a limiting factor
Models exceeding 10^{25} FLOPs lose exemptions, regardless of openness. Developers must monitor growth and establish internal governance early.

Global relevance
Compliance unlocks access to EU markets and public procurement. Aligning with EU rules strengthens global competitiveness and trust.

Source: analysis based on artificialintelligenceact.eu, digital-strategy.ec.europa.eu and other sources

Balancing innovation, compliance, and ethics in EU Open-Source AI

Societal values

EU approach

- The EU emphasises AI that aligns with democratic values: fairness, inclusiveness, transparency, and respect for fundamental rights.

Open-source models

- Open-source models can more effectively adapt to local contexts and foster civic engagement.
- By being auditable and community-driven, they are regarded as potential facilitators of democratic control and digital sovereignty.
- However, both open and closed models risk reinforcing bias or undermining oversight if they are not properly governed.

Training Data

EU approach

- The EU AI Act requires training data to be relevant, representative, and free from discriminatory bias.
- Transparency and documentation are vital, particularly for high-risk systems.
- Datasets must adhere to GDPR and copyright laws to guarantee lawful processing.

Open-source models

- Open models frequently reveal data sources, fulfilling EU demands for transparency.
- Community-driven auditing helps identify issues in data quality and bias.
- However, many open models still depend on web-scraped data that lacks curation, raising compliance concerns.
- The amount of computing power also needs to be significantly increased across the region. To enable open source to be more widely adopted by SMEs, everyone must be able to fully utilise the technology's potential.

Trustworthy AI

EU approach

- The EU promotes "trustworthy AI" based on safety, human oversight, and accountability.
- The AI Act establishes a risk-based framework with more rigorous rules for models that pose a systemic risk. AI that poses unacceptable risks is prohibited.
- Models that pose unacceptable risks to rights or democracy should be restricted or prohibited.

Open-source models

- Open models provide transparency and reproducibility, essential for ethical assessment.
- Community scrutiny can promote ethical innovation and shared safety practices.
- Open-source ecosystems presently lack formal governance structures or enforceable safety standards. This complicates ensuring consistent ethical compliance.

Source: analysis based on artificialintelligenceact.eu, digital-strategy.ec.europa.eu and other sources

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The commoditisation of AI models

As Gen AI becomes commoditised, Europe's opportunity can also lie in capturing value through open innovation, infrastructure, and strategic application

The rising cost of model training

Escalating training costs, diminishing differentiation

Training state-of-the-art AI models now requires millions – or even hundreds of millions – of euros. Proprietary models like GPT-4 and Gemini are estimated to cost over €100 million to train, driven by huge model sizes and compute needs.

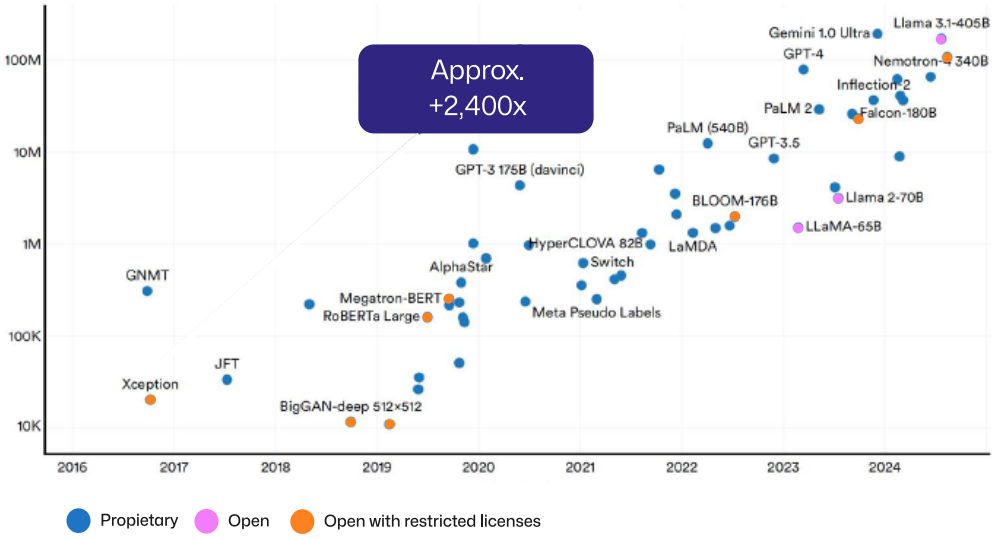
Open-source models are also costly but significantly less than proprietary equivalents. Meta's LLaMA 2 (70B) reportedly cost €2.7–3 million, while DeepSeek-V3 required an estimated €5–6 million.

