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Abstract

This chapter analyzes the evolution of global collaboration networks that drive innovation in artificial intelligence (AI). Historically, AI research emerged within academic institutions and was coordinated through professional societies, conferences, and scholarly journals that shaped the intellectual foundations of the discipline. For several decades, progress remained largely within academic circles due to the limited industrial applicability of early machine learning methods. However, technological breakthroughs in computer vision and natural language processing during the 2010s transformed AI into a production-grade technology, triggering an unprecedented wave of industrial investment and international collaboration. As a result, the global architecture of AI innovation shifted from university-centered exploration toward a hybrid ecosystem dominated by large technology firms, open-source communities, public-private partnerships, and sovereign infrastructure initiatives. Drawing on contemporary reports and strategic roadmaps, this chapter traces the institutional evolution of AI collaboration from academic societies such as AAAI, ACM SIGAI, and IEEE Computational Intelligence Society to multi-stakeholder alliances including the Partnership on AI and the Frontier Model Forum. It also examines the empirical shift in research leadership, where industry produced nearly 90 percent of notable AI models by 2024, reflecting the growing importance of compute infrastructure, large datasets, and specialized engineering capabilities. The chapter further situates these developments within a geopolitical context, analyzing national AI strategies introduced across major economies and the emerging competition over infrastructure, talent, and regulatory frameworks. Finally, the chapter evaluates the emergence of international governance initiatives aimed at harmonizing safety, ethics, and responsible AI development. The analysis concludes by highlighting the tension between accelerating global innovation networks and the parallel pursuit of national technological sovereignty.

Keywords

Artificial Intelligence Collaboration, Innovation Networks, AI Governance, National AI Strategies, Technological Sovereignty

Introduction

The term AI originated in academic circles. Fundamental research defining the field, and building the foundations was also driven by academic institutions. The field struggled to gain traction in industrial circles in the pre-2010 era due to the limited success of machine learning in solving fundamental vision, language, planning, perception, and learning problems. The circle of diminishing returns was broken, first by advances in vision models circa 2010–2012 (Russakovsky et al., 2015), later by language models in 2022 (Ouyang et al., 2022), and subsequently by vision-language models (Radford et al., 2021). This led to a flourishing interest in the industry, followed by the formation of collaborative and innovative networks, as well as regulatory bodies.

The contemporary global architecture of AI innovation reflects a profound transformation from scientific exploration to production-grade industrialization. In the early decades of AI research, innovation emerged primarily from university laboratories and publicly funded research programs. Academic communities organized themselves through professional associations, conferences, and peer-reviewed journals that established the intellectual norms of the field. Over time, however, the increasing computational requirements of machine learning and the availability of massive digital datasets shifted the locus of innovation toward technology corporations capable of sustaining large-scale infrastructure investments.

This chapter argues that global AI innovation has historically originated in academic hubs but has gradually transitioned toward industrial consortia, open-source ecosystems, and sovereign infrastructure networks supported by national governments. The following sections examine this transformation by analyzing the institutional evolution of AI collaboration, the empirical shift in research leadership toward industry, the emergence of national strategies shaping geopolitical competition, and the development of global governance frameworks seeking to harmonize safety and ethical standards.

1. The Genesis of AI Collaboration: From Academic Dominance to Multi-Stakeholder Ecosystems

The structural evolution of AI research can be understood as a gradual shift from tight-knit academic communities to expansive, cross-sector alliances. Hence, we first examine the foundational era in the academic circles.

1.1. The Historical Emergence of Academic Professional Societies

The earliest clustering of AI research started in academic institutions, with the MIT AI Lab leading the pack, followed by Stanford, and other institutions that launched AI/robotics-intensive projects (Table 1). Precise dating of institutions is rather complicated, since many projects that eventually led to the establishment of formal labs/institutes preceded them by several years.

Research proposals, algorithms, and theoretical frameworks produced within these institutes competed through conference submissions and journal publications (Jordan & Mitchell, 2015). The most promising approaches survived through replication and adoption by other laboratories. This process helped formalize methodological standards while also creating a global network of researchers who shared common evaluation benchmarks and datasets.

