BEYOND COMPLIANCE

GAIA

ALIGNING AI WITH PEOPLE, PLANET AND PURPOSE

GAIA REPORT

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The views expressed herein do not necessarily represent the opinions, endorsements, or official positions of the experts, institutions, or organizations quoted or referenced throughout the report.

All cited contributions have been included to enrich the diversity of insights and are presented in the spirit of fostering informed dialogue about the AI Act, sustainable digital transformation, and the future of responsible innovation.

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Beyond Compliance

Aligning AI with People, Planet and Purpose

Authors
Damian Ciachorowski
Robert Kroplewski

GAIA

Executive Summary

The European Union's Artificial Intelligence Act (AI Act) marks a decisive moment in global digital governance. Yet its true significance lies not merely in setting compliance thresholds—it lies in catalyzing a more ethical, resilient, and human-centered digital transformation.

Beyond Compliance repositions the AI Act as a structural opportunity: a lever to drive a sustainable digital future where technology serves life, ecosystems, and dignity, not just efficiency or profit.

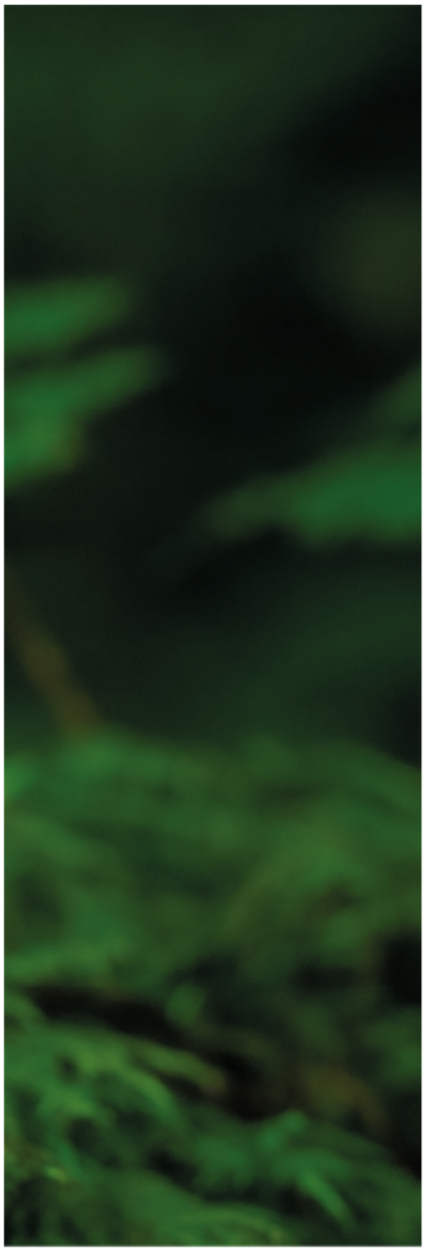
Drawing from the insights of 25 global experts across policy, academia, industry, and civil society, this report explores the AI Act's multidimensional implications for innovation systems, data governance, organizational resilience, and societal trust.

Our key findings show that:

- **The AI Act must be understood as an enabler of sustainable digital transformation**, where sustainability extends beyond environmental stewardship to embrace social equity, institutional resilience, and the ethical treatment of all stakeholders—internal and external alike.
- **Resilience is the new competitive edge.** Organizations must develop adaptive governance systems, foresight capacities, and values-driven cultures to survive and thrive amid technological volatility.
- **The principles: human dignity, well-being and "no harm" must become central to AI deployment.** Protecting the rights, well-being, and autonomy of individuals, communities, and ecosystems must anchor every AI lifecycle stage—from design and training to deployment and monitoring.
- **Data governance must evolve into collective stewardship.** Moving from individual consent models to participatory, transparent, and community-anchored data infrastructures is essential to reclaim legitimacy and trust.
- **The global leadership Europe seeks through the AI Act requires openness, humility, and continuous adaptation.** Only through participatory governance, anticipatory policymaking, and multilateral dialogue can the AI Act remain credible in a fluid technological landscape.

Ultimately, ***Beyond Compliance*** argues that the future of AI is inseparable from the future of humanity itself. Building sustainable, just, and resilient digital systems is not a technological choice—it is a societal imperative.

Beyond compliance lies responsibility. Beyond regulation lies transformation.
Beyond algorithms lies human dignity.



About

THE REPORT

This report aims to provide a multidimensional evaluation of the European Union's Artificial Intelligence Act (AI Act) in the context of the ongoing digital transformation. It integrates diverse expert perspectives to assess how the AI Act addresses contemporary governance challenges, anticipates technological disruption, and aligns with the principles of sustainable, ethical innovation. The report is designed as both a diagnostic tool and a forward-looking roadmap for regulators, industry leaders, civil society actors, and academia.

The authors

DAMIAN CIACHOROWSKI

He is a researcher and executive specializing in artificial intelligence (AI) applications in management and sustainable innovation. He is currently a Ph.D. candidate at Gdańsk University of Technology, where his research focuses on sustainable digital transformation. He has over a decade of experience leading multi-national research and education initiatives, having coordinated more than 100 international projects spanning research, education, and technology. His work bridges academia and industry: his research is dedicated to integrating AI solutions into business strategy in a sustainable, responsible manner.

ROBERT KROPLEWSKI

He is a legal counselor, has a long-standing practice in the field of technological convergence and specializes in the law of new technologies and their transfer, electronic media and information society services. Currently a member of the Network of Experts without Borders at UNESCO for Ethical Artificial Intelligence and a member of the Expert Network of Consultation at the High Level Advisory Body of AI for Secretary General of United Nations. Founder of SAIL – Stewardship of AI Laboratory at Kroplewski Law Office.

THE ORGANIZATION

Global Artificial Intelligence Alliance Foundation (GAIA) is a research and innovation platform dedicated to shaping the future of artificial intelligence in service of humanity and the planet. We combine human creativity, compassion, and ethical leadership with the computational power of AI to foster sustainable, inclusive, and responsible technological development. Our work focuses on advancing the concept of **Compassion AI**—systems designed not merely for performance, but for the well-being of individuals, societies, and ecosystems. At GAIA, we envision AI evolving from a tool of efficiency to a genuine partner in global dialogue and renewal. We are committed to humanizing technology, embedding ethics at every layer of its design, and ensuring that the digital transformation strengthens rather than fragments the social and environmental fabric.

We believe that artificial intelligence, guided by human values and ethical wisdom, can become a catalyst for a just, resilient, and sustainable future.

GAIA

Partners

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ALOHAS Regenerative Foundation
SAIL - Stewardship AI Lab - Kroplewski Law Office
AI Impact Ecosystem

Expert Commentary

Michał Żukowski

Chairman of the Platform for New Technologies at Pracodawcy RP,
CEO of Innteo

"The AI Act is the result of years of international cooperation aimed at creating coherent and ethical frameworks for the development of artificial intelligence. As a participant in public consultations and an advisor in the field of new technologies law, I emphasize that the greatest value of this regulation lies in its risk-based approach and its focus on transparency and the protection of citizens' rights. The implementation of the AI Act will require organizations not only to adopt new procedures, but also to rethink their data management strategies and accountability for algorithms. This is not the end of the legislative process—the AI Act will continue to evolve alongside technological advancements and international dialogue. It is crucial that Polish companies actively engage in this debate and build competencies that allow them not only to meet the requirements, but also to co-create the future of responsible AI at both the European and global levels."

Paweł Łopatka

Vice-Chairman of the Platform for New Technologies at Pracodawcy RP,
Managing Director of Experis Poland - ManpowerGroup

"The AI Act is more than a regulatory framework—it's a catalyst for strategic digital transformation in Europe. As a leader in the technology sector, I observe how these new regulations are pushing companies not just to adjust compliance processes, but to build a culture of innovation rooted in responsibility and security. Regulations like the AI Act, DORA, or NIS 2 challenge businesses to integrate legal requirements with business practice while maintaining competitiveness and agility. It becomes essential to invest in team competencies, develop cybersecurity, and implement ethical AI models that serve both people and the economy. I believe that if we treat the AI Act not just as an obligation but as an opportunity, it will become a catalyst for sustainable development and strengthen Europe's global position in the digital world."


AI

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Methodology

DATA COLLECTION AND EXPERT CONSULTATION

The findings in this chapter are based on a multi-method qualitative research design carried out between July 2024 and February 2025, involving:

- **Semi-structured expert interviews:** Conducted with 25 high-level experts across academia, policymaking, civil society, and industry. Each interview was conducted by two moderators, recorded in audiovisual format, and transcribed using a computer program. The resulting transcripts were manually reviewed and corrected by human reviewers to ensure accuracy. Interviews focused on future-oriented governance, AI innovation trajectories, and adaptive regulation.
- **Interview data specifics:** Across the 25 interviews, lasting an average of 48 minutes each, 60 distinct questions were posed. Thematic analysis led to the creation of 102 unique codes, which appeared 1005 times across the corpus.
- **Document analysis:** Review of EU legislative proposals, OECD, UNESCO, UN, DARP, Hiroshima Process, GPAI reports, foresight studies, and ethics guidelines.
- **Thematic coding:** Coding was performed exclusively by human researchers to preserve interpretative integrity and avoid algorithmic biases.
- **Use of generative AI:** Generative AI tools were utilized solely for auxiliary tasks such as linguistic refinement, preliminary keyword extraction, and design of visual materials. Every product generated by artificial intelligence was independently reviewed by both lead authors. Any disputed elements were subject to joint discussion and consensual resolution. No generative AI was involved in substantive coding, interpretation, or analysis.
- **Contextual reference to the policy environment**: The report was developed at a time when the AI Act had been formally adopted, and the legislative process had concluded. Throughout the research, authors and experts referred to the trajectory of negotiations, the finalized legal texts, and comparable frameworks under development in other jurisdictions and international organizations.

The expert pool was selected through purposive sampling to ensure geographical, institutional, and disciplinary diversity. Contributions were anonymized or cited by name with consent.

List of experts

AMIR BANIFATEMI

Founder of AI Commons and Chief Responsible AI Officer with Cognizant

NOZHA BOUJEMAA

Global VP AI Innovation and Trust - Decathlon

MARC BUCKLEY

CEO ALOHAS Regenerative Foundation

RAJA CHATILA

Professor at Sorbonne University

VILAS DHAR

President and Trustee of the Patrick J. McGovern Foundation

PAM DIXON

Founder and Executive Director, World Privacy Forum

OLIVIA J. ERDELYI

Senior Lecturer Above the Bar, University of Canterbury; Mercator Visiting Professor for AI in the Human Context, University of Bonn; Partner, AI Ethics and Governance, PHI INSTITUTE for Augmented Intelligence.

MARKO GROBELNIK

Jozef Stefan Institute, AI Department, Slovenia

SEBASTIAN HALLENSLEBEN

Chair - CEN-CENELEC JTC21

YUKO HARAYAMA

Secretary General of the Global Partnership on AI (GPAI)
Tokyo Expert Support Center

GRY HASSELBALCH

PhD. Co-founder DataEthics.eu

MERVE HICKOK

President – Center for AI and Digital Policy

CYRUS HODES

General Partner at 1infinity Ventures

RAFAŁ KAMIŃSKI

Advisor to the Member of the European Parliament

LEO KARKKAINEN

Professor of Embedded Systems in University of Eastern Finland

OCTAVIO KULESZ

Philosopher and UNESCO Expert

LAURENCE LIEW

Director of AI Innovation, AI Singapore

INMA MARTINEZ

Zug Research Society for the Advancement of Humanity

IEVA MARTINKENAITE

Senior Vice President, Head of AI, Telenor Group

NICOLAS MIAILHE

CEO & Co-founder, PRISM Eval; Founder & Chairman of the Board (non exec.), The Future Society

ANA PRICĂ- CRUCEANU

The Network of Experts without Borders, UNESCO for Ethical Artificial Intelligence

SALLY RADWAN

Chief Digital Officer, UN Environment Programme

TOMASZ TRZCIŃSKI

The IDEAS Institut, Warsaw University of Technology, Tooploox.

ELINOR WAHAL

Legal and Policy Officer, European Commission AI Office

SAMO ZORC

AI Governance Officer, NLB d.d;, OECD AI expert; Chair AI TC, Slovenian institute for standardizatio sist.si

Chapter 1

INTRODUCTION TO THE AI ACT

1.1 The genesis of the AI Act – from ethical principles to legal framework

The European Union's Artificial Intelligence Act (AI Act) is not merely a legislative text—it is the culmination of nearly a decade of work involving multi-stakeholder dialogue, international collaboration, and a determined attempt to craft a regulatory framework that balances innovation with protection of human rights, democratic values, and sustainable progress.

The foundations of the AI Act were laid by the High-Level Expert Group on Artificial Intelligence (HLEG), established by the European Commission in 2018. This group developed the Ethics Guidelines for Trustworthy AI, setting out seven key requirements: human agency and oversight, technical robustness and safety, privacy and data governance, transparency, diversity, non-discrimination and fairness, societal and environmental well-being, and accountability. These guidelines became the ethical and conceptual backbone of the AI Act [European Commission, 2019].