These organisations reduce costs by reusing architectures, adopting efficient techniques like FP8 training, and leveraging subsidised or academic compute infrastructure.

Ironically, the global race to build increasingly powerful general-purpose models may speed up their own commoditisation and reduce their returns.

As leading players invest resources in scaling architectures and datasets, performance across top-tier models is starting to converge.

Estimated Training Cost of Frontier AI Models – 2016-2024, USD



"Training an AI model today costs around $100 million, but there are models in training today that are more like a billion. I think we'll go to $10 or $100 billion, and I think that will happen in 2025, 2026, maybe 2027."

Dario Amodei,
Anthropic CEO

Source: Epoch AI via Nestor Maslej et al., 'The AI Index 2025 Annual Report,' AI Index Steering Committee, Stanford HAI (4/25); In Good Company podcast (6/24)

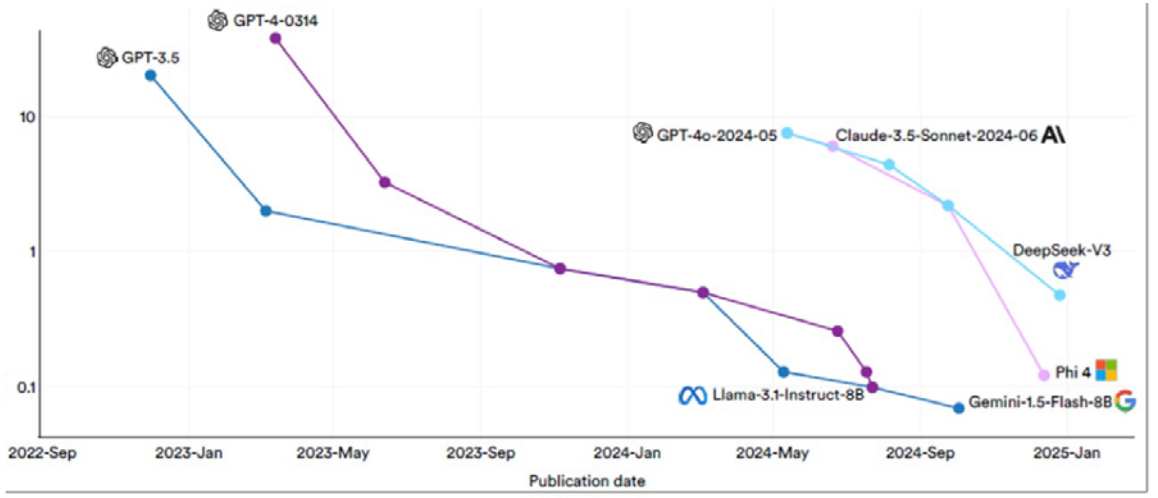
Converging performance is accelerating commoditisation

As models' performance level out, commoditisation speeds up

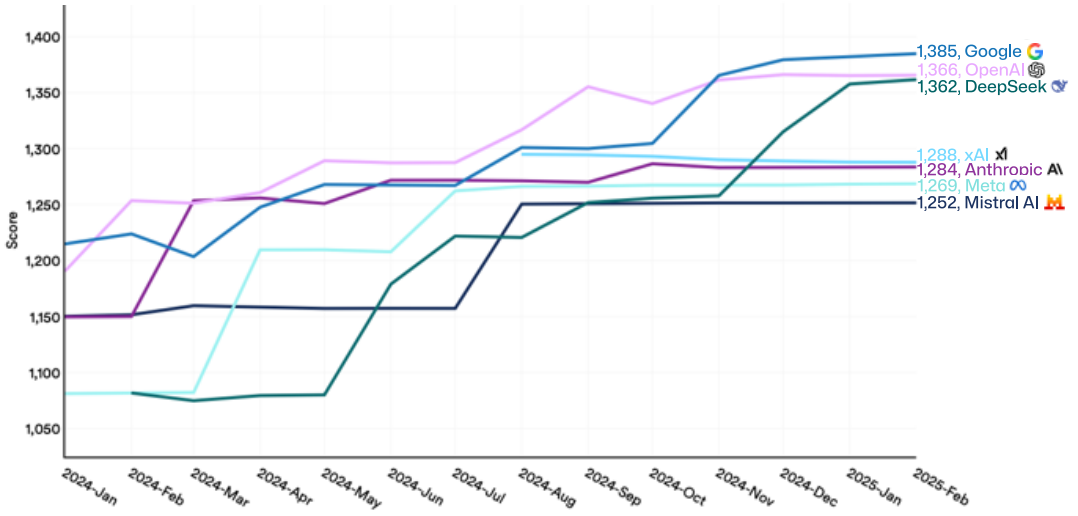
Inference costs refer to the compute and energy needed to generate outputs (e.g., answering a prompt). These costs are paid by those who run the model—typically cloud providers, enterprises, or startups—and are passed on to users through subscription fees, API charges, or embedded service costs. Newer open-source models are optimised to deliver high performance with fewer computational resources. The inference cost of using general-purpose models is decreasing rapidly.