Table 1

The Chronological List of the Earliest AI Labs from Academic Circles

Lab	Year	Notable Project	Impact
MIT AI Lab (The MIT AI Project)	1959	LISP Language	Created the "standard" AI coding language for decades.
Edinburgh	1963	Freddy the Robot	Pioneer in robotic object recognition.
Stanford Artificial Intelligence Laboratory (SAIL)	1963	Stanford Cart	Early roots of self-driving car technology.
Carnegie Mellon University (CMU)	1965	Logic Theorist	Proved AI could handle symbolic mathematical logic.
Stanford Research Institute (SRI) Artificial Intelligence Center (AIC)	1966	Shakey the Robot	Combined computer vision, NLP, and navigation.

During the formative decades of artificial intelligence research, academic professional societies played a decisive role in structuring the global research community. Organizations such as the Association for the Advancement of Artificial Intelligence (originally American Association for Artificial Intelligence, AAAI), the Association for Computing Machinery's Special Interest Group on Artificial Intelligence (ACM SIGAI), and the IEEE Computational Intelligence Society established the intellectual infrastructure necessary for a coherent scientific discipline (see Table 2). These institutions organized conferences, facilitated peer review, and maintained scholarly journals that allowed new ideas to undergo rigorous evaluation.

Table 2

Professional Associations and Societies in AI, Some of Which Originated as Informal Committees (*)

Organization	Year Est.	Primary Focus
ACM SIGAI	1966	**Academic Foundation:** One of the oldest AI groups; manages the bridge between general computer science (ACM) and AI research.
IAPR	1972/78*	**Pattern Recognition:** An international federation of societies focused on image processing and pattern recognition. (IAPR, n.d.)
CAIAC	1973	**Canadian AI:** Founded as CSCSI.
AAAI	1979	**Advancement of AI:** The premier global society for promoting the scientific understanding of intelligent behavior.
EurAI	1982	**European AI:** A "society of societies" that coordinates AI research and the ECAI conference across Europe.
JSAI	1986	**Japanese AI:** A major hub for robotics and symbolic AI research in the Asia-Pacific region.
IEEE CIS	1987/89*	**Computational Intelligence:** Focuses on biologically inspired AI (Neural Networks, Fuzzy Logic, and Evolutionary Computing).
PRICAI	1990	**Pacific Rim AI:** A regional society focused on fostering AI development and collaboration in the Pacific Rim countries.

The central venues of knowledge production were academic conferences such as NeurIPS, ICML, and CVPR. These events functioned as the primary meeting points for the international AI community, where breakthroughs were presented and debated. Alongside these conferences, specialized journals (e.g., Artificial Intelligence Journal; Journal of Machine Learning Research; IEEE Transactions on Pattern Analysis and Machine Intelligence; Machine Learning Journal) provided a record of the field's intellectual development.

However, while these focused on the 'engine' of AI, venues like IUI (Intelligent User Interfaces), UIST (User Interface Software and Technology), and CSCW (Computer Supported Cooperative Work) were instrumental in closing the gap between humans and computers. By integrating machine learning with human-centric design, these conferences pioneered the transition from AI as a back-end process to AI as an interactive partner, hence transforming raw computational power into intuitive tools for collaboration, accessibility, and creativity. Table 3 indicates a wider list of notable conferences and events.

Table 3

Major Conferences and Events Shaping Theoretical and Applied AI Research

Conference	Year Est.	Primary Focus
ACL	1962	**Natural Language Processing:** The premier venue for computational linguistics and language modeling, first meeting in 1963.
AAAI	1980	**General AI:** One of the oldest venues covering the full spectrum of AI, from logic to robotics.
ICML	1980	**Machine Learning:** A foundational venue for algorithmic ML research and theory.
CVPR	1983	**Computer Vision:** The leading conference for image and video recognition and processing.
CSCW	1986	**Collaborative AI:** Focuses on how technology and AI support group work and social interaction.
NeurIPS	1987	**Neural Systems:** The premier event for deep learning, neural networks, and advanced ML.
UIST	1988	**Interface Tech:** Focuses on the software and hardware innovations that enable human-computer interaction.
IUI	1993	**Intelligent Interfaces:** The primary bridge where AI meets HCI to create adaptive, smart user experiences.
EMNLP	1996	**Empirical NLP:** Specialized in data-driven and statistical approaches to language processing.
ICLR	2013	**Representation Learning:** A top-tier venue specifically focused on deep learning and feature learning.
FAccT	2018	**AI Ethics:** Crucial for research into Fairness, Accountability, and Transparency in algorithmic systems.