Expert Raja Chatila highlights this continuity: „The whole process of the creation of the AI Act is founded on the work of the HLEG. These ethics guidelines and the assessment list for trustworthy AI are essentially present in the recitals of the AI Act".

Simultaneously, international bodies such as the OECD were developing complementary frameworks. In 2019, the OECD released its AI Principles, which were the first intergovernmental standard on AI and have since been adopted by the G20. Pam Dixon, a key contributor, recalls: "We were among the very small group in 2017 that began writing the OECD AI principles and definitions upon which some definitional aspects of the EU AI Act, was based".

This convergence of efforts helped solidify the EU's ambition to lead globally in the ethical governance of AI, rooted in a values-based approach rather than a laissez-faire, innovation-at-all-costs model. The initiative was further bolstered by Japan's Society 5.0 vision and similar frameworks from the United Nations, including the UNESCO Recommendation on the Ethics of AI, adopted in 2021 by 193 Member States [UNESCO, 2021].

1.2 The multinational and multilevel dimension of policymaking

While the EU was developing the AI Act, it was also engaging in international diplomacy to harmonize standards and exchange best practices. Gry Hasselbalch, a senior expert for the EU's InTouchAI.eu project, participated in the working group that developed the EU-U.S. Technology and Trade Council's transatlantic joint AI roadmap and AI taxonomy and terminology between 2022-2024, emphasizing that back then "it was surprisingly easy to agree on common values like democracy and human rights". These efforts contributed to transatlantic roadmaps and taxonomies for AI risk management.

Yuko Harayama, a policy advisor in Japan, adds depth to this perspective: "We have launched the concept of Society 5.0, which is about guiding technological innovation by prioritizing societal benefit. We had regular dialogues with EU representatives about the shared need for a policy framework that was values-based and globally resonant".

Such multilateral dialogues played a key role in making the AI Act not only a European regulation but also a template for future global frameworks. Scholars from the Stanford HAI, OECD.AI, and the World Economic Forum have emphasized that regional approaches such as the AI Act have a spillover effect, influencing regulatory conversations in North America, Asia-Pacific, and Africa [Stanford HAI, 2023; WEF, 2022].

1.3 From political intent to legislative reality

The road from ethical guidelines to enforceable legislation was long and complex. As Elinor Wahal, an officer at the European Commission's AI Office, explains, the journey began with the 2018 European Strategy on AI and continued through the White Paper on AI in 2020. Public consultations and expert engagement played key roles in shaping the draft proposal.

„Negotiations between co-legislators lasted over three years and involved more than 3,000 proposed amendments," Wahal notes. "It was a politically and technically intense process, with added urgency after the release of ChatGPT, which shifted parliamentary priorities".

Stakeholders from academia, industry, and civil society were involved throughout. Merve Hickok from the Center for AI and Digital Policy (CAIDP) reflects on civil society's role:

"CAIDP engaged directly with rapporteurs, committees and other civil society organizations, bringing forward the voices of fundamental rights advocates and vulnerable communities".

Sebastian Hallensleben, involved in the technical design of harmonized standards, emphasizes the pragmatic approach: "The AI Act regulates the application, not the technology. That's crucial—it's about use, context, and impact, not abstract capabilities".

1.4 The purpose and vision of the AI Act

The primary objective of the AI Act is to ensure that AI systems placed on the European market are safe and respect existing laws on fundamental rights and values. It seeks to establish a legal framework based on the level of risk posed by AI systems, introducing obligations proportionate to those risks. This design allows regulators to mitigate dangers without stifling innovation. The Act also aims to foster trust in AI, which is essential for widespread adoption and long-term societal benefit.

As Nozha Boujemaa notes, „It's a way to regulate and control the development and deployment of AI, to keep it human-centric and to make it trustworthy enough for people, for the planet, and for society."

1.5 The benefits of the AI Act

The AI Act brings a broad range of strategic, legal, economic, and societal benefits—both immediate and long-term. Its structure and content are tailored not only to protect but also to foster innovation and competitiveness within a safe and values-driven environment.

1. Legal certainty and market harmonization

The AI Act creates a unified legal environment across all 27 EU Member States, avoiding the patchwork effect of diverging national legislations. For companies operating in multiple countries, this harmonization significantly reduces compliance costs and complexity. Experts like Leo Karkkainen point out that "this consistency builds confidence among stakeholders, enabling them to plan long-term development within a predictable regulatory framework". This gap is particularly problematic in high-risk sectors such as healthcare or defense, where the failure of an AI system could have catastrophic consequences. Without standardized and transparent validation protocols, stakeholders may struggle to distinguish compliant and safe AI from experimental or opaque systems. Such a certification body could also help harmonize the understanding of what constitutes trustworthy AI, particularly as general-purpose models become more complex. Several experts call for the EU to establish a dedicated AI oversight institution capable of technical auditing, benchmarking, and continuous monitoring of systems post-deployment.

2. International leadership and global influence

The AI Act enables the EU to set global standards for AI ethics and regulation, positioning Europe as a leader in responsible AI. According to Pam Dixon, "the definitional and normative work we did at OECD has been folded into the AI Act, creating a global reference point for governance". This leadership is not just symbolic—countries in Latin America, Asia, and Africa have begun referencing EU principles in their own emerging policies. By embedding democratic values, privacy safeguards, and ethical oversight into a binding legal structure, the EU offers an alternative to the more permissive or state-controlled models observed in the US and China. This influence is evident in recent policy alignment discussions at the G7 and in UNESCO's global AI recommendations. The EU's leadership also encourages international businesses to align with EU norms proactively, often adopting compliance frameworks preemptively to maintain market access. Consequently, the AI Act is a powerful diplomatic and economic tool as much as a regulatory one.

3. Promotion of trustworthy innovation

Trust is the bedrock of technological adoption, particularly for disruptive tools like AI. As Gry Hasselbalch noted, "when you explain to vulnerable groups that there will be a law requiring AI systems to be fair, safe, and transparent, it creates reassurance". The AI Act establishes conditions that encourage the development of trustworthy AI by mandating transparency obligations and human oversight for high-risk systems. This regulatory approach ensures that citizens are not subjected to opaque or biased decision-making algorithms, especially in sensitive areas such as education, recruitment, or criminal justice. When users feel protected and empowered, they are more likely to adopt AI technologies in everyday contexts. For developers and companies, a clear code of conduct helps embed ethical practices into their design and development processes from the outset, reducing the risk of public backlash or litigation. Thus, trust is not an abstract ideal—it's a practical asset fostered by legal safeguards.

4. SME and startup enablement

Startups and SMEs often fear regulation due to limited compliance resources. However, the AI Act specifically addresses their needs through several mechanisms, and most notably with innovative AI applications under the supervision of national authorities. As Elinor Wahal highlighted, "regulatory sandboxes give small players a real chance to test their systems and understand legal expectations before going to market". This forward-looking tool is particularly important in preventing market consolidation by large firms that can more easily afford compliance departments. Additionally, the Act includes scaled penalties and reporting requirements that take the size and revenue of the company into account.

This differentiated treatment supports a more inclusive innovation ecosystem across the EU. Furthermore, Member States are encouraged to provide financial and technical support to SMEs during the transition, creating a more level playing field in AI development.

5. Support for public interest objectives

The AI Act is unique in integrating broad societal goals—such as environmental sustainability, social inclusion, and accessibility—into its risk framework. This orientation reflects Europe's broader digital and green transitions. For instance, systems that may impact people's rights to healthcare, housing, or fair treatment in public services are scrutinized more closely. Sally Radwan from UNEP noted the Act's potential to influence sustainability: "We need AI to help solve the triple planetary crisis, but only if it is governed responsibly. The AI Act has the potential to align AI development with broader sustainability goals, but its real impact will depend on how inclusively and responsibly it is implemented across diverse global contexts". This shows that AI governance is not limited to minimizing harm—it can actively promote collective well-being. By requiring transparency about environmental footprints and discouraging discriminatory design, the Act ensures that AI contributes positively to both people and the planet. This alignment with the UN Sustainable Development Goals (SDGs) is also expected to guide funding allocations and research priorities in the EU.

6. Clarity on AI risks and responsibilities

One of the most appreciated aspects of the AI Act is its stratified risk classification, which clearly delineates responsibilities among various actors in the AI value chain. Sebastian Hallensleben emphasized that "regulating the application, not the technology itself, allows for a more meaningful allocation of accountability". Developers, deployers, and users each have specific duties based on the system's risk category—from documentation and testing to transparency and human oversight. This clarity reduces ambiguity and strengthens governance structures within companies. It also helps public institutions procure and deploy AI responsibly by offering a checklist of requirements. For civil society organizations and watchdogs, the classification system offers a reference for evaluating AI systems' societal impact. Ultimately, clearer roles and responsibilities promote ethical business conduct and enhance enforcement capacity, particularly when combined with the harmonized standards currently under development.

Sebastian Hallensleben

Chair - CEN-CENELEC JTC21

"The AI Act regulates the application, not the technology. That's crucial—it's about use, context, and impact, not abstract capabilities".

1.6 Concerning issues and criticisms

Despite its ambition and breadth, the AI Act has prompted a variety of concerns among experts, practitioners, and advocacy groups. These criticisms are not intended to undermine the significance of the regulation but to highlight areas that may need refinement, adaptation, or further development as the regulatory landscape evolves.

1. Lack of independent model certification

One of the most frequently cited concerns is the absence of a centralized certification mechanism for AI systems. Inma Martinez, who has worked closely with governments and global corporations, emphasizes the gap: "Nowhere in these 144 pages is there any mechanism for certification of models. We need an agency to test and approve AI systems the way the EMA [European Medicines Agency] certifies medicine. Otherwise, how can we trust what's on the market?". This gap is particularly problematic in high-risk sectors such as healthcare or defense, where the failure of an AI system could have catastrophic consequences. Without standardized and transparent validation protocols, stakeholders may struggle to distinguish compliant and safe AI from experimental or opaque systems. Such a certification body could also help harmonize the understanding of what constitutes trustworthy AI, particularly as general-purpose models become more complex. Several experts call for the EU to establish a dedicated AI oversight institution capable of technical auditing, benchmarking, and continuous monitoring of systems post-deployment.

2. Over-simplification of the risk-based approach

The AI Act relies heavily on a four-tier risk categorization: unacceptable, high, limited, and minimal. However, experts like Raja Chatila argue that "AI systems don't fit neatly into discrete boxes. The boundaries are blurry, and this creates uncertainty for both developers and regulators". For instance, an AI used in HR recruitment might be classified as high risk due to potential discrimination. But what if that same system is used to screen CVs for volunteer positions? Is the risk the same? The static classification model may fail to capture dynamic contexts and cumulative societal effects. Moreover, critics warn that classifying systems based on intended purpose overlooks how they may be repurposed or evolve in real-world use. To address this, some propose a more flexible, context-sensitive model that considers evolving risks, feedback loops, and secondary uses.

3. Implementation gaps and institutional capacity

Regulating AI is one thing—implementing and enforcing those regulations across a diverse union of 27 Member States is another. Elinor Wahal points out that "without the technical capacity and trained personnel in national agencies, we risk having suboptimal enforcement of the rules on the ground". Some Member States have not yet designated or empowered competent authorities to handle AI-related oversight. Additionally, smaller countries may lack the infrastructure to operate regulatory sandboxes or evaluate sophisticated systems. Experts call for increased EU-level funding, cross-border collaboration, and training programs to ensure uniform application. Without this, enforcement may become uneven, leading to regulatory arbitrage or loss of public trust.

4. Risk of deterring innovation

While the AI Act includes innovation-friendly features such as sandboxes and proportional penalties, there are fears that overly burdensome requirements for high-risk systems could discourage investment in AI R&D. Laurence Liew, speaking from the experience of the Singaporean AI ecosystem, observed that „many smaller AI companies express concern about the resources required for comprehensive regulatory compliance. Finding the right balance between necessary safeguards and enabling innovation is a challenge all jurisdictions face in AI governance". Especially for startups and scale-ups, the cost of documentation, testing, and legal support can be prohibitive. There is also concern that European universities and public research organizations may hesitate to commercialize innovations that might fall under high-risk categories. To mitigate this, experts recommend greater clarity on scope exemptions and streamlined procedures for entities operating in good faith.