At the same time, AI model performance is converging quickly. According to Stanford HAI, results from the LMSYS Chatbot Arena—a platform where users compare chatbots in blind tests—show that leading open-source and proprietary models now perform similarly across many tasks. In common use cases like summarisation or data extraction, the practical performance gap between top models has narrowed. As a result, developers are discovering that high-cost models are often unnecessary for reliable output.

AI Inference Cost per 1 Million Tokens for customers (2022-2025)



Performance of Top AI Models on LMSYS Chatbot Arena –1/24-2/25



Source: Nestor Maslej et al., 'The AI Index 2025 Annual Report,' AI Index Steering Committee, Stanford HAI (4/25)

AI transitions from premium to commodity

The 99% collapse in inference costs

The decline in AI inference costs—from approximately 20 USD per million tokens in late 2022 to just 7 cents in late 2024—represents a 99.7% drop. This significant reduction demonstrates how AI has rapidly shifted from premium infrastructure to a lower-cost utility, emphasising the commoditisation of foundational models. Two main factors explain this cost collapse:

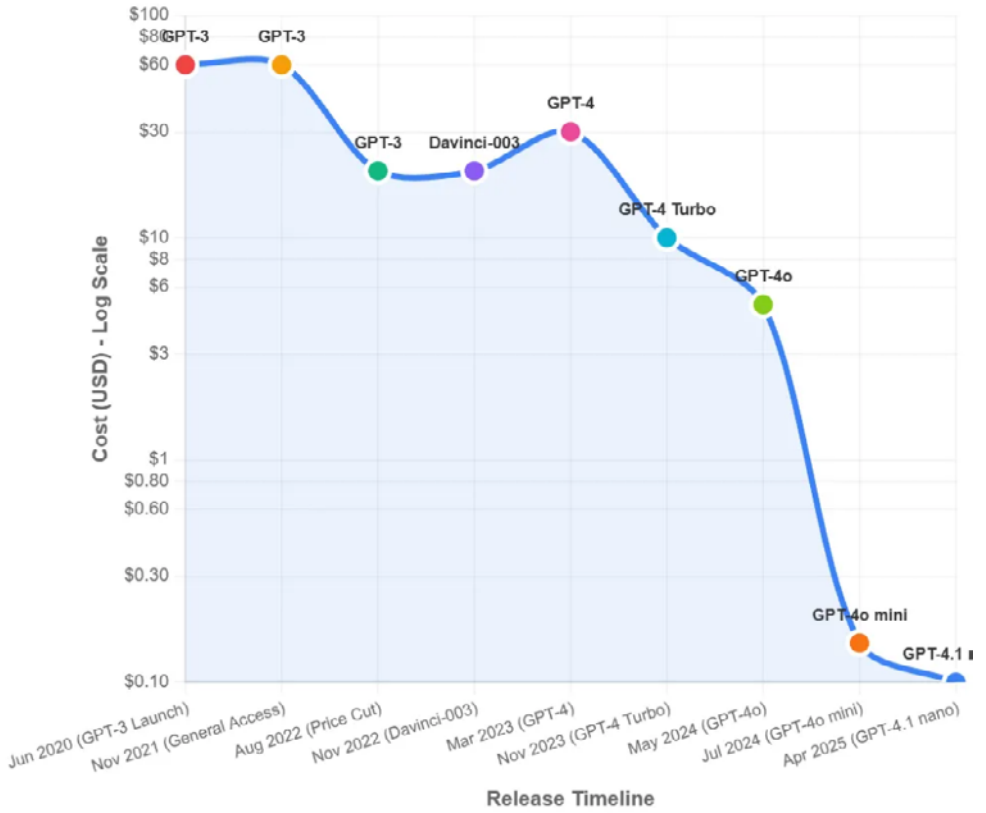
- **Model efficiency gains** – Models like LLaMA 3 and Mistral are architected to deliver strong performance with fewer parameters and optimised computation, significantly reducing the resources required per output.
- **Hardware advancements** – AI chips have evolved rapidly. For instance, NVIDIA's 2024 Blackwell GPU delivers inference with up to 105,000× greater energy efficiency per token than its 2014 Kepler predecessor.