Shifting attention to the end users of the technology made it clear that the theoretical orientation of early AI research also imposed limitations. Many algorithms performed well in controlled laboratory conditions but struggled when deployed in real-world environments characterized by noisy data and computational constraints. As a result, many research and practical questions regarding the use of AI in actual settings were posed and studied in these circles as early as the 80s and 90s.

1.2. The Multi-Stakeholder Transition (2017–2025)

Industrial adoption remained limited until the convergence of three enabling factors: the availability of large-scale datasets, the rapid improvement of graphical processing units (GPUs), and the maturation of deep learning techniques.

Beginning in the late 2010s, the escalating demands for massive computational power ("compute"), specialized engineering talent, and hyperscale datasets fundamentally altered the trajectory of AI research. The global architecture of AI collaboration expanded beyond traditional academic silos to include multinational technology corporations, civil society organizations, open-source communities, and intergovernmental agencies.

One of the earliest signals of this transformation was the creation of hybrid research laboratories linking universities with large technology companies to share the financial and infrastructural burdens of modern machine learning. A notable example is the MIT-IBM Watson AI Lab, which successfully combined academic theoretical expertise with industrial engineering capacity. Similarly, Mila (The Quebec AI Institute) emerged as a leading deep learning research center, functioning as a nexus where academic researchers, industry partners, and startups collaborate to accelerate innovation. Other notable large-scale academic-industrial collaboration initiatives include Project Oxygen from MIT CSAIL, which also contributed substantially to closing the gap between the algorithmic and theoretical advances and the end users to create a user-centric AI theme.

The Rise of Specialized Institutes and Think Tanks

As AI systems began to demonstrate profound societal impacts, the research ecosystem diversified to include specialized institutes and think tanks dedicated to steering AI development toward the public good. These organizations largely bifurcated into two focus areas: social equity and existential safety.

On the human-centric and equitable front, organizations like Stanford HAI (Institute for Human-Centered Artificial Intelligence) and the AI Now Institute established rigorous, multidisciplinary research agendas focused on the social, economic, and political implications of algorithmic systems. Furthermore, the Distributed AI Research Institute (DAIR) pioneered community-rooted AI research, actively challenging the centralized, resource-intensive models dominated by Big Tech.

Simultaneously, the sheer capability of frontier models triggered the formation of institutes focused heavily on safety and risk mitigation. The Future of Life Institute (FLI) and the Center for AI Safety (CAIS) became prominent voices dedicated to reducing societal-scale and existential risks posed by transformative AI technologies. For example, FLI initiated the Asilomar AI Principles (Future of Life Institute, 2017), and the Pause Giant AI Experiments (Future of Life Institute, 2023) initiatives, and CAIS published the Statement on AI Risk (Center for AI Safety, 2023) and had it endorsed by leading voices. Meanwhile, the Allen Institute for AI (AI2) championed open and transparent engineering for the common good, while the Alan Turing Institute solidified its role as the UK's national hub for data science, bridging the gap between fundamental research and national security.

Global Coalitions and Intergovernmental Governance

To manage this sprawling, multi-stakeholder landscape, a new generation of global coalitions emerged. Private and hybrid alliances, such as the Partnership on AI (PAI), brought together fierce corporate competitors, academic institutions, and non-profits to promote best practices in responsible AI (Partnership on AI, 2024). Following the explosive growth of generative AI, the Frontier Model Forum was established specifically by leading developers of large language models to coordinate safety standards and red-teaming practices for the world's most capable systems.

However, the realization that self-regulation was insufficient quickly drew the attention of the international policy community. Intergovernmental bodies and supranational organizations mobilized to establish binding frameworks (OECD, 2019) and global norms (see Table 4). The OECD.AI Policy Observatory, (launched in 2020) became a critical node for data and multidisciplinary policy analysis (OECD, 2024), heavily influencing the Global Partnership on Artificial Intelligence (GPAI), which is an international initiative designed to bridge the gap between abstract AI theory and practical policy implementation.