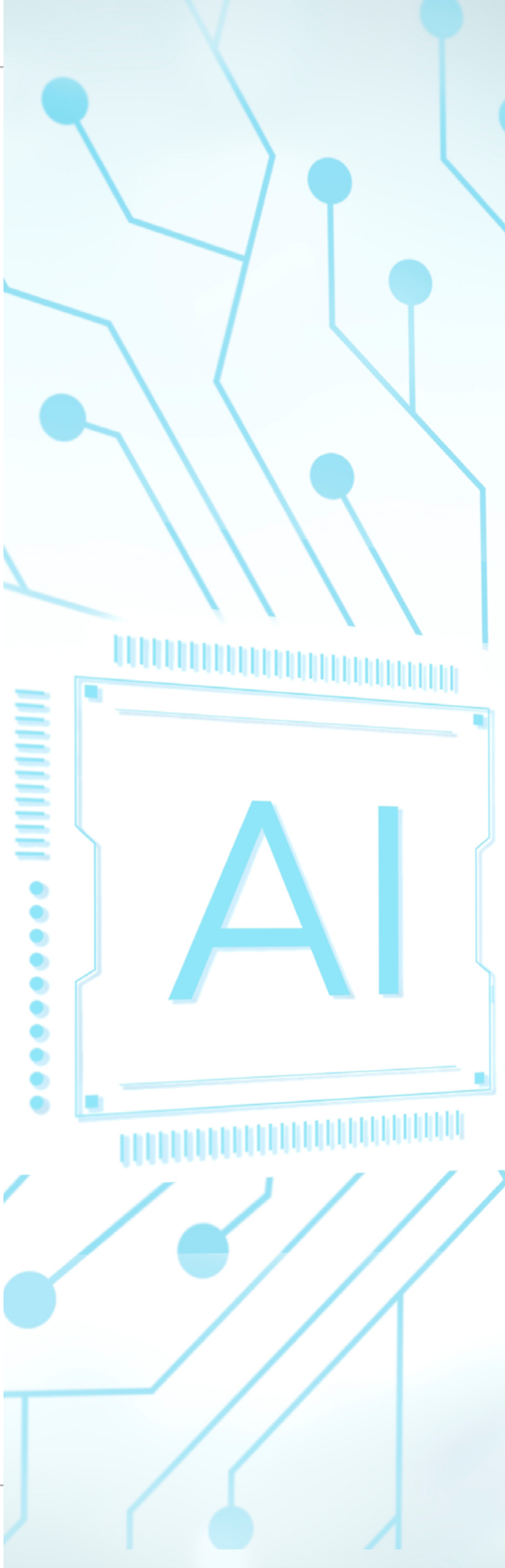
5. Insufficient provisions for General-Purpose AI

Since the Act was drafted before the explosive growth of large language models and other general-purpose AI systems, many experts believe it does not adequately address these technologies. Marko Grobelnik explains: "We're regulating AI as if it were built for narrow, well-defined tasks. But what happens when you have models that can do everything—translate, predict, generate, interact? That's not accounted for in the current structure". The Act's late-stage amendments to include general-purpose AI are seen by some as reactive rather than strategic. The challenge lies in defining obligations without stifling versatility and scalability. Some suggest that general-purpose AI may require an entirely new regulatory logic, one that includes dynamic licensing, open datasets registries, and collaborative public testing environments.

6. Global interoperability and fragmentation risks

Sally Radwan, who led environmental AI policy at the UN level, warns that "the AI Act was negotiated with strong internal consensus, but from an external perspective, it can feel exclusionary. Not every country wants to adopt the European model wholesale". The Act's extraterritorial implications requiring companies outside the EU to comply if they serve EU users have been criticized as regulatory imperialism. While the GDPR achieved global alignment over time, AI presents unique geopolitical stakes, particularly as countries race to dominate in emerging tech. If the EU does not actively foster collaborative frameworks with key partners such as the U.S., Japan, and African Union, it may face friction, legal disputes, or duplication of efforts. A balanced approach that includes mutual recognition, interoperability frameworks, and technical diplomacy is therefore essential.

These concerns do not diminish the groundbreaking nature of the AI Act. Rather, they reflect the complexity of regulating a fast-evolving and deeply transformative technology. Addressing these issues openly will be key to the Act's success and to maintaining the public legitimacy and international influence it seeks to achieve.



1.7 How the AI Act differs from previous policy documents?

Having explored the benefits and challenges of the AI Act, it is essential to consider how it fits within the broader landscape of digital regulation. Understanding its distinctive approach helps contextualize both its ambitions and limitations.

The AI Act marks a clear departure from earlier digital regulations such as the General Data Protection Regulation (GDPR), the Digital Services Act (DSA), and the Digital Markets Act (DMA). While those instruments focused respectively on personal data protection, platform responsibilities, and market fairness, the AI Act is the first to specifically address the design, development, deployment, and oversight of AI systems themselves.

Unlike GDPR, which operates primarily through the lens of individual data rights, the AI Act introduces a risk-based regulatory model rooted in public interest outcomes. Rafał Kamiński notes that this approach „moves beyond the procedural safeguards of the GDPR and tries to assess how AI systems operate in the world, whether they align with or disrupt fundamental rights, social fairness, or even democratic stability".

Another major difference is the focus on use cases rather than data types. GDPR regulates the collection and processing of personal data regardless of the technology. The AI Act, by contrast, targets AI system applications across domains—employment, education, law enforcement placing stricter obligations where risk is higher.

From a legislative design standpoint, the AI Act also introduces horizontal regulation, meaning it applies across sectors and industries. This contrasts with the often sector-specific rules found in earlier laws. According to Sebastian Hallensleben, this "horizontal structure allows for a more coherent regulatory vision, but it also demands more flexible implementation frameworks at the national level".

Finally, the Act integrates values and principles, such as transparency, accountability, and robustness—that had previously been discussed in non-binding documents like the Ethics Guidelines for Trustworthy AI from the HLEG. Here, those soft law norms are transformed into binding obligations with associated penalties. That shift from voluntary ethics to enforceable compliance is seen by many as a turning point in digital governance.

Marko Grobelnik

Jozef Stefan Institute, AI Department, Slovenia

„We're regulating AI as if it were built for narrow, well-defined tasks. But what happens when you have models that can do everything—translate, predict, generate, interact? That's not accounted for in the current structure".

AUTHORS' KEY TAKEAWAYS

1. The AI Act as a projection of Europe's normative tech sovereignty.

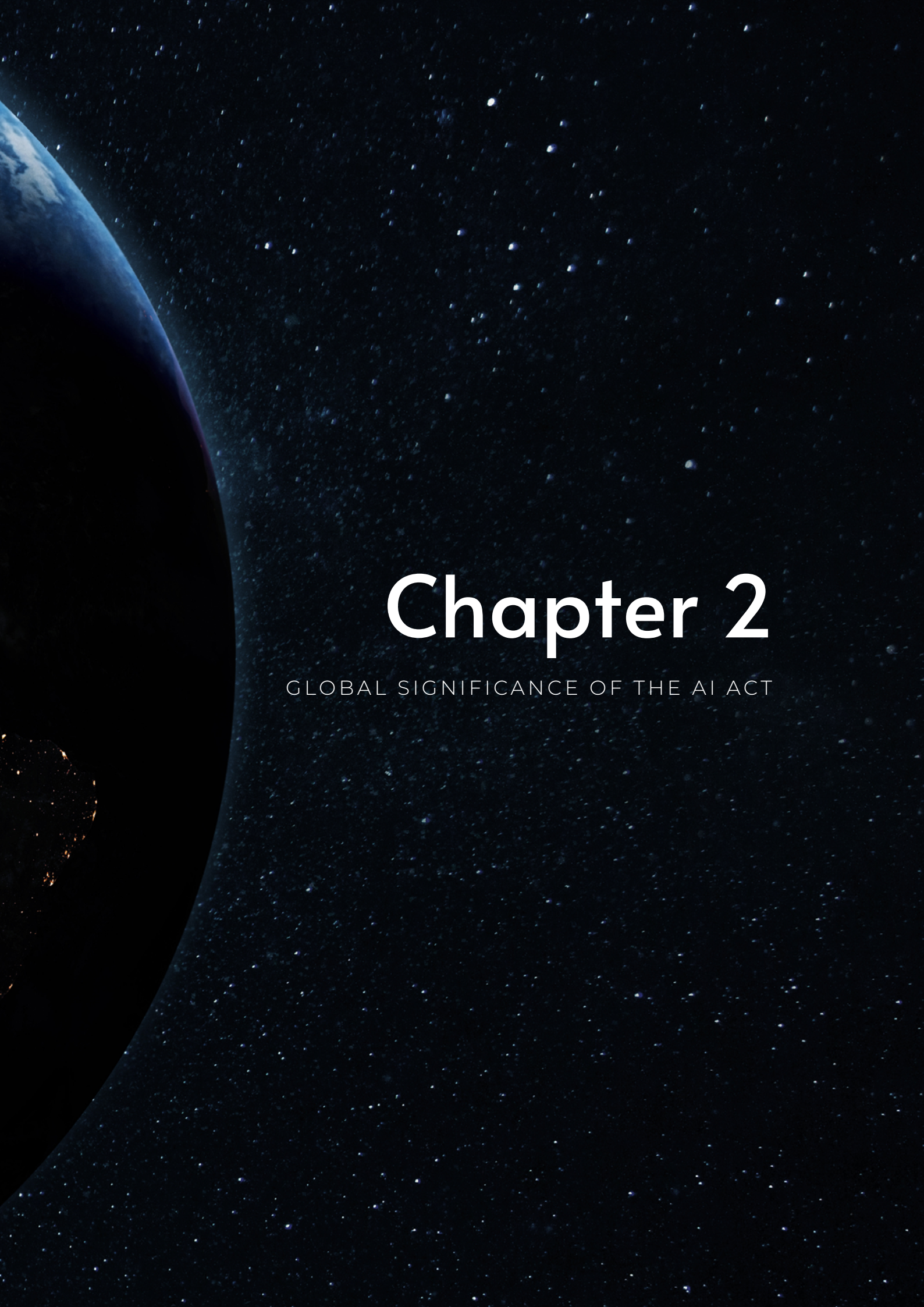
The AI Act is more than a regulatory instrument—it is a deliberate projection of the EU's normative power, aiming to shape global standards of ethical and sustainable AI development. Modeled after the success of the GDPR, the AI Act already influences regulatory thinking across Latin America, Africa, and Asia, including jurisdictions beyond the EU's direct scope.

2. A functional yet incomplete regulatory architecture.

The AI Act introduces an innovative risk-based governance model centered on application context rather than technology type. While this brings interpretative flexibility, it also exposes structural gaps—such as the absence of a certification authority for high-risk models, ambiguities around general-purpose AI, and underdeveloped enforcement mechanisms at the Member State level.

3. Effectiveness will be measured by institutional readiness and political durability.

The future impact of the AI Act hinges less on its text and more on the operational capacity of EU institutions. National authorities' preparedness, the availability of compliance tools for SMEs, and the ability to enforce obligations across asymmetrical market actors will be decisive. Moving forward, the EU must pair regulatory clarity with technical standards, real-time responsiveness, and a politically resilient oversight ecosystem.



Chapter 2

GLOBAL SIGNIFICANCE OF THE AI ACT

2.1 Introduction: Why global matters in AI governance?

Artificial intelligence does not recognize borders. Its applications from facial recognition and recommendation engines to autonomous weapons and climate modeling circulate across jurisdictions, making purely national governance models insufficient. The European Union's Artificial Intelligence Act (AI Act), while regionally binding, aspires to global influence. It is a foundational attempt to set rules that could shape how other countries, international bodies, and industries think about responsible AI.

Pam Dixon, a senior researcher and long-time OECD delegate, emphasizes this aspiration: "Some parts of the AI Act build on work we did at the OECD. That work was always international in nature. It was never intended to be a European-only discussion".

By combining human rights, consumer protection, market innovation, and environmental sustainability in one legal text, the AI Act represents the most ambitious effort to date to align AI with democratic values and sustainable development principles. As such, its global relevance is not only inevitable, it is strategic.

2.2 AI Act as a global reference model

Since its announcement, the AI Act has been frequently cited as a reference by policymakers around the world. From G7 declarations to working groups under the Global Partnership on AI (GPAI), elements of the AI Act—especially its risk-based approach—have begun influencing global regulatory thinking.

Cyrus Hodes, co-founder of the Future Society and an early participant in OECD's AI governance work, reflects: "We drafted the OECD AI principles that were adopted by G20 countries. Much of that architecture is now embedded in the EU AI Act. That gives it legitimacy beyond just the European context".

In Japan, Yuko Harayama describes similar resonance: "Even though we didn't directly draft the AI Act, our Society 5.0 vision and involvement in G7 policy dialogues shared the same principles—human-centric innovation, societal benefit, and long-term sustainability".

The AI Act's structure particularly its clear obligations based on application risk has been lauded by UN representatives, who see it as a possible foundation for converging global policy efforts. Dhar emphasizes that, unlike the fragmented patchworks emerging elsewhere, the Act represents „a comprehensive, enforceable attempt to legislate trust and fairness in AI".

In this way, the AI Act operates as both a normative template and a diplomatic tool—one that may inspire, provoke, or pressure other nations to develop compatible frameworks. But as later sections will show, this global influence is not without friction or critique.