Unlike training costs (which involve teaching the model using large datasets), inference occurs every time the model is used in real time.

While the cost per token is decreasing, the total cost of inference is rising sharply due to surging demand and increased usage volume. This makes inference the main operational expense of large-scale AI deployments.

As inference becomes cheaper and more efficient, competition among LLM providers intensifies – not only on accuracy but also on latency, uptime, and cost-per-token.

AI Inference Cost per 1 Million Tokens (2020–2025, in USD)



Graph Source: "The smart second mover", L. Garicano, Siliconcontinent, July 2025

Business model and profitability of open-source models

Open access, indirect returns: how Open-Source AI monetises the ecosystem

Open-Source AI models such as DeepSeek, Mistral, and LLaMA are released under permissive licences, enabling free access to their architecture and weights. Instead of monetising the models directly, developers generate revenue by creating an ecosystem around them.

Primary revenue sources include:

- **Hosted APIs and infrastructure services** enable enterprises to utilise open models without managing the backend. Hugging Face offers free model access but earns revenue by charging for managed inference APIs and enterprise collaboration tools
- **Fine-tuning, integration, and support services**, particularly in regulated or complex sectors.
- **Dual or tiered licensing**, where models are free for research but require commercial licences for enterprise deployment.
- **Sponsorships or grants**, many open models emerge from academic labs, non-profits or community projects rather than profit-driven startups. Similar to DeepSeek, which a hedge fund backs to drive ecosystem presence.

Despite the transparency, profitability remains achievable through low-cost models and widespread adoption. Models like DeepSeek-V3 cost less than $6 million to train – significantly less than proprietary equivalents – enabling viable margins via scaled services and enterprise deployment.

However, competition is fierce, and margins are more limited compared to closed models. Sustainability often relies on ecosystem influence rather than on model exclusivity.

Source: Analysis based on BOND – AI Trends report 2025 and other sources

deepseek

DeepSeek provides open weights under a community licence and monetises primarily through high-efficiency inference services, enabled by FP8 optimisation and low serving costs. Its training data is largely Chinese-language, which may require additional alignment for European use.

Revenue sources:
- High-volume, low-cost inference services
- Enterprise integrations and deployment support

Hugging Face

Hugging Face reports operating profitably despite offering extensive free tooling, supported by strong enterprise demand and a global team of around 220 staff.

Revenue sources:
- Inference API subscriptions
- Enterprise Hub: managed hosting, security, and support
- Partnerships and cloud credits with AWS, Azure, and others

MISTRAL AI_

Mistral combines open-weight releases with premium services, offering high-speed inference and enterprise-ready deployments.

- Revenue sources:
- High-performance paid API
- Enterprise partnerships and fine-tuning services
- Commercial licences for gated models

Business model and profitability of proprietary models

Proprietary leaders scale rapidly–but none are yet profitable

In the case of proprietary AI developers, such as OpenAI, Anthropic, and Google Gemini–their business models focus on direct monetisation of access, usage, and integrations, with stricter control over intellectual property and data pipelines.

Primary revenue sources include:

- **API access and subscriptions**, such as OpenAI's GPT-5 pricing, with metered usage (tokens) and enterprise plans.
- **Platform integrations**, including Microsoft Copilot, Amazon Bedrock, or Claude embedded in Notion, Slack, and others.
- **Vertical SaaS applications**, embedding models into productivity, legal, finance, and customer service tools.
- **Cloud partnerships**, as seen in exclusive infrastructure deals (e.g. OpenAI–Microsoft Azure; Anthropic–Amazon AWS) that bundle model access with compute sales.
- **Enterprise licensing and custom deployments**, offering model fine-tuning, data control, and compliance guarantees.

The main obstacle to profitability is the cost of computing (for both training and inference), which is not compensated by current pricing models or user growth.