Table 4

Key Organizations Driving the Multi-Stakeholder AI Ecosystem

Organization Category	Institution / Coalition	Primary Focus
Hybrid & National Institutes	Mila (Quebec AI Institute)	Leading deep learning research center bridging academia and industry.
	The Alan Turing Institute	The UK's national institute for data science and AI.
Human-Centric & Social Impact	Stanford HAI	Promotes human-centered AI design and multidisciplinary study.
	AI Now Institute	Policy research institute focused on implications of AI in the public interest.
	DAIR	Focuses on equitable, community-rooted AI research.
Safety & Open AI Engineering	Allen Institute for AI (AI2)	Dedicated to AI research and open-source engineering for the common good.
	Center for AI Safety (CAIS)	Nonprofit dedicated to reducing societal-scale risks from AI.
	Future of Life Institute (FLI)	Focused on steering transformative tech and mitigating existential AI risks.
Intergovernmental & Policy	OECD.AI Policy Observatory	Provides data, guidelines, and multidisciplinary analysis on AI policy.
	GPAI	International initiative bridging the gap between AI theory and practice.
	UNESCO AI Ethics Program	Spearheads the global Recommendation on the Ethics of Artificial Intelligence.

	UN Advisory Body on AI	Governing body focusing on international AI cooperation and alignment.
	WEF AI Governance Alliance	Unites industry leaders, governments, and academia to design governance frameworks.
European Regulatory Bodies	European AI Office	Oversee the implementation and enforcement of the EU AI Act.
	Council of Europe (CAHAI)	Committee focusing on human rights, democracy, and the rule of law regarding AI.
Industry Consortiums & Alliances	The AI Alliance	Led by IBM and Meta, championing open innovation and open science in AI.
	Frontier Model Forum	Formed by Anthropic, Google, Microsoft, and OpenAI to ensure safe development of frontier AI models.
	Partnership on AI (PAI)	Focuses on responsible AI development and best practices across industries.
	MLCommons	Standardizes AI benchmarking, datasets, and best practices globally.
	AI Verify Foundation	Led by Singapore's IMDA, focused on testing and governing AI systems.
	Coalition for Health AI (CHAI)	Focuses on trustworthy AI in healthcare.

Simultaneously, standard-setting initiatives like the UNESCO AI Ethics Program and the United Nations Advisory Body on AI worked to align AI development with fundamental human rights on a global scale (UNESCO, 2021). In Europe, this theoretical governance transitioned into hard law with the establishment of the European AI Office, tasked with overseeing the enforcement of the landmark EU AI Act (European Commission, 2024a), working alongside the Council of Europe Committee on Artificial Intelligence (initially CAHAI (2019-2021), followed by CAI (2022-2025) and CDNET (Council of Europe, n.d.). Finally, platforms like the World Economic Forum (WEF) AI Governance Alliance successfully united industry leaders with state actors, acknowledging that regulating modern AI requires the active participation of the corporations building it.

Research institutes and policy think tanks have further broadened the landscape. Institutions such as Stanford's Institute for Human-Centered Artificial Intelligence and the Alan Turing Institute produce interdisciplinary research examining both technological capabilities and societal implications. Intergovernmental organizations, including UNESCO and the OECD, contribute policy frameworks and ethical guidelines that influence national strategies and regulatory debates.

Taken together, these developments reflect the emergence of a multi-stakeholder ecosystem in which universities, corporations, governments, and civil society organizations interact within complex innovation networks.

2. AI Collaboration and Innovation Networks

As the multi-stakeholder ecosystem described in the previous section matured, it catalyzed the formation of highly specialized innovation networks. These networks have become complementary vehicles through which artificial intelligence is researched, developed, funded, and deployed. Unlike the isolated academic labs of the 20th century, contemporary AI innovation is characterized by decentralized, interdependent webs of collaboration. These networks can be broadly categorized by their operational models: open-source community development, geographically clustered public-private R&D, and commercial strategic alliances (see Table 5).

2.1. Open-Source Communities, Crowdsourcing, and Co-Creation

A defining feature of the modern AI landscape is the powerful countermovement to proprietary, closed-model development: the open-source and open-science ecosystem. This movement partly emerged from the need to demonstrate reproducibility and benchmarking of research. Platforms like Papers with Code, Hugging Face have emerged as central infrastructure hubs, enabling global researchers and developers to share, refine, and deploy machine learning models as well as massive benchmark datasets.

This democratization is further driven by decentralized collectives such as EleutherAI and LAION (Large-scale Artificial Intelligence Open Network), which provide the foundational open datasets and models that power much of the independent AI research sector. Complementing these are crowdsourcing networks like Omdena, DrivenData, and Africa-focused Zindi, which leverage global talent to solve real-world social and environmental challenges through collaborative AI development.