2.3 Reception and Impact in Global South and Emerging Economies

While the AI Act is often cited as a best-practice model, its reception in the Global South has been more nuanced. Experts and policymakers in regions such as Africa, Latin America, and Southeast Asia often welcome the ethical aspirations of the Act, but caution against adopting it wholesale.
Sally Radwan, who has worked on AI policy in the Arab and African context, remarks: "The language and obligations of the AI Act assume a level of administrative and legal infrastructure that many countries simply don't have. We need capacity building before we can think of implementation".
Many stakeholders in emerging economies appreciate the Act's risk classification, especially as a guideline for managing AI in public services. However, there are concerns that strict compliance requirements may unintentionally exclude smaller players and reinforce technological dependencies on the Global North. Ieva Martinkenaite notes: "Without proper funding mechanisms or investment incentives, the AI Act risks replicating structural inequalities in access to AI tools and governance".

Furthermore, several voices, especially from civil society in the Global South—have raised the issue of regulatory asymmetry. While European companies benefit from legal clarity, companies in Africa or South Asia may face new entry barriers if they must comply with a European framework to access the EU market.

Thus, the AI Act is seen both as a standard to aspire to and as a challenge to adapt. Greater cooperation on co-designing frameworks, knowledge sharing, and support for local AI ecosystems will be crucial if the AI Act is to play a truly inclusive global role.

2.4 Transatlantic dialogue and comparative regulatory models

The development of the AI Act has fueled intense comparisons with regulatory approaches in the United States, Canada, and key Asian markets. These comparisons reveal deep philosophical and institutional differences that shape each region's response to the opportunities and risks of AI.

Vilas Dhar points out: "The U.S. approach reflects a commitment to individual rights and market-driven innovation. The EU, by contrast, positions collective safety and institutional accountability at the center of its regulatory model."

While the U.S. has yet to implement a comprehensive AI regulation, several federal and state-level initiatives, such as the Algorithmic Accountability Act and voluntary NIST frameworks reflect growing interest in ethical AI. However, their binding nature and enforceability pale in comparison to the AI Act.

Meanwhile, Canada's proposed Artificial Intelligence and Data Act (AIDA) introduces a framework similar in spirit to the AI Act but more limited in scope and enforceability. In Asia, countries like South Korea and Singapore have embraced innovation-first frameworks, promoting AI through incentives and guidance rather than regulation.

According to Inma Martinez, this divergence could lead to "regulatory shopping," where companies select jurisdictions based on the lowest compliance cost. However, she warns that without interoperability, global AI trade and cross-border development may suffer.

In this context, the AI Act serves as a counterweight and a benchmark. It raises the bar globally, but also places pressure on international alignment a process that will require ongoing diplomacy, flexibility, and mutual recognition.

Ieva Martinkenaite

Senior Vice President, Head of AI, Telenor Group

"Without proper funding mechanisms or investment incentives, the AI Act risks replicating structural inequalities in access to AI tools and governance".

2.5 AI Act and international standardization

One of the most profound impacts of the AI Act is its potential to influence global standards for artificial intelligence. Through collaboration with international bodies such as ISO, IEEE, OECD, and the Global Partnership on AI (GPAI), the European Union is using the Act as a lever to shape the language, structure, and processes of international AI governance.

Gry Hasselbalch, who was directly involved in EU–US diplomatic dialogues, recalls: "We created a joint roadmap for AI risk and a shared terminology with partners at NIST in the U.S. This was based on the work we'd done in the High-Level Expert Group on AI. It's a sign that convergence is not only possible but already happening at the technical level".

A shared taxonomy is particularly important for enabling interoperability. Without agreement on what constitutes "high-risk AI," "human oversight," or "transparency," regulators and companies may struggle to navigate compliance across jurisdictions. The AI Act's classification system, though Eurocentric in origin, offers a scalable framework that can be customized by other nations.

Pam Dixon stresses that standards development must also be participatory: "If the EU is going to lead on AI standards, it must also include the Global South in those conversations. Otherwise, the Act risks becoming another example of Western-centric digital governance".

Efforts are underway to ensure this inclusivity. The European Commission has supported the creation of multi-stakeholder expert panels to oversee standardization under the Act, and international observers have been invited into European standards bodies such as CEN-CENELEC. However, the long-term success of this effort will depend on meaningful co-creation, not just consultation.

2.6 Contested global impacts: opportunities and tensions

While the AI Act has been widely praised, its global projection has not been universally welcomed. Several governments and private sector actors see the Act as potentially disruptive to trade, innovation, and regulatory sovereignty.

Sally Radwan highlights this tension from a diplomatic perspective: "EU negotiators need to demonstrate an understanding of the context of other countries when trying to convince them to adopt EU ideas, including being more open to those countries wanting to add or remove what they consider to be critical elements of their legislation, simply because they may not apply to, or may indeed violate political, cultural, or social realities in different countries.".

This dynamic has fueled concerns about regulatory imperialism, where powerful economies externalize their internal norms to shape global rules. The extraterritorial effects of the AI Act, especially the requirement for non-EU providers to comply when accessing EU markets are seen by some as a de facto standard-setting tool without consent.
In addition, tech industry leaders warn that the AI Act might create fragmentation in the global innovation ecosystem. If different regions adopt divergent rules, companies may face rising costs, delays, and legal uncertainties.

Despite these challenges, others see the Act's assertiveness as necessary. Inma Martinez argues that "if we don't define guardrails for AI now, we'll look back in ten years and regret our inaction. The AI Act may not be perfect, but it sets a floor where currently there's just fog".

What emerges, then, is a landscape of both alignment and resistance, cooperation and contestation. Whether the AI Act becomes a global model or a regional outlier will depend on how Europe engages with these criticisms—and whether it adapts its strategy to listen as much as it leads.

2.7 Summary: Europe's role in shaping the global AI order

The European Union's Artificial Intelligence Act represents more than a regional legal instrument—it is a deliberate assertion of normative leadership in the digital age. As this chapter has demonstrated, the AI Act is already shaping global discussions, frameworks, and strategic choices concerning artificial intelligence.

Through its risk-based approach, its alignment with democratic values, and its ambition to embed ethical guardrails into technical innovation, the AI Act is emerging as both a reference point and a lightning rod. Policymakers across continents are debating whether to emulate, adapt, or challenge the European model.

From the enthusiastic uptake in international standard-setting bodies to more cautious and critical voices in the Global South, the AI Act generates both momentum and friction. It catalyzes harmonization efforts, but also reveals deep inequalities in capacity, infrastructure, and influence.

Its extraterritorial effects, while instrumental in shaping global markets, must be tempered by inclusive governance practices that invite non-EU voices into the co-creation of standards. Experts emphasize that legitimacy on the global stage is built not only through technical leadership but also through humility, ethical clarity, and inclusive dialogue. As Amir Banifatemi notes: „The AI Act is an ambitious global milestone, more ambitious to what GDPR achieved for privacy. Its success will depend on the ability to foster coordination and mutual respect across diverse regulatory cultures, identify business value and not just impose standards."

It is built not only through technical leadership but also through humility, ethical clarity, and inclusive dialogue. Tomasz Trzciński underlines the regulatory milestone: „A big success for Europe and for the world in general, because it is effectively the first comprehensive legal framework that we have in the world around AI. It is really meant to protect the health, safety and fundamental rights of people." Marc Buckley adds a systemic caution: „I truly believe we're asking the wrong questions and letting too many people guide the conversation instead of really knowing what's going on and where it needs to be. It's important that we have good ethics and knowledge about what it means for our future."

Europe, therefore, finds itself at a crossroads. It can insist on exporting its regulatory template—or it can build coalitions that recognize contextual diversity and support regulatory interoperability. If the AI Act is to define the global AI order, it must evolve as a living instrument: responsive, participatory, and grounded in mutual respect.

This chapter does not offer a final judgment on the global role of the AI Act. Rather, it offers a framework for interpreting its reach and responsibility. The next chapters of this report will examine how the Act supports or challenges sustainable digital transformation on the ground—in institutions, businesses, and communities around the world.

Pam Dixon

Founder and Executive Director,
World Privacy Forum

"If the EU is going to lead on AI standards, it must also include the Global South in those conversations. Otherwise, the Act risks becoming another example of Western-centric digital governance".

AUTHORS' KEY TAKEAWAYS

1. The AI Act projects EU regulatory influence beyond its borders.

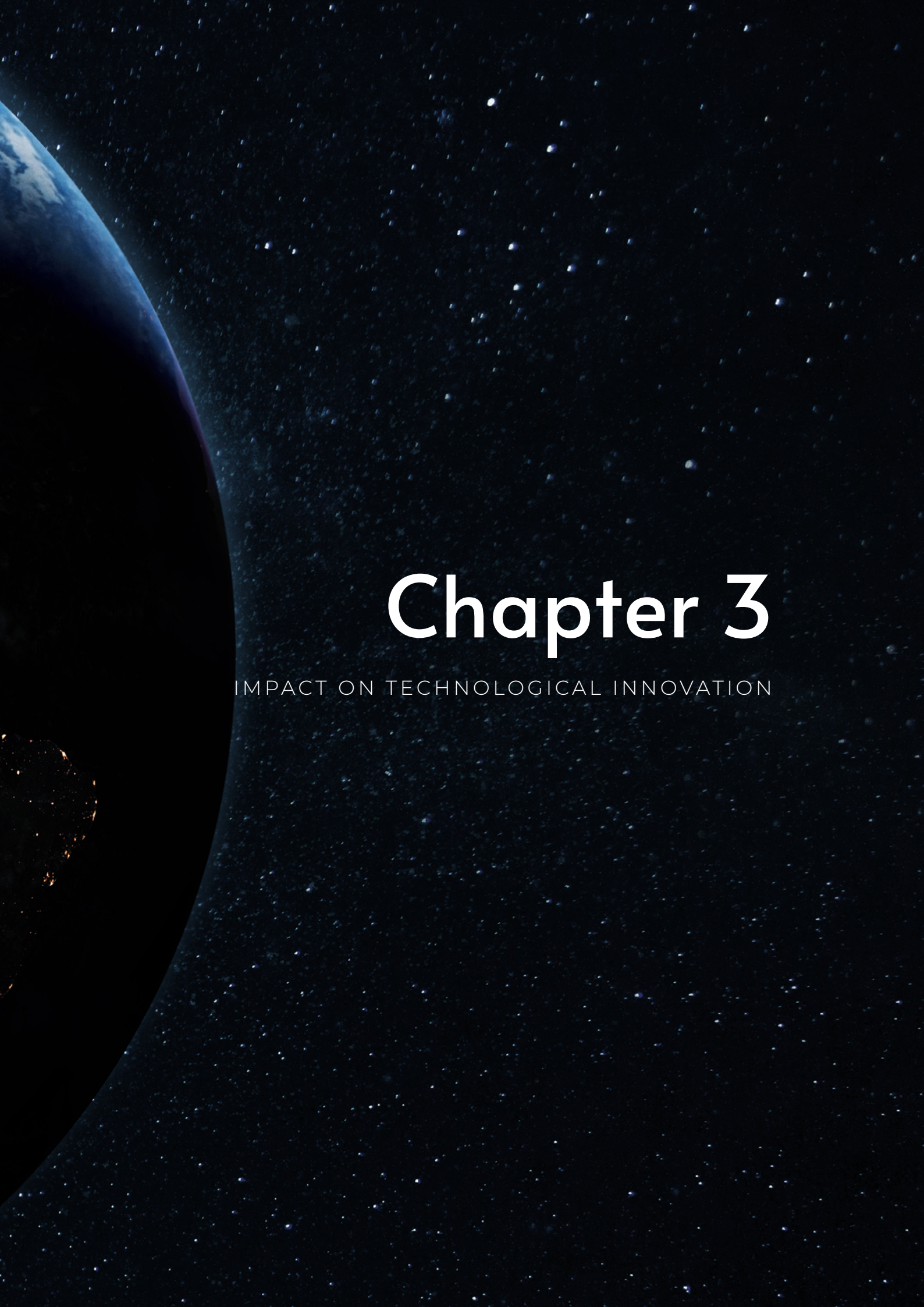
By formalizing a rights-based and risk-oriented approach, the AI Act has already positioned itself as a global benchmark—shaping policy discussions not only across the G7 and OECD, but also in countries of the Global South. Its extraterritorial implications create de facto incentives for global alignment with EU norms.

2. Global uptake is uneven and conditional.

While many jurisdictions view the AI Act as a model, concerns about regulatory asymmetry, implementation costs, and contextual relevance remain. Particularly in the Global South, capacity-building and policy co-design are seen as prerequisites for meaningful adoption.

3. The Act catalyzes convergence but also creates tensions.

The AI Act plays a dual role: as a unifying framework for international standards and as a source of geopolitical friction. Its assertive extraterritorial stance is viewed by some as regulatory overreach, raising debates about digital sovereignty, innovation freedom, and global interoperability.