These models require significant capital to develop and operate (GPT-5 is estimated to have cost over €500M per train). Although current revenue increases rapidly due to rising enterprise demand, profitability hinges on maintaining low inference costs and attracting high-volume, high-value users.

Source: Analysis based on BOND – AI Trends report 2025 and other sources

OpenAI

Revenue sources:
- ChatGPT Plus ($20/month) and GPT-4 API usage
- Enterprise contracts (e.g. ChatGPT Enterprise)
- Strategic partnership with Microsoft (Copilot, Azure)

Not profitable due to high R&D and compute costs. Heavily backed on August 2025 with $8.3B investment at $300B valuation.

ANTHROP\C

Revenue sources:
- Claude Pro subscriptions (e.g. $20/month for individuals)
- Claude API access, used by Notion, Quora (Poe), Slack
- Amazon partnership, with Anthropic committing to use AWS for training and deployment

Not profitable, but scaling rapidly; targeting enterprise use and benefiting from strategic cloud bundling, with a last funding round or $13B in September 2025.

Gemini

Revenue sources:
- Integration in Google Workspace: Gemini powers Docs, Gmail, etc., under a premium subscription
- Gemini API via Google Cloud
- Vertical offerings, such as model-powered developer tools and data analytics

Google does not disclose standalone Gemini profitability. Likely subsidised by broader Google Cloud revenue.

How AI revenue models are evolving

The next revenue layer: emerging trends in AI monetisation

Despite rapid revenue growth, the current monetisation mode, focused on core model access, remains difficult to sustain at scale. Open-source AI models prove that training costs and inference expenses can decrease, creating pricing pressures in the market. Simultaneously, the LLM landscape is fragmenting: compact, fine-tuned models for specific use cases (e.g., OpenEvidence in health).

In this environment, profitability will increasingly rely on shifting value towards services, infrastructure, and applied solutions. Key trends include:

- **Hybrid monetisation models:** Open-weight models will increasingly be paired with paid services – e.g. APIs, fine-tuning, hosting – creating a dual strategy of broad reach and revenue generation. Proprietary players may adopt "freemium" tactics to expand adoption.
- **Licensing evolution:** We may see more "semi-open" models (e.g. RAIL, commercial-use clauses) that protect value while enabling open innovation.
- **Cloud ecosystem integration:** Cloud platforms (AWS, Azure, Scaleway, OVHcloud) are becoming distribution and monetisation hubs for both open and closed models. This reinforces infrastructure-as-a-service as the dominant revenue layer.
- **Efficiency as a business edge:** Future profitability will hinge on models that deliver competitive performance with lower training and inference costs.
- **Market segmentation & convergence:** Open models will grow in sectors valuing flexibility, transparency and cost control. Proprietary models may dominate regulated, compliance-heavy contexts. But the boundaries are blurring: enterprises increasingly integrate open models via third parties, while proprietary providers release select tools or data.
- **Application-layer monetisation:** Value is moving "up the stack" – toward domain-specific fine-tuned models, AI-native SaaS, and vertical solutions. Open-source models may become infrastructure, with monetisation shifting to those who apply them best.

Decreasing costs and mounting pricing pressures mean open-source AI can no longer compete merely on being "free." It must compete on being uncontrollable by big tech.

Will providers try to build horizontal platforms?
Will they dive into specialized applications?
Will one or two leaders drive dominant user and usage share and related monetization, be it subscriptions, digital services, ads, etc.?

Only time will tell. In the short term, it's hard to ignore that the economics of general-purpose LLMs look like commodity businesses with venture-scale burn."

BOND

Trends – Artificial Intelligence
BOND Capital Special Report
May 2025

Source: Analysis based on BOND – AI Trends report 2025 and other sources

CASE STUDY:

Too Good to Go

Solving the partner retention

Context and scale
Too Good To Go, a prominent European platform dedicated to the mitigation of food waste, facilitates a marketplace connecting bakeries, grocery retailers, and catering entities with consumers seeking surplus inventory at reduced rates. It counts with over 100 million registered users and maintains partnerships with nearly 200,000 active vendors. To date, this initiative has successfully diverted over 400 million meals from the waste stream,

The challenge: partner retention
Despite its widespread adoption, the organisation encountered difficulties regarding vendor retention. Specifically, when partners ceased supply or departed the platform entirely, the existing analytical frameworks were insufficient for identifying the root causes. The internal processes for diagnosing this 'churn' were deemed inefficient, lacking the depth required to formulate effective retention strategies. Consequently, the organisation identified a strategic imperative: to qualitatively analyse the interactions between the sales team and dormant vendors. These communications were viewed as critical data repositories capable of informing product development and marketing refinements.