Furthermore, the boundary between developer and user has blurred, giving rise to "co-creation" networks. In communities like the Midjourney Discord, Civitai, and the GitHub Copilot Community, millions of users actively fine-tune models, generate reinforcement learning telemetry, and shape the evolutionary trajectory of the tools they use.

Table 5

AI Innovation Networks

Network Type	Notable Entities	Core Function & Focus
Open-Source & Platforms	Hugging Face, EleutherAI, LAION, LF AI & Data, OpenMined	Decentralized sharing of models, massive datasets, and privacy-preserving tools.
R&D & Collaborative Hubs	CLAIRE, ELLIS, NSF AI Institutes, BAAI	Pan-institutional frameworks pooling academic and state research capabilities.
Crowdsourcing & Challenges	Kaggle, Omdena, DrivenData, Zindi, Topcoder	Harnessing global data science communities to solve specific enterprise or social challenges.
Regional Clusters	Cyber Valley, Vector Institute, TÜBİTAK BİLGEM	Geographically concentrated ecosystems linking local universities, governments, and industries.
User Co-Creation	Midjourney Discord, Civitai, Runway ML, GitHub Copilot	Continuous model refinement driven by mass user feedback, fine-tuning, and telemetry.
Public-Private Partnerships	NAIRR, AI Singapore, EuroHPC, DARPA AI Exploration	State-backed initiatives providing sovereign compute infrastructure and strategic defense capabilities.
Strategic Alliances	Microsoft/OpenAI, Google/Anthropic, AWS/Hugging Face	Symbiotic corporate partnerships trading cloud computing power for frontier model access.
Supply Chain Ecosystems	NVIDIA Inception, Intel Liftoff, AWS AI Partner Network	Bridging hardware manufacturers, cloud providers, and early-stage AI startups.
Accelerators & Venture	Y Combinator, CDL, Techstars AI, AI Fund	Rapid commercialization, capital injection, and mentorship for scalable AI ventures.

2.2. Regional R&D Clusters and Public-Private Partnerships

While digital networks transcend borders, physical infrastructure and specialized talent remain geographically bound, leading to the rise of regional innovation clusters. Europe has aggressively pursued this model through confederations like CLAIRE and ELLIS, alongside localized super-hubs such as Germany's Cyber Valley, which links deep-tech academia with automotive and manufacturing industries. Similarly, Canada's Pan-Canadian Artificial Intelligence Strategy interlocks regional powerhouses like the Vector Institute, Mila, and Amii. In Türkiye, TÜBİTAK BİLGEM and ULAKBİM act as centralized national research hubs and resources driving strategic informatics and AI security.

Because training frontier AI requires prohibitive amounts of computing, Public-Private Partnerships (PPPs) have become essential. Initiatives like the National AI Research Resource (NAIRR) in the US and the EuroHPC Joint Undertaking in Europe pool government resources to democratize access to supercomputing infrastructure, ensuring that academic and independent researchers are not entirely priced out of the field by corporate hyperscalers. Other initiatives targeted innovation and startups (European Commission, 2024b).

2.3. Strategic Alliances, Supply Chains, and Accelerators

At the highest end of the computer and commercial spectrum, innovation is dictated by strategic alliances and joint ventures. The immense cost of training large language models has forced symbiotic relationships between frontier AI labs and cloud infrastructure providers. The Microsoft and OpenAI Partnership and the Google Cloud and Anthropic Alliance exemplify this trend, exchanging massive computing resources for exclusive commercialization rights.

To sustain the broader industrial ecosystem, supply chain networks like the NVIDIA Inception Program and Intel Liftoff provide early-stage startups with critical hardware access and technical expertise. This pipeline is actively fed by global incubator and accelerator networks such as Y Combinator, the Creative Destruction Lab (CDL), and Andrew Ng's AI Fund. These rapidly match technical founders with venture capital, domain experts, and enterprise integration opportunities.

By the mid-2020s, the industry had become the dominant producer of frontier artificial intelligence systems. Empirical analyses indicate that nearly 90 percent of notable AI models introduced in 2024 (Maslej et al., 2025) originated from corporate research laboratories rather than universities. This represents a dramatic increase from roughly 60 percent only a year earlier.

The explanation lies primarily in the extraordinary computational requirements of modern machine learning systems. Training state-of-the-art large language models and multimodal architectures requires thousands of high-performance GPUs or specialized AI accelerators, as well as extensive engineering teams capable of managing distributed training pipelines. These requirements exceed the capabilities of most academic laboratories, even those located at leading research universities.