Chapter 3

IMPACT ON TECHNOLOGICAL INNOVATION

3.1 Introduction: innovation in the shadow of regulation

Innovation and regulation have long had a tense relationship. While innovation thrives in agile, risk-tolerant environments, regulation exists to reduce uncertainty, protect rights, and prevent harm. The European Union's Artificial Intelligence Act (AI Act) attempts to do both: encourage safe and sustainable technological advancement while ensuring ethical and legal safeguards. But does it succeed?

At the heart of this tension lies a critical question: Will the AI Act empower or constrain the next wave of technological breakthroughs in Europe and beyond? The stakes are high. As Raja Chatila observed, „Europe started to lag in the computer and electronics industry, before AI. With AI, the challenge is to lead rather than follow".

Other experts take a more cautious view. Ieva Martinkenaite described the regulation as "a good starting point," but warned: "If it's not accompanied by massive investment and industry support, Europe risks falling behind again".

This chapter explores the multifaceted impact of the AI Act on innovation. Drawing on interviews with global experts, it examines the opportunities and risks associated with Europe's regulatory ambition.

3.2 Regulatory certainty and business investment

One of the strongest arguments in favor of the AI Act is that it provides legal certainty for businesses operating in the European market. In contrast to a fragmented landscape of national laws or voluntary frameworks, the Act offers a single rulebook for all 27 Member States.

Elinor Wahal, a legal and policy officer at the European Commission's AI Office, explains: "For companies, having a single set of rules - instead of 27 national ones - means reduced legal ambiguity. This clarity encourages investment, especially for firms previously hesitant to scale AI solutions due to regulatory grey zones".

This legal predictability also benefits international firms looking to enter the European market. Knowing what is expected in terms of risk classification, data documentation, and transparency can make the difference between choosing Europe or turning elsewhere.

However, some caution that this benefit is conditional. Nicolas Miailhe points out that the framework's practical effectiveness will depend on the enforcement capabilities of national authorities and the guidance provided to smaller players. "Uniformity on paper is one thing. Implementation is another," he notes.

Despite these caveats, many agree that legal clarity is a cornerstone of innovation-friendly policy. If done right, the AI Act could offer companies a stable and predictable environment in which to build ethically aligned AI systems and that in itself is a competitive advantage.

3.3 Innovation-friendly tools: sandboxes, exemptions, pilots

To avoid stifling innovation, especially among startups and SMEs, the AI Act includes specific mechanisms designed to create space for experimentation. Among the most notable are regulatory sandboxes - safe environments where developers can test AI systems under the supervision of national authorities without immediate risk of penalties.

Elinor Wahal notes, "The inclusion of regulatory sandboxes is a clear sign that the Commission does not want to block innovation, it wants to guide it. These sandboxes will help startups navigate compliance while still moving quickly".

The Act also introduces exemptions for research and development activities, shielding exploratory work from overly burdensome oversight. This carve-out is particularly important for academic institutions and smaller companies with limited resources, ensuring they can participate in AI advancement without excessive constraints.

Inma Martinez supports this direction but adds a caution: "While the tools are there, access is not automatic. Smaller actors still need technical and legal support to use them effectively. Otherwise, the tools benefit only the well-connected".

Pilot projects, supported by national or EU-level innovation funds, are also encouraged. These pilots allow for early feedback on compliance processes and help shape harmonized standards across Member States.

Sebastian Hallensleben stresses that such measures must go hand-in-hand with funding: "Regulatory relief alone doesn't foster innovation. It must be paired with infrastructure, mentorship, and investment".

If implemented equitably and supported institutionally, these tools could transform regulation from a barrier into a platform for innovation especially in Europe's vast network of emerging AI enterprises.

3.4 Risks of overregulation and innovation flight

Despite the Act's innovation-friendly intentions, many stakeholders voice concern that its strict provisions may unintentionally discourage AI development in Europe. Startups and global firms may find the cost of compliance too high or the administrative burden too heavy leading to what some have described as „innovation flight."

Laurence Liew, working in the Singaporean AI ecosystem, noted, "Globally, we're observing that AI companies are carefully evaluating regulatory approaches in different regions like the EU AI Act. Every jurisdiction, including Singapore, is working to develop frameworks that provide clarity and certainty while acknowledging that AI is still an evolving technology."

This sentiment is echoed by Tomasz Trzciński, who warns that innovation ecosystems are sensitive to perceived overreach: "If the Act creates too many hurdles before an AI product can be brought to market, entrepreneurs may simply look elsewhere".

The fear is not just economic, but strategic. Europe may find itself consuming AI systems developed under less stringent frameworks without having shaped their development. Raja Chatila warns: "If global players avoid Europe due to high compliance costs, we lose not only market share, but influence over how AI is built and used".

Moreover, the classification of high-risk AI can be too broad or too rigid. In sectors like health and education, systems that may offer significant innovation are automatically subject to complex obligations. This may deter experimentation or pilot deployments in fields where AI could deliver substantial public good.

Inma Martinez

Zug Research Society for the Advancement of Humanity

"We would never accept uncertified medicine. Why should we accept uncertified AI systems, especially if they make decisions about our health, safety, or rights?".

As the Act enters its implementation phase, experts call for monitoring and feedback mechanisms that assess whether these regulations are having the desired effect—or inadvertently creating barriers to innovation. As Samo Zorc summarizes: The real work starts now. Regulation includes governance structure and provisions that enable its adaptation following the advancements in AI and thus evolution alongside technology, but based on current speed of developments in AI, it is yet to be seen if and how this in fact will be utilized. Otherwise, it might become obsolete before it even takes hold".

3.5 Sectoral case studies: health, finance, mobility

The AI Act's sectoral impact varies depending on how tightly specific use cases are regulated. In high-risk sectors such as healthcare, finance, and mobility, the Act's provisions can both guide innovation and inadvertently limit it.

In healthcare, AI holds immense potential for diagnostic systems, personalized medicine, and resource management. However, under the AI Act, many of these systems fall into the high-risk category, subjecting them to strict documentation, transparency, and oversight requirements. As Olivia Erdelyi notes, „Overregulation in health AI might delay the deployment of life-saving tools—not because they're unsafe, but because they're novel".

Nevertheless, others argue that such caution is necessary. Nozha Boujemaa emphasizes that "when patient lives are at stake, we need certainty that AI behaves reliably and ethically. The Act creates a framework for trust, which is essential for adoption in public health systems".

In the financial sector, many firms welcome the clarity the Act brings, particularly around algorithmic transparency and bias mitigation. Algorithms in credit scoring, fraud detection, and trading are now held to higher standards.

Leo Karkkainen warns, however, that innovation in fintech could slow due to the increased cost of compliance: "Some smaller fintech firms may not have the resources to demonstrate conformity to the same extent as large institutions".

To address this, several Member States are exploring cooperative models where regulators and fintech startups co-design compliance strategies within national sandboxes.

The mobility sector faces its own challenges. Autonomous driving technologies, in particular, are directly impacted by the Act's risk framework. Systems that interact with the physical environment and human safety are under intense scrutiny. Rafał Kamiński sees this as both a challenge and a necessity: "The public must feel that autonomous systems are safe before they can be widely adopted. Regulation is how we build that trust".

Yet, the need for iterative testing and fast development cycles in autonomous systems presents a regulatory mismatch. Experts suggest that more dynamic, context-sensitive approaches may be required to support innovation in this space.

Taken together, these sectoral snapshots illustrate a broader pattern: the AI Act creates both guardrails and friction. How each sector balances innovation with responsibility will depend not just on the law itself, but on the ecosystems of support, cooperation, and trust that surround it.

3.6 Future-proofing AI innovation

A recurring concern among experts is whether the AI Act is sufficiently dynamic to remain relevant in the face of rapid technological progress. With general-purpose AI (GPAI), large language models, and autonomous systems evolving at unprecedented speed, there are fears that regulation may lag behind innovation, or worse, suppress it.

Marko Grobelnik reflects on this issue: "The current generation of regulation is not designed for systems that learn and evolve in unpredictable ways. We need mechanisms that adapt at the pace of the technology they're meant to govern". This sentiment is echoed by Sally Radwan, who notes that "hardcoded legal categories can't keep up with soft-edged technologies." As she explains, the regulatory emphasis on discrete risk levels and predefined categories may not be flexible enough to capture the nuances of emerging AI architectures.

To mitigate this, experts propose several forward-looking strategies:

- Modular regulatory updates that can be introduced through delegated acts or secondary legislation, allowing the framework to evolve without requiring full renegotiation.
- Public-private foresight mechanisms, including permanent expert panels or innovation councils to advise the Commission on technology trends and emerging risks.
- Dynamic compliance models, such as real-time auditing or rolling risk assessments for GPAI systems, rather than static documentation.

Inma Martinez proposes the creation of an independent certification body for AI models, similar to the EMA in pharmaceuticals. "We would never accept uncertified medicine. Why should we accept uncertified AI systems, especially if they make decisions about our health, safety, or rights?".

Additionally, some argue that future-proofing AI regulation requires not just legal tools, but investment in infrastructure, education, and interdisciplinary research. As Raja Chatila puts it: "You can't regulate what you don't understand. And you can't innovate safely if you regulate in a vacuum".

The question is not whether the AI Act will become outdated. It will. The real question is whether it has the built-in capacity to evolve, and whether its implementers are prepared to listen, learn, and legislate at the speed of change.

Olivia J. Erdelyi

Universities of Canterbury and Bonn, PHI INSTITUTE

„The Act is a floor, not a ceiling. It must grow with the technology it seeks to govern."

3.7 Summary: Regulation as a Catalyst or Constraint?

The European Union's AI Act is not a simple rulebook it is a regulatory experiment in balancing technological ambition with societal values. As this chapter has shown, its impact on innovation is both enabling and constraining, depending on sector, scale, and perspective.

The Act offers undeniable advantages in terms of legal certainty, ethical alignment, and structured risk management. These are particularly valuable in sensitive domains such as healthcare, finance, and mobility, where public trust is essential. Tools like regulatory sandboxes and exemptions for research activities have the potential to bridge the gap between compliance and creativity.

Yet, the challenges are equally clear. Overregulation, especially for general-purpose and high-risk AI, may lead to delays, market withdrawal, or relocation of development efforts. SMEs, in particular, face a disproportionate compliance burden. Additionally, the Act's static structure is being tested by dynamic, rapidly evolving AI models that do not fit neatly into regulatory boxes.

To ensure that the AI Act becomes a catalyst—not a constraint—policymakers must remain vigilant and responsive. As Olivia J. Erdelyi aptly noted, "The Act is a floor, not a ceiling. It must grow with the technology it seeks to govern". Only then can the AI Act serve not just as a model for regulation, but as a foundation for globally competitive, human-centered innovation in the age of artificial intelligence.

Elinor Wahal

Legal and Policy Officer, European Commission AI Office

"For companies, having a single set of rules - instead of 27 national ones - means reduced legal ambiguity. This clarity encourages investment, especially for firms previously hesitant to scale AI solutions due to regulatory grey zones".

AUTHORS' KEY TAKEAWAYS

1. Legal harmonization is necessary but not sufficient for dynamic AI ecosystems.

While the AI Act standardizes rules across the EU, creating a unified regulatory environment, the rigidity of its categories and procedural demands risks sidelining iterative innovation models, especially for fast-scaling AI startups and academic spin-offs.

2. AI innovation requires more than regulatory clarity, it needs governance agility.

High-complexity systems like general-purpose AI (GPAI) evolve beyond predefined risk tiers. The lack of mechanisms for continuous reassessment and real-time auditing may render the Act obsolete unless policy instruments are modular, updatable, and responsive to emergent functionalities.

3. Cross-sectoral regulatory adaptation is key to AI-driven transformation.

Case studies in healthcare, finance, and mobility show both regulatory traction and inertia. Without sector-specific adaptation of enforcement and compliance strategies, innovation pipelines may stall—even when use cases align with public interest goals like efficiency, accessibility, or safety.

Chapter 4

ETHICS AND RESPONSIBILITY IN AI

4.1 Introduction: ethics as infrastructure

Ethics in artificial intelligence is often framed as a constraint—an afterthought to innovation or a soft discipline compared to technical engineering. But in the context of the AI Act, ethics is something much more foundational. It acts as a form of digital infrastructure: shaping trust, guiding responsibility, and anchoring societal acceptance. As Ana Pricã-Cruceanu observes, "Ethical AI isn't just about compliance; it's about creating systems that reflect our long-term vision of digital sustainability and human dignity". In this view, ethics must be embedded not only in design principles but also in legal instruments, funding frameworks, and governance practices.

This chapter explores how the AI Act addresses ethics and responsibility—not as abstract values, but as operational principles that govern real-world AI deployment. It highlights both process and gaps, drawing on insights from researchers, policy advisers, civil society leaders, and global organizations.