The solution: Mistral AI
To address this deficiency, Too Good To Go endeavoured to build a bespoke solution utilising the Large Language Models (LLMs) developed by Mistral AI, the Paris-based open-weights laboratory. The objective was to systematically analyse and categorise the reasons for vendor attrition. The decision to deploy Mistral AI was predicated on three core competencies: (1)Multilingual Support; (2) Categorisation efficacy; and (3) Coste efficiency. Also a primary driver for the selection of an EU-native model was the assurance of data governance. Daniel Redgate, Product Analytics Lead at Too Good To Go, highlighted the confidence derived from utilising a sovereign system.

The implementation of the Mistral AI architecture has yielded substantial operational insights. Most notably, the automated analysis revealed a previously unidentified cohort of vendors. The AI analysis indicated that approximately 20 per cent of the analysed tickets belonged to a completely new category of stores. This discovery has necessitated a fundamental rethinking of the onboarding approach.

5

Recommendations

Key findings and recommendations

Key Findings

Europe boasts world-class research institutions, a collaborative developer community, and strong values around transparency and ethics. However, challenges persist. The EU accounts for only 5–10% of global open-source models, has secured just $1.7 billion in startup funding compared to $17 billion in the US, and, despite improvements, it still needs to work on compute access and talent readiness.

Adoption and Implementation Issues

- Funding and compute access: EU startups receive ten times less capital than US counterparts, and 10% of startups cite limited HPC access as a major barrier.
- Differentiation: As model performance converges, Europe's advantage lies not in frontier model size but in trustworthy, domain-specific, and multilingual AI aligned with its industrial base.
- Adoption gap: Only 14% of EU firms used AI in 2024, significantly below the 75% target for 2030. The challenge is particularly acute for small enterprise (1-49 employees) where 11% had used AI in 2024.

Taking this as the overall context of the report, it is possible to highlight three key findings that the recommendations ahead will try to address:

Finding 1	Finding 2	Finding 3
EU-level investment and compute access must be scaled to avoid long-term dependency on foreign models and infrastructure.	Europe can differentiate globally through AI diffusion in niche and regulated domains.	To accelerate AI adoption, especially for SMEs, the EU needs to boost public procurement of open-source AI, increase SME adoption of open-source AI and continue expanding AI Skills programmes.

Finding 1:

EU-level investment and compute access must be scaled to avoid long-term dependency on foreign models and infrastructure

↓

The EU contributes only 5–10% of global open-source models, and EU open-source AI startups raised just €0.5B compared to €10B in the US in 2024. Combined with limited compute access, this leaves Europe dependent on foreign models and infrastructure, constraining sovereignty and competitiveness.

Adoption and Implementation Issues

- **Critical funding disparity:** EU open-source AI startups receive 20× less capital than their US counterparts, limiting their ability to scale globally.
- **Compute bottlenecks:** Startups cite lack of HPC access as a top challenge, despite new EuroHPC and AI Factories investments.
- **Venture capital risk aversion:** European investors hesitate to back high-risk, long-term open-source projects.

Recommendations

Finding 1:
Key actions (1/2)

Scale EU-level investment:

- The recent announcement by the Commission of the Scaleup Europe Fund responds to the urgent need for Europe to boost investments in scaleups and close the gap with global leaders. Building on this initiative, the EU Commission should include within this framework a specific sub-vehicle oriented towards AI, including open-source AI.
- The European Commission should establish a dedicated open-source AI track in the next EU's Multiannual Financial Framework, similar to the EIC Green Deal pilot..
- The European Commission should leverage the existing public–private Joint Undertaking programs, to launch open-source pilots in areas such as Health, pharma, mobility and Bio-based tech.

Create Early Markets via procurement

- The European Commission and Member States should reserve a minimum of 5% of its ICT procurement budgets (~€1–2B annually) for open-weight/open-API solutions.
- The European Commission should reinforce the plan outlined in the Apply AI Strategy to launch major EU-wide competitions to develop open frontier AI models that drive innovation..