Large technology firms therefore, occupy a structurally advantageous position within the innovation ecosystem. Their access to proprietary data, cloud infrastructure, and global engineering talent enables them to scale experiments at a pace that academic research environments cannot easily match.

3. Geopolitical Dynamics and National AI Strategies

This section examines how national governments have responded to the rapid industrialization of AI by framing the technology as a critical pillar of national security and global economic competitiveness. It explores the strategic roadmaps adopted, while analyzing the emerging tension between maintaining borderless innovation networks and securing national technological sovereignty.

3.1. National Roadmaps: United States, China, and the European Union

Major powers have increasingly framed artificial intelligence as a strategic technology with implications for economic competitiveness, national security, and technological sovereignty (Simon & Wagner, 2025). The United States has emphasized infrastructure leadership, research funding, and national security applications through a series of initiatives, including the American AI Initiative and subsequent legislative frameworks (National Science and Technology Council, 2023) (also see Table 6). Note that some the dates refer to formal announcements under a "strategy" or "roadmap" document, although many countries had task forces or initiatives laying the foundation for these roadmaps.

Table 6

AI Roadmaps and Strategy Documents by Date of Introduction

Country	Date Introduced	Name of Initial Strategy	Recent Updates / Notes
Canada	March 2017	Pan-Canadian Artificial Intelligence Strategy	First in the world; updated with new funding phases for 2021–2026.
Japan	March 2017	Artificial Intelligence Technology Strategy	Updated with the "AI Strategy 2022" focusing on national resilience.
China	July 2017	New Generation AI Development Plan	Set the aggressive goal of becoming the world's primary AI center by 2030.
United Arab Emirates	October 2017	UAE National Strategy for Artificial Intelligence 2031	Appointed the world's first Minister of State for Artificial Intelligence.

Country	Date Introduced	Name of Initial Strategy	Recent Updates / Notes
Finland	December 2017	Finland's Age of Artificial Intelligence	Pioneered a goal to teach 1% of its population the basics of AI.
France	March 2018	For a Meaningful Artificial Intelligence	Launched as part of "France 2030" with a second phase running 2021–2025.
India	June 2018	National Strategy for Artificial Intelligence	Branded as #AIforAll, focusing on social inclusion and developing economies.
Germany	November 2018	Artificial Intelligence Strategy (KI-Strategie)	Updated in 2020 and 2023 with a heavy focus on "Industry 4.0" and manufacturing.
United States	February 2019	American AI Initiative	Followed by the National AI Initiative Act (2020) and recent Executive Orders on AI safety.
Qatar	October 2019	National Artificial Intelligence Strategy for Qatar	Now heavily integrated into Qatar's "Digital Agenda 2030" (released 2024); focuses on transitioning to a knowledge-based economy and establishing localized AI guidelines.
Australia	November 2019	Artificial Intelligence Roadmap	Pivoted recently toward a "Safe and Responsible AI" regulatory framework.
Singapore	November 2019	National Artificial Intelligence Strategy	Upgraded to NAIS 2.0 in 2023 to heavily focus on systemic economic integration.
Saudi Arabia	October 2020	National Strategy for Data and AI (NSDAI)	Driven by SDAIA to support Vision 2030. Recently updated with a

Country	Date Introduced	Name of Initial Strategy	Recent Updates / Notes
			comprehensive "AI Adoption Framework" in 2024 to push KSA into the top 15 global AI nations.
Spain	December 2020	National Artificial Intelligence Strategy (ENIA)	Updated in 2024 to emphasize the use of the Spanish language in AI models.
Ireland	July 2021	AI - Here for Good	Emphasizes ethical, trustworthy, and human-centric design.
Türkiye	August 2021	National Artificial Intelligence Strategy 2021-2025	Recently updated with a 2024-2025 Action Plan to address generative AI and infrastructure.

China has pursued an ambitious national strategy through its New Generation AI Development Plan (State Council, 2017) and complementary industrial initiatives. These programs aim to integrate artificial intelligence across manufacturing, logistics, healthcare, and urban governance systems.

The European Union has adopted a regulatory-oriented approach that combines innovation funding with comprehensive governance frameworks. The EU AI Act and related initiatives seek to establish global standards for trustworthy and human-centric AI deployment.