4.2 Ethical Principles in the AI Act

The AI Act incorporates a range of ethical safeguards that were first articulated in the European Commission's Ethics Guidelines for Trustworthy AI (2019). These include principles of human agency and oversight, technical robustness and safety, privacy and data governance, transparency, diversity, non-discrimination, and societal well-being.

According to Nozha Boujemaa, "These principles are not only ethical—they're practical. Without accountability, robustness, and transparency, you don't have a trustworthy system; you have a liability".

The Act attempts to embed these ideals by requiring risk assessments, transparency disclosures, human oversight mechanisms, and post-market monitoring for high-risk systems. It also prohibits certain uses of AI altogether, such as manipulative systems that exploit vulnerabilities. However, the translation of ethical vision into legal articles is far from seamless. As Olivia J. Erdelyi notes, „The AI Act operationalizes reliability, but trustworthiness—understood in its deeper ethical sense—remains elusive. We regulate process, but the moral dimension often slips through the gaps".

Moreover, as Octavio Kulesz points out, ethics must also consider cultural plurality: „Ethics can't be one-size-fits-all. If the AI Act aspires to global

Octavio Kulesz

Philosopher and UNESCO Expert

Ethics can't be one-size-fits-all. If the AI Act aspires to global influence, it must be sensitive to philosophical and societal differences in how we define justice, autonomy, and harm. This does not mean abandoning core ethical commitments, but rather making room for pluralism in their interpretation and implementation

Ana Pricã- Cruceanu

The Network of Experts without Borders, UNESCO for Ethical Artificial Intelligence

"Ethical AI isn't just about compliance; it's about creating systems that reflect our long-term vision of digital sustainability and human dignity".

influence, it must be sensitive to philosophical and societal differences in how we define justice, autonomy, and harm. This does not mean abandoning core ethical commitments, but rather making room for pluralism in their interpretation and implementation." The ethical architecture of the AI Act, then, is both a strength and a work in process—rich in aspiration, but still uneven in implementation.

4.3 Responsibility gaps and governance challenges

One of the more pressing concerns raised by experts is the distribution of responsibility when AI systems cause harm. While the AI Act clearly defines duties for providers and users of high-risk systems, gray areas remain—particularly for general-purpose AI or systems repurposed outside their intended use.

Merve Hickok stresses the urgency of addressing these gaps: "Without clear accountability and liability mechanisms, we risk a world where no one is responsible when things go wrong—and that undermines trust in the whole system".

The Act includes requirements for human oversight, but it does not mandate ethical audits or human rights impact assessments. As Raja Chatila argues, „An ethics-by-design approach is not enough if it's not backed by systemic governance—ethics must be enforced, not just encouraged". Furthermore, Gry Hasselbalch points out the challenge of regulating AI through traditional static rules: "AI evolves; governance must be dynamic. We need mechanisms that monitor how ethical risks shift over time, not just at the point of deployment".

Several experts have proposed independent oversight bodies or AI ombuds institutions that could oversee not just compliance but ethical responsibility—ensuring that ethical standards are not a box-ticking exercise but an ongoing commitment.

4.4 Contextualizing trust: reliability vs. trustworthiness

The AI Act speaks extensively about reliability, safety, and technical compliance—but many ethicists argue that this misses a deeper dimension: trustworthiness. While a system may be reliable (i.e., it works as intended), it may still not be trustworthy (i.e., worthy of moral confidence).

Olivia J. Erdelyi explains: "There's a critical distinction between what's functionally sound and what's ethically sound. An AI that is technically

robust but deployed in emotionally manipulative ways may pass compliance, yet fail ethics".

This is especially relevant for AI systems with human-like features or functions—such as chatbots, virtual companions, or recommender systems—where the user's perception of trust plays a central role. As Marc Buckley notes, "We're creating systems that simulate empathy, but we haven't agreed whether it's ethical to simulate a soul".

The difference also manifests in public expectations. Trustworthiness often includes transparency, explainability, fairness, and the ability to contest decisions—factors that go beyond what technical regulation usually provides.

Therefore, the challenge now is twofold: to bridge the semantic gap between legal reliability and ethical trust, and to align regulatory language with societal expectations around justice, dignity, and human agency in ways that are genuinely beneficial for both individuals and the planet

4.5 Ethical challenges in specific domains

As AI systems permeate more aspects of daily life, the ethical challenges they pose become highly context-dependent. From biometric surveillance to education and public services, the risks and dilemmas vary—but the need for principled frameworks remains constant.

One of the most discussed examples is facial recognition technology. Sally Radwan warns, "The use of biometric surveillance in public spaces tests the very boundaries of democratic societies. Without strict safeguards, we risk normalizing mass observation".

In the education sector, AI-driven assessments and learning personalization raise questions of equity and algorithmic bias. Laurence Liew highlights the vulnerability of underrepresented groups: "If AI systems are trained on skewed datasets, they can reinforce the very inequalities they claim to overcome".

Healthcare, too, presents unique ethical stakes. Systems used to predict disease or allocate resources can produce life-altering outcomes. Elinor Wahal emphasizes the importance of contestability: "Patients need the right to challenge AI-driven decisions that affect their treatment, just like they would challenge a human physician's judgment".

AI-generated content introduces a new category of ethical complexity. Generative models can

Nozha Boujemaa

Global VP AI Innovation and Trust - Decathlon

"These principles are not only ethical—they're practical. Without accountability, robustness, and transparency, you don't have a trustworthy system; you have a liability".

Raja Chatila

Professor at Sorbonne University

„An ethics-by-design approach is not enough if it's not backed by systemic governance—ethics must be enforced, not just encouraged".

produce misinformation, perpetuate harmful stereotypes, or infringe on intellectual property rights. As Octavio Kulesz notes, „We need ethical clarity on what it means to co-create with a machine—especially when that machine reflects our cultural biases".

Moreover, many experts are concerned about the ethical opacity of so-called black-box models. As Ana Prică-Cruceanu argues, „Explainability is not a luxury—it's a necessity for ethical accountability, particularly in high-stakes domains like law enforcement or finance".

Each domain introduces distinct dilemmas, but all point to a common need: a regulatory framework that is not only risk-sensitive but also ethically attuned to context, users, and societal values.

4.6 Emerging ethical standards and global convergence

While the AI Act is rooted in the European value system, its ethical aspirations resonate globally—yet at times conflict with other jurisdictions' legal and cultural frameworks. The Act intersects with a growing ecosystem of ethical frameworks, such as the OECD AI Principles, UNESCO's Recommendation on the Ethics of AI, regional charters like the African Union's Data Policy Framework and standards recommended for NATO by Data and AI Review Board.

Nicolas Miailhe emphasizes the significance of alignment: "If we want AI to serve global humanity, we need common languages—not just in code, but in values. The AI Act can lead this convergence, but only if it listens as much as it leads". Global collaboration around ethics is not just a political challenge but a practical necessity. Without it, companies face overlapping or conflicting requirements when building international AI systems. As Cyrus Hodes warns, „Without a shared baseline for ethical AI, we risk creating regulatory silos that limit both innovation and rights protections".

Several experts point to the role of multi-stakeholder platforms in bridging these divides. The Global Partnership on AI (GPAI), for instance, has initiated projects on responsible AI that involve voices from governments, academia, civil society, and industry.

Amir Banifatemi underlines the role of ethics as a dynamic force: "Ethics cannot be separate from technological innovations. They must evolve

Merve Hickok

President – Center for AI and Digital Policy

„Ethics is not a compliance checkbox—it's a commitment to treating people with dignity, even when the system doesn't demand it".

together through ongoing dialog and coordination. Rather than relying on static declarations, we need living ethical frameworks that develop alongside AI systems and are actively co-created with public participation."

Efforts toward ethical convergence also include the development of global indicators for fairness, accountability, and transparency. While these are still in their early stages, initiatives like AI Ethics Impact Groups (EIS, IEEE) and ISO technical committees are laying important groundwork.

The AI Act, as a comprehensive and enforceable regulation, can serve as a blueprint—but its effectiveness will hinge on Europe's willingness to engage in mutual learning with other regions, and to evolve its own standards in the process.

4.7 Summary: ethics as an enabler of Trustworthy AI

The AI Act represents one of the most comprehensive attempts to institutionalize ethics within a binding regulatory framework. Yet, as this chapter has shown, embedding ethics into law is neither linear nor complete. The Act draws strength from its normative ambition—enshrining values like transparency, fairness, and human oversight—but struggles with implementation gaps, interpretive ambiguities, and the ever-evolving nature of AI technologies.

Experts agree that responsibility cannot be static. It must be continually reassessed as AI systems adapt, contexts shift, and societal expectations evolve. From facial recognition and generative AI to algorithmic governance in health and education, ethical issues are as varied as they are urgent—including the governance of asymmetries in access to AI-enabling technologies and markets.

A recurring insight throughout the chapter is that trust is built not only through legal reliability but through perceived fairness, contestability, and moral legitimacy. As Merve Hickok notes, „Ethics is not a compliance checkbox—it's a commitment to treating people with dignity, even when the system doesn't demand it". Ethics will not regulate itself. But with deliberate action, the AI Act can evolve into a living framework—one that protects, inspires, and earns the trust of the societies it seeks to serve.

AUTHORS' KEY TAKEAWAYS

1. Ethics legally anchored, yet enforcement gaps persist

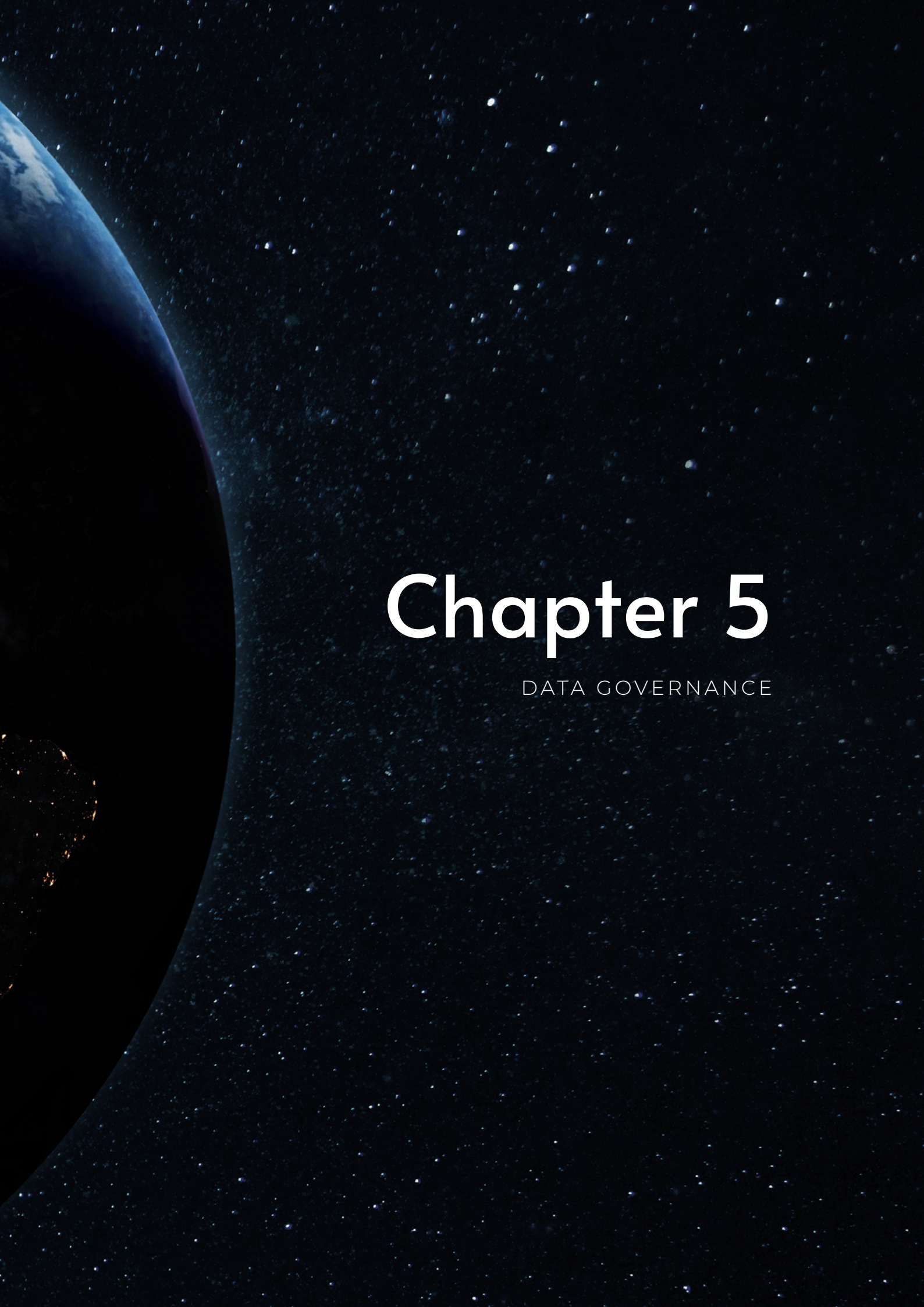
The AI Act grounds itself in the Trustworthy AI framework, making ethical principles an integral part of its legal logic and institutional design. While mechanisms exist to reflect these values in practice, concerns remain about the adequacy and consistency of implementation—particularly regarding the depth of fundamental rights assessments and the absence of binding ethical audit requirements across systems and jurisdictions.