Recommendations

Finding 1:
Key actions (2/2)

Expand compute access:

- Fund 100+ regional compute micro-clusters for European Digital Innovation Hubs (EDIHs) to allow local prototyping before scaling to EuroHPC systems.
- Member States should extend R&D tax relief to explicitly cover AI compute and storage costs when results are released open-source.

Create AI Sovereignty initiatives

- European Commission along with Member States should create a €2B+ AI Sovereignty Fund focused on open LLMs, multilingual models, and energy-efficient inference.
- Open an EIF "Open Source AI Growth Window" to co-invest with VCs backing open-weight AI startups.
- Member States should introduce an "Open AI IP Box" to reduce effective tax rates on revenue from EU-developed Open-Source AI models.

Finding 2:

Europe can differentiate globally through AI diffusion in niche and regulated domains

↓

As the performance of proprietary and open-source AI models converges and costs collapse (99.7% drop in inference costs since 2022), Europe's advantage does not necessarily have to come from chasing frontier model size but from developing open, domain-specific, trustworthy, and multilingual applications tailored to its industrial base

Adoption and Implementation Issues

- **Commoditisation pressure:** As general-purpose LLMs converge in performance, new entrants risk being undifferentiated.
- **Sectoral opportunities:** Europe's industrial strengths in healthcare, manufacturing, legal, and finance remain underserved by global incumbents.
- **Compliance-driven demand:** GDPR and the AI Act create natural demand for explainable, transparent, and multilingual AI.

Finding 2:
Key actions

Support vertical AI Diffusion:

- Create sectoral accelerators (e.g., OpenHealthAI) under GenAI4EU, combining computing power and regulatory guidance.
- Mobilise EDIHs to prioritise Open-Source AI models for their Test Before Invest actions.
- Publish sector starter kits from the AI Office, including a reference open model, connectors, and a compliance checklist.

Move "up the stack":

- The European Commission should coordinate, along with Member States and national agencies, the publication of interoperability standards for APIs and data formats in ERP, PLM, and EHR systems, ensuring open-source AI applications integrate seamlessly.
- Member States should provide 3-year tax credits or micro-grants for SMEs building open-source connectors to enterprise platforms (SAP, Siemens Teamcenter, Epic).
- Require EU-funded reference stacks (e.g., EHR-AI assistants) to be published under the EU Public License for open reuse.

Build sectoral data spaces:

- Fast-track Common European Data Spaces (health, manufacturing, mobility) with AI-ready open licensing templates by 2027.
- Develop EU-wide model contributor agreements for safe-to-share industrial and clinical data, aligned with GDPR and the Data Act.
- Fund public–private consortia (e.g., those involving large European Corporates + SMEs + large European Research institutes) to train benchmark open models on sectoral datasets, replicating models like ELIXIR in life sciences.

Finding 3:

To accelerate AI adoption, especially for SMEs, the EU needs to boost public procurement of open-source AI, increase SME adoption of open-source AI and continue expanding AI Skills programmes

↓

Only 14% of EU firms used AI in 2024, far below the EU's 75% adoption target for 2030. SMEs, in particular, struggle due to high compliance costs and a lack of skilled AI talent

Adoption and Implementation Issues

- **Low demand:** Only 14% of EU firms used AI in 2024, far from the 75% target by 2030. SMEs are especially constrained.

Finding 3:
Key actions

Expand AI Skills:

- The European Commission and Member States should leverage the AI Skills Academy to deliver training opportunities to SME engineers, midcareer workers, and civil servants that have a strong focus on Open-Source AI.
- Member States should extend R&D tax credits to certified AI training programs, enabling firms to deduct training costs.
- Require European Digital Innovation Hubs (EDIHs) to run quarterly “AI Integration Bootcamps” where SMEs deploy open models on their own datasets.

Boost SME adoption:

- Build Trusted AI Integrator Networks, accrediting 10–20 SME-focused providers per Member State via European Digital Innovation Hubs (EDIHs).
- The European Commission along with Member States should extend AI-on-Demand platform to include a sector-based SME front door, offering vetted open-source tools, accredited integrators, and plain-language guidance.

Lead by example in procurement:

- The European Commission and Member States should introduce an open-first procurement rule, reserving at least 10% of EU and Member State AI tenders for open stacks (open-weights, open APIs).
- The European Commission and Member States should recommend to include exit strategy clauses in all public AI contracts (open APIs, standard export formats, vendor exit plans) to avoid lock-in.
- Run multi-city pilots (e.g., citizen-service assistants), publishing results under the EU Public License for reuse across Member States.

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