3.2. Managing Decoupling: The "Smart Openness" Model

Despite growing geopolitical competition, scientific collaboration remains an essential driver of innovation. However, recent years have witnessed a measurable decline in co-authored publications between certain major powers, reflecting broader strategic tensions.

The concept of "smart openness" has therefore emerged as a concept that attempts to balance international collaboration with national security considerations. This model encourages cooperation in low-risk research areas while introducing transparency requirements and selective restrictions for technologies considered strategically sensitive.

4. Global Governance and Regulatory Harmonization

As artificial intelligence systems become increasingly powerful and widely deployed, international organizations have begun to explore mechanisms for coordinated governance. The United Nations has convened expert panels to assess the societal implications of AI, culminating in policy reports that emphasize safety, transparency, and equitable access to technological benefits (United Nations, 2024).

At the same time, as noted above, a global network of AI safety institutes has emerged across multiple countries. These institutions conduct technical evaluations of advanced models and collaborate on the development of standardized risk-assessment methodologies. At the same time, responsible AI has evolved from a peripheral research topic into a central component of technology governance (Zhang et al., 2021). Governments, corporations, and academic institutions increasingly adopt ethical frameworks addressing fairness, accountability, transparency, and human oversight.

The integration of responsible AI principles into innovation networks reflects a growing recognition that technological progress must be accompanied by robust institutional safeguards. These safeguards aim to ensure that artificial intelligence contributes to economic development (Brynjolfsson et al., 2018; Varian, 2019) and social welfare while minimizing potential harms.

Conclusion

The trajectory of artificial intelligence has undergone a fundamental architectural shift, transitioning from the isolated academic laboratories of the 20th century to a deeply interconnected, multi-stakeholder global ecosystem. As this chapter has illustrated, the immense computational, financial, and data requirements of modern machine learning have decentralized AI innovation. Today, progress is driven not by a single sector, but by a complex web of industrial consortia, open-source communities, public-private partnerships, and intergovernmental bodies.

However, the defining dynamic of the contemporary AI landscape is the profound tension between these borderless innovation networks and the aggressive pursuit of national technological sovereignty.

While decentralized platforms and crowdsourced R&D continue to democratize access and accelerate algorithmic breakthroughs, artificial intelligence has simultaneously become the primary battleground for geopolitical supremacy. Major economies have recognized that leadership in frontier AI is inextricably linked to economic resilience and national security. Through comprehensive roadmaps, nations are actively building strategic moats around talent, computing power, and proprietary data. Examples of these range from infrastructure initiatives and AI development plans (e.g., by the US and China respectively), to regulatory frameworks (e.g, by the EU).

Consequently, the paradigm of "smart openness" has emerged as the pragmatic path forward. It reflects the reality that total technological decoupling is structurally unfeasible and detrimental to scientific progress. Instead, state and corporate actors must navigate a delicate equilibrium: maintaining open corridors for foundational, low-risk scientific collaboration while enforcing stringent safeguards around highly sensitive, production-grade technologies.

Ultimately, the future trajectory of global AI development will not be determined solely by computational scaling or algorithmic efficiency, but by institutional capacity. Ensuring that artificial intelligence serves the global public good requires robust, harmonized international governance. As the field continues to accelerate, multilateral frameworks must evolve at the pace of the technology itself, successfully bridging the gap between state-driven security interests, corporate commercial imperatives, and fundamental human-centric ethics.

Looking forward, the central challenge for policymakers and researchers will be to reconcile the accelerating pace of global AI innovation with the legitimate pursuit of national technological sovereignty. Achieving this balance will require new institutional arrangements that support international collaboration while safeguarding security, ethical standards, and long-term societal interests.

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References

Brynjolfsson, E., Mitchell, T., & Rock, D. (2018). What can machines learn, and what does it mean for occupations and the economy? *AEA Papers and Proceedings, 108*, 43–47. https://doi.org/10.1257/pandp.20181019

Center for AI Safety. (2023). *Statement on AI risk.* https://safe.ai/work/statement-on-ai-risk

Council of Europe. (n.d.). *Steering Committee for New and Emerging Digital Technologies (CDNET).* https://www.coe.int/en/web/artificial-intelligence/cdnet

European Commission. (2024a). *Artificial Intelligence Act: Regulation (EU) 2024/1689 of the European Parliament and of the Council.* Publications Office of the European Union. https://eur-lex.europa.eu/eli/reg/2024/1689/oj