2. Trust in AI requires more than compliance—it demands moral legitimacy.

Legal reliability does not guarantee public trust. As AI systems increasingly simulate empathy, autonomy, and agency, ethical trustworthiness must encompass contestability, cultural sensitivity, and the psychological and social dimensions of human-machine interaction.

3. Ethical governance must evolve alongside technological architecture.

Static codes cannot match the fluidity of AI deployment. A shift toward "living ethics" is needed—flexible, participatory, and context-aware frameworks that adapt with new use cases, cultural settings, and system capabilities.



Chapter 5

DATA GOVERNANCE

5.1 Introduction: data as the foundation of AI

Artificial intelligence systems are only as good as the data they rely on. Data shapes outcomes, reveals patterns, and encodes both knowledge and bias. In the age of AI, data governance becomes a central pillar not only of performance, but of legitimacy, safety, and fairness.

Equally critical are the skills and organizational readiness required to govern data effectively—especially alongside knowledge modeling—as foundational capabilities in both the design and responsible use of AI systems. As Ana Prică-Cruceanu explains, "Without proper governance, data-driven systems become engines of exclusion. Ethics, sustainability, and inclusivity start at the level of data collection, access, and use".

The AI Act reflects growing recognition of this reality. While the regulation does not offer a complete data governance framework, it intersects with a range of existing laws—especially the GDPR—and sets expectations for high-risk AI systems concerning data quality, training processes, and documentation. This chapter explores these intersections and challenges, as well as the emerging calls for a broader, more participatory model of data stewardship.

5.2 Legal and ethical principles in data governance

Data governance under the AI Act is grounded in the principles of data minimization, quality, representativity, and fairness. High-risk systems are required to use training, validation, and testing datasets that are relevant, sufficiently representative, and free of errors. These requirements echo the EU's commitment to a rights-based digital ecosystem, where privacy and non-discrimination are central.

Pam Dixon underscores this dual mandate: "The AI Act tries to harmonize two demands: technological scalability and fundamental rights. That's not easy. Many problems with AI start at the level of data, not just algorithms".

The AI Act builds on prior legislation such as the GDPR, which already established key obligations around consent, purpose limitation, and transparency. However, as Olivia J. Erdelyi notes, „GDPR regulates the ‚how' of data, the AI Act is starting to regulate the ‚why' and the ‚with what consequence."

These overlapping frameworks require alignment—not only in law, but in institutional practice. Questions persist about how data protection authorities and AI market surveillance bodies will coordinate their efforts. Furthermore, the line between personal and non-personal data is increasingly blurred with synthetic data, inferred data, and anonymization methods that may still allow reidentification.

Ultimately, data governance is not only about compliance but about shaping responsible innovation. As Cyrus Hodes suggests, „It's time to think of data not only as a commodity or risk, but as a commons—something to be collectively managed for public benefit".

5.3 Data quality, bias and representativity

High-quality, unbiased data is the lifeblood of trustworthy AI. Yet many of today's systems are trained on datasets that contain systemic biases, omissions, or errors—often inherited from the real-world environments they reflect. The consequences can be far-reaching: from perpetuating stereotypes to denying services, justice, or opportunity to entire groups.

Laurence Liew draws attention to the practical risks: "If 70% of your training data comes from English-speaking, urban users, the system may work beautifully for them—and fail catastrophically for everyone else".

The AI Act attempts to address these risks through requirements for data representativeness, especially in high-risk applications. Developers must document their training and testing datasets, and demonstrate that they account for population diversity. However, many experts argue this doesn't go far enough.

Merve Hickok emphasizes the need for structural reform: "Bias mitigation can't be a patch. It has to be baked into the design, procurement, and evaluation cycles—especially in public sector deployments".

Additionally, data quality is often conflated with data quantity. But as Marko Grobelnik notes, more data doesn't always mean better results: "Poorly labeled or noisy data at scale just creates more sophisticated failures. Quality and provenance must come first".

A comprehensive strategy for data quality must therefore include not just technical validation, but also transparency about sourcing, curation practices, and community engagement—particularly when datasets affect historically marginalized groups.

As AI becomes embedded in more critical functions of society, ensuring that its foundations are inclusive and fair is not just a technical challenge, but a democratic imperativ

5.4 Access, ownership, and control

Who controls data, and who decides how it can be accessed and reused? These questions lie at the heart of modern AI development. In legal terms, data—unless it concerns personal information—is not owned; it is a digital representation of reality, which itself remains non-proprietary. Yet in practice, vast amounts of data are collected, enclosed, and monetized by a small number of actors. The AI Act begins to chart a regulatory path toward fairer access, but many experts argue that more is needed: a framework that secures equitable access rights and enables data sharing for the common good—not only of users, but of future innovators.

Amir Banifatemi raises a fundamental concern: "SMEs can't afford to collect or license vast datasets. If data access remains in the hands of a few tech giants, then innovation will never be truly competitive—or inclusive".

The AI Act imposes documentation obligations, but it leaves many decisions about data access and reuse in the hands of developers and providers. While this may allow flexibility, it also risks reinforcing monopolistic control over foundational data resources. Nicolas Miailhe notes, "We need to democratize access to high-quality data if we want an AI landscape that serves all, not just the most powerful".

The issue of ownership also applies to data subjects. Under the GDPR, individuals have rights over their personal data, including access and deletion. However, in AI development, much of the data is aggregated, inferred, or anonymized—raising new challenges for accountability and user control.

Nicolas Miailhe

CEO & Co-founder, PRISM Eval

We need to democratize access to high-quality data if we want an AI landscape that serves all, not just the most powerful".

As Octavio Kulesz emphasizes, "If AI systems are built on cultural, linguistic, or behavioral data from communities, then those communities must have a say in how their data is used. Consent cannot be abstract or retroactive".

Creating mechanisms for collective governance—such as data cooperatives, commons-based models, or public data infrastructures—could help distribute both control and benefits more equitably. But these models require institutional support, legal clarity, and above all, political will.

5.5 The challenge of data sovereignty

Data sovereignty—the idea that data is subject to the laws and governance structures within the nation where it is collected—has become a central concept in the AI policy debate. For the European Union, data sovereignty is a cornerstone of its digital strategy, reflecting the desire to ensure that European data serves European interests, complies with European values, and is protected from foreign exploitation.

Samo Zorg highlights this geopolitical angle: "If Europe wants to lead ethically, it must also lead infrastructurally. We can't build sovereign AI systems without sovereign control over the data that feeds them".

The AI Act reinforces this vision indirectly. While it does not explicitly legislate data sovereignty, its alignment with the GDPR and the broader Digital Strategy—including the Data Governance Act and the upcoming European Health Data Space—positions it as part of a larger architecture of European digital autonomy, particularly in light of the Free Flow of Non-personal Data Regulation (FFOD) within the internal European market and digital trade provisions embedded in free trade agreements with like-minded third countries.

Yuko Harayama notes that this differs sharply from the U.S. model: "Europe's focus is on shared value and regulatory consistency. The American model is more fragmented and market-driven, while Asia blends centralization with innovation push".

Yet sovereignty is not just a matter of borders. In practice, it also relates to institutional capacities, interoperability across jurisdictions, and the rights of individuals and communities. For countries in the Global South, data sovereignty can mean the ability to resist extractive practices by foreign tech companies and to build local capacity for AI governance.

Amir Banifatemi

Founder of AI Commons and Chief Responsible AI Officer with Cognizant

SMEs can't afford to collect or license vast datasets. If data access remains in the hands of a few tech giants, then innovation will never be truly competitive—or inclusive".

Samo Zorc

OECD AI expert

"If Europe wants to lead ethically, it must also lead infrastructurally. We can't build sovereign AI systems without sovereign control over the data that feeds them".

Sebastian Hallensleben warns of the risks of misinterpreting the concept: "Data sovereignty should not become data protectionism. We need openness with safeguards—not walls that prevent scientific exchange and cooperative innovation". Striking the right balance between local control and global interoperability will require ongoing policy refinement and multilateral coordination. The AI Act can serve as a platform for asserting democratic data governance—but only if it remains open to dialogue, adaptation, and partnership.

5.6 Future pathways: from compliance to collaborative data governance

As AI systems become more integral to public services, scientific research, and commercial operations, the question is no longer whether data should be governed, but how. Experts increasingly argue that compliance-based models must evolve into more dynamic, collaborative, and participatory frameworks.

Ana Prică-Cruceanu envisions a shift toward shared responsibility: "We need new mechanisms—data commons, data trusts, citizen panels—that allow people to co-govern the data that impacts their lives". Such models challenge the conventional notion of data as a resource controlled exclusively by companies or states.

Federated learning, synthetic data sharing, and privacy-preserving technologies offer new ways to pool knowledge while respecting privacy. But their adoption requires standards, infrastructure, and public trust. Raja Chatila stresses the need for accountability at every layer: "Ethical data governance isn't only about access—it's about responsibility throughout the lifecycle: collection, labeling, usage, retention, and deletion".

Cyrus Hodes adds a global dimension: "We can't talk about climate change or pandemic preparedness without cross-border data sharing. But cooperation must be underpinned by ethical terms—not just efficiency metrics".

The European Union has begun to explore these frontiers through the Common European Data Spaces and sectoral initiatives in health, energy, and mobility. However, most efforts remain early-stage and fragmented.

To scale, collaborative governance needs:

- Legal clarity on rights and obligations within data partnerships.
- ools for ethical auditing and community consent.
- Governance bodies that include underrepresented voices.
- Establishing a fair framework for trustworthy data sharing spaces.

Without these elements, even the most innovative models risk becoming pilot projects that never reach systemic relevance. The challenge ahead is to embed collaborative governance as a standard, not an exception, in the future of European and global data ecosystems.

5.7 Summary: building an open and responsible data infrastructure

Data governance is no longer a peripheral issue in artificial intelligence—it is its foundation. As this chapter has explored, how we collect, access, control, and share data defines the ethical and operational boundaries of AI.

From legal frameworks like the GDPR and AI Act to emerging models of collaborative stewardship, the landscape is rapidly evolving. But significant gaps remain. Challenges around bias, quality, access, sovereignty, and global interoperability persist and, if unaddressed, may deepen digital inequalities.

Experts agree that data governance must be democratized. Not just in terms of who holds the data, but who shapes the rules, who audits the processes, and who benefits from the insights.

As Marc Buckley puts it, "True sustainability means building data ecosystems that include many voices—not just the most powerful". Only through bold, inclusive, and ethical data governance can we ensure that AI technologies empower society rather than divide it. The AI Act offers a start—but the infrastructure of trust must be continually built, challenged, and renewed.

Cyrus Hodes

General Partner at 1infinity Ventures

„It's time to think of data not only as a commodity or risk, but as a commons—something to be collectively managed for public benefit".

AUTHORS' KEY TAKEAWAYS

1. The AI Act is promoting a federated framework for data governance, but lacks institutional depth.

While it sets strong expectations for data quality and fairness, the AI Act defers many substantive decisions—on access, stewardship, and accountability—to future mechanisms or existing frameworks like the GDPR. This creates a patchwork in need of institutional consolidation and dedicated oversight.

2. Data governance is evolving from individual rights to collective ethics.

Experts advocate a shift from data protection models centered on ownership of access to data and consent toward shared governance models such as data commons, cooperatives, and data trusts. These emerging paradigms are better suited to address power asymmetries, community impact, and equity in access to high-quality datasets.

3. Sovereignty, sustainability, and inclusivity must converge in a post-GDPR regulatory ecosystem.

European data sovereignty is framed as a reaction to transnational platform dominance. However, it also risks being misinterpreted as protectionism. The future lies in balancing local control with interoperability, and embedding environmental and social dimensions into every stage of data lifecycle governance.

Chapter 6

SUSTAINABLE DIGITAL TRANSFORMATION

6.1 Introduction: A Triple Transition

Sustainable digital transformation is not a technical trend, nor is it reducible to eco-efficiency or green IT. It is a systemic, long-term shift that places human dignity, institutional resilience, and social equity at the core of technological change. True sustainability in digital transformation means designing ecosystems that respect planetary limits, but also recognize human fear, preserve agency, and inclusive innovation. It is a response to automation anxiety and workforce displacement, and a counter-narrative to the notion that disruption must come at the cost of cohesion. Sustainable digital transformation is about building futures that are not only faster—but fairer, wiser, and more adaptive.

In the European Union's twin transition agenda—digital and green—the AI Act plays a pivotal role. It sets ethical and technical guardrails for artificial intelligence, but its indirect effects on sustainability are equally critical. As Sally Radwan notes, „We can't decouple AI from its environmental context. Sustainability has to be coded into our digital infrastructure, not added as an afterthought".

This chapter examines how the AI Act supports—and at times constrains—the deeper vision of sustainable digital transformation. Far beyond emissions and efficiency, the stakes lie in whether AI can be aligned with a model of change that is human-centered, socially inclusive, environmentally responsible, and resilient in the face of disruption.

6.2 Green AI and environmental responsibility

Artificial intelligence, particularly in the form of large-scale models, demands immense computational power. The environmental footprint—from energy consumption in data centers to rare-earth mining for hardware—has grown significantly. Yet the AI Act offers only a partial framework for addressing these concerns.

Inma Martinez emphasizes the regulatory blind spot: "Nowhere in the AI Act's 144 pages is there a mandate to evaluate the carbon footprint of AI systems. That's an unacceptable oversight in the age of climate crisis".

Efforts to introduce eco-design principles or limits on training emissions have so far been fragmented. Still, some see potential in linking AI system certification with environmental performance. As Marc Buckley argues, "Sustainability isn't

Marc Buckley

CEO ALOHAS Regenerative Foundation

We don't just need greener servers. We need regenerative systems—ethical by design, and beneficial by intention".

just carbon reduction—it's about regenerative systems. The AI Act should help align digital infrastructures with planetary boundaries".

Innovative solutions such as energy-efficient algorithms, modular model design, and data center heat recycling are emerging—but adoption remains limited without clear regulatory incentives. The AI Act could evolve to support such innovations, especially if linked to broader EU frameworks like the Green Deal or taxonomy for sustainable activities.

Amir Banifatemi adds a systemic perspective: "Resilience isn't just about robust systems to include resilient societies, communities, and economic structures. When designing digital transformation, we must consider entire ecosystems—not just code, but also energy consumption, labor impacts, and supply chain sustainability."

A green AI future requires more than better chips. It calls for a new compact between technology and society—one where efficiency is measured not only by speed or scale, but by long-term ecological and social coherence.

6.3 Digital transformation for public good

Beyond market efficiency, digital transformation must serve broader societal goals. The AI Act has the potential to guide this shift, particularly if implemented in ways that prioritize public interest, inclusion, and sustainability.

Vilas Dhar underlines this point: "We need AI to serve the many, not the few. That means shaping policies that embed justice, dignity, and sustainability into the algorithms that now shape lives".

AI has already shown promise in supporting the UN Sustainable Development Goals (SDGs)—from optimizing energy grids and modeling climate change to enhancing access to healthcare and education. However, without safeguards, the same technologies risk reinforcing digital divides, automating exclusion, or accelerating extractive models of development.

Leo Karkkainen reflects on the tension: "Digital transformation must be a transformation for all. If AI benefits only the most connected, we have failed the sustainability test".

Merve Hickok emphasizes community engagement: "We can't just deploy AI in underserved areas—we must co-create with them. Otherwise, we risk digital paternalism and experimentation, not empowerment".

The AI Act, while focused on risk and safety, can support public good outcomes if it integrates principles like algorithmic equity, access to training data for non-profit applications, and incentives for open-source solutions. Public sector use of AI should become a driver of inclusive digital innovation—not a replicator of systemic bias.

Ultimately, sustainable digital transformation must be measured not only by GDP growth or tech unicorns, but by how it reduces inequalities, restores trust, and enhances well-being across communities.

6.4 Barriers to sustainable AI adoption

Despite a growing consensus on the importance of sustainable digital transformation, practical obstacles continue to hinder its realization. These barriers are not merely technical—they are infrastructural, economic, geopolitical, and cultural.

Ieva Martinkenaite highlights a central tension: "We hear a lot about regulation, but very little about investment. Without public-private funding partnerships, sustainable AI will remain a PowerPoint ambition".

One of the most immediate challenges is the uneven availability of digital infrastructure across regions. In some EU Member States, and even more so in developing countries, outdated grids, lack of affordable computing power, and insufficient broadband access constrain the deployment of responsible AI systems.

Marko Grobelnik adds another layer: "It's not just about data centers. It's about semiconductors, supply chains, clean energy, and geopolitical stability. Europe must produce the components of digital sovereignty within its borders if it hopes to lead".

Small and medium enterprises (SMEs) also face disproportionate burdens. Lacking in-house compliance teams or advanced technical capabilities, they are often left behind in the race

Leo Karkkainen

Professor of Embedded Systems
in University of Eastern Finland

"Digital transformation must be a transformation for all. If AI benefits only the most connected, we have failed the sustainability test".

Vilas Dhar

President and Trustee of
the Patrick J. McGovern Foundation

We need AI to serve the many, not the few. That means shaping policies that embed justice, dignity, and sustainability into the algorithms that now shape lives".

toward AI innovation. Tomasz Trzciński captures this reality: "AI Act is a civil defense mechanism for the digital age. It protects citizens—but it must not become a barrier for those trying to build value ethically".

Barriers are also cognitive. A lack of awareness about sustainability implications of digital technologies, combined with poor data literacy and unclear metrics for measuring digital sustainability, stalls progress in both public and private sectors.

In the global context, differences in standards and approaches further complicate efforts to build interoperable, cross-border AI systems that are both sustainable and trusted. As Vilas Dhar observed, "Technological sovereignty is not about isolation. It's about shaping global frameworks from a values-based position".

Tackling these barriers will require more than compliance—it demands vision, collaboration, and courageous policymaking. The AI Act offers an opening, but realizing its potential will depend on what is built around and beyond it.

6.5 Policy innovation: aligning AI with sustainability goals

The intersection of digital innovation and environmental stewardship demands a new kind of policymaking—one that sees sustainability not as an externality, but as a core objective of technological development. The AI Act has laid the foundation for such an approach, but to truly align with sustainability goals, further innovations in policy design and implementation are essential.

Gry Hasselbalch emphasizes this shift: "We must stop treating sustainability as a checklist and start treating it as a design principle. That means new metrics, new partnerships, and new forms of public engagement".

One promising direction is the incorporation of AI into strategic sustainability efforts, such as climate mitigation, energy transition, and circular economy models. This includes:

- Incentivizing eco-certification for AI systems, including energy efficiency and resource traceability.
- Mandating lifecycle assessments for high-impact AI applications.
- The ethics of AI must come before its instrumental use in pursuing the SDGs.

Octavio Kulesz argues that sustainable digital transformation must also be culturally grounded: "True sustainability requires diversity—of actors, narratives, and markets. It cannot be achieved through one-size-fits-all frameworks dominated by tech monopolies".

Policy experimentation is already taking shape. Some Member States are piloting green procurement policies that reward environmentally conscious AI solutions. Others are exploring public-private innovation labs that support AI for environmental and social benefit.

Nicolas Miailhe highlights the urgency: "The speed of technological evolution must be matched by the speed of institutional imagination. Without agile governance, we will always be regulating the past".

To succeed, policy innovation must be holistic—connecting the dots between AI regulation, climate law, digital economy strategies, and public procurement. It must also be inclusive, bringing SMEs, civil society, academia, and underrepresented communities into the heart of AI development and oversight.

The AI Act can be a cornerstone of this ecosystem—but only if complemented by bold, adaptive, and justice-oriented policy architectures.

6.6 Summary: toward a sustainable AI ecosystem

The AI Act marks an important milestone in aligning digital innovation with democratic values including fair competition, but its full potential will only be realized if sustainability becomes a central metric of success, not a marginal afterthought. As this chapter has shown, the transformation we face is not merely digital, but structural and ecological.

From the environmental footprint of AI infrastructure to the social consequences of digital exclusion, sustainable digital transformation must be approached as a systemic endeavor. This requires more than technical fixes, it calls for rethinking how AI is built, deployed, regulated, and shared.

As Marc Buckley put it, „We don't just need greener servers. We need regenerative systems—ethical by design, and beneficial by intention". Sustainability is not an optional feature of digital transformation—it is its measure of legitimacy and long-term viability. The AI Act can be a driver of this vision, but only if it evolves in conversation with those most affected by the technologies it regulates. A just, inclusive, and sustainable digital future depends on what we choose to prioritize today.

Sally Radwan

Chief Digital Officer, UN Environment Programme

We can't decouple AI from its environmental context. Sustainability has to be coded into our digital infrastructure, not added as an afterthought".

AUTHORS' KEY TAKEAWAYS

1. Sustainability is no longer optional—it's a structural metric for AI legitimacy.

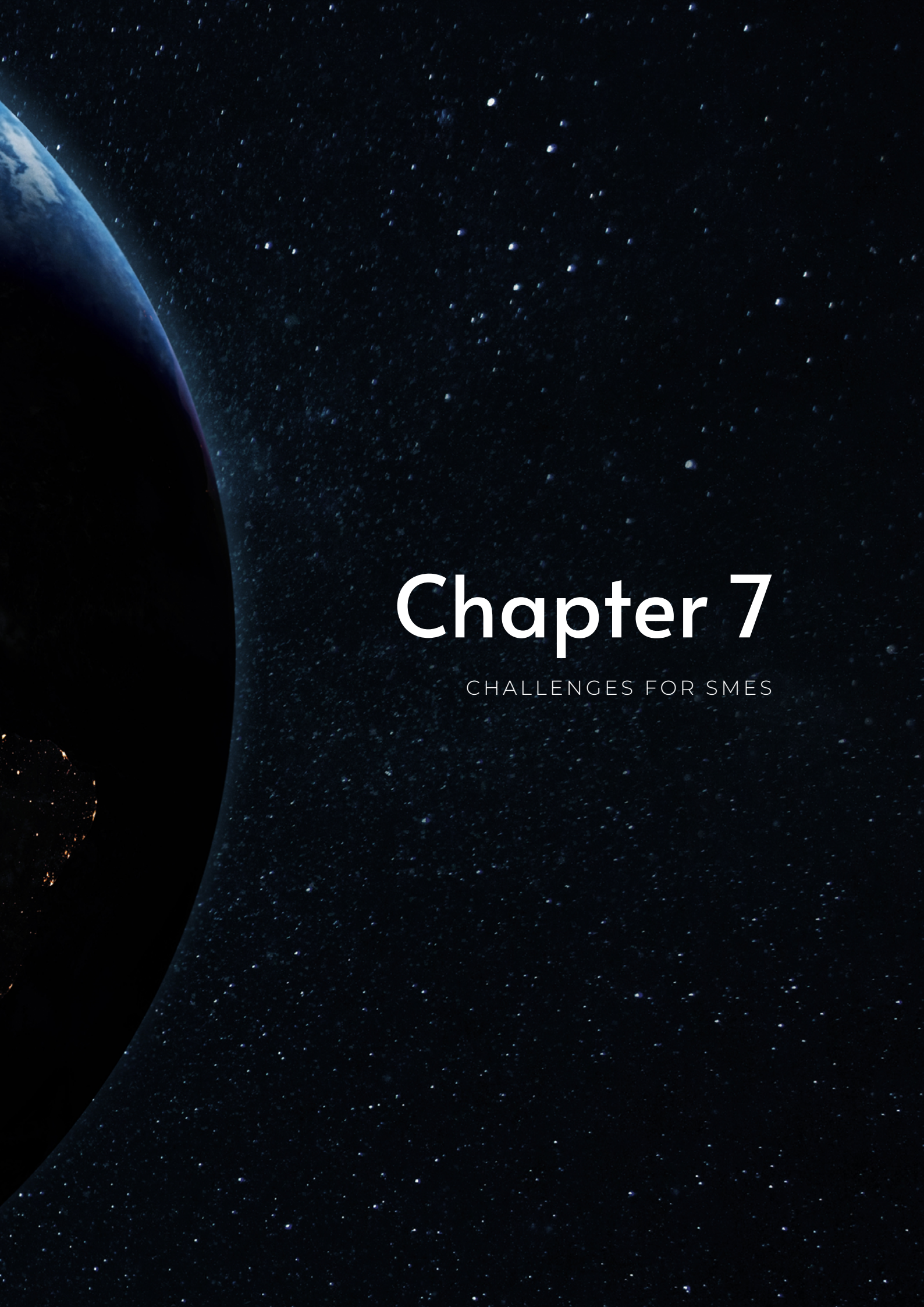
The AI Act implicitly reshapes the metrics by which AI systems are evaluated: not just performance or safety, but long-term environmental viability, energy efficiency, and contribution to digital equity. Sustainability must be internalized as a default feature of AI system design, governance, and deployment.

2. Systemic barriers hinder the emergence of a green, inclusive AI ecosystem.

From fragmented infrastructure and uneven market readiness to supply chain dependencies and insufficient investment, Europe faces geopolitical and industrial constraints that go beyond regulation. The challenge is to co-align AI policy with energy, industrial, and procurement strategies in a whole-of-ecosystem approach.

3. The AI Act could become a platform for socio-technical policy innovation.

Sustainability needs policy innovation that is inclusive, cross