European Commission. (2024b). *Communication on boosting startups and innovation in trustworthy artificial intelligence.* https://digital-strategy.ec.europa.eu/en/library/communication-boosting-startups-and-innovation-trustworthy-artificial-intelligence.docx

Future of Life Institute. (2017). *Asilomar AI Principles: Future of Life Institute,* 2017 (futureoflife.org/open-letter/ai-principles)

Future of Life Institute. (2023). *Pause Giant AI Experiments: Future of Life Institute,* 2023 (futureoflife.org/open-letter/pause-giant-ai-experiments)

International Association for Pattern Recognition. (n.d.). About IAPR. https://www.iapr.org

Jordan, M. I., & Mitchell, T. M. (2015). Machine learning: Trends, perspectives, and prospects. *Science, 349*(6245), 255–260. https://doi.org/10.1126/science.aaa8415

Maslej, N., Fattorini, L., Perrault, R., Parli, V., Reuel, A., Brynjolfsson, E., Etchemendy, J., Ligett, K., Lyons, T., Manyika, J., Niebles, J. C., Shoham, Y., Wald, R., & Clark, J. *Artificial intelligence index reports.* Stanford Institute for Human-Centered Artificial Intelligence. (2024, 2025, 2026) https://aiindex.stanford.edu/report/

National Science and Technology Council. (2023). *National artificial intelligence research and development strategic plan: 2023 update.* Executive Office of the President of the United States.

OECD. (2019). *OECD principles on artificial intelligence.* Organisation for Economic Co-operation and Development. https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449

OECD. (2024). *OECD AI policy observatory.* https://oecd.ai

Ouyang, L., Wu, J., Jiang, X., Almeida, D., Wainwright, C. L., Mishkin, P., Zhang, C., Agarwal, S., Slama, K., Ray, A., Schulman, J., Hilton, J., Kelton, F., Miller, L., Simens, M., Askell, A., Welinder, P., Christiano, P., Leike, J., & Lowe, R. (2022). *Training language models to follow instructions with human feedback.* Advances in Neural Information Processing Systems, 35, 27730–27744.Partnership on AI. (2024). About partnership on AI. https://www.partnershiponai.org

Radford, A., Kim, J. W., Hallacy, C., Ramesh, A., Goh, G., Agarwal, S., Sastry, G., Askell, A., Mishkin, P., Clark, J., Krueger, G., & Sutskever, I. (2021). Learning transferable visual models from natural language supervision. Proceedings of the 38th International Conference on Machine Learning, PMLR 139, 8748–8763.

Russakovsky, O., Deng, J., Su, H., Krause, J., Satheesh, S., Ma, S., Huang, Z., Karpathy, A., Khosla, A., Bernstein, M., Berg, A., & Fei-Fei, L. (2015). ImageNet large scale visual recognition challenge. International Journal of Computer Vision, 115(3), 211–252. https://doi.org/10.1007/s11263-015-0816-y

Simon, D., & Wagner, C. S. (2025, November 4). *U.S.–China scientific collaboration at a crossroads: Navigating strategic engagement in the era of scientific nationalism (QI Paper No. 18).* Quincy Institute for Responsible Statecraft. https://quincyinst.org/research/u-s-china-scientific-collaboration-at-a-crossroads-navigating-strategic-engagement-in-the-era-of-scientific-nationalism

State Council of the People's Republic of China. (2017). *Next generation artificial intelligence development plan.* http://www.gov.cn/zhengce/content/2017-07/20/content_5211996.htm

UNESCO (2021). *Recommendation on the ethics of artificial intelligence.* https://unesdoc.unesco.org/ark:/48223/pf0000380455

United Nations. (2024). *Governing AI for humanity: Final report of the High-Level Advisory Body on Artificial Intelligence.* https://www.un.org/sites/un2.un.org/files/governing_ai_for_humanity_final_report_en.pdf

Varian, H. R. (2019). Artificial intelligence, economics, and industrial organization. In A.Agrawal, J. Gans, & A. Goldfarb (Eds.), *The economics of artificial intelligence: An agenda* (pp. 399–419). University of Chicago Press.

Zhang, B., Dafoe, A., & Zhou, B. (2021). *AI governance: A research agenda* (Update ed.). Centre for the Governance of AI, University of Oxford.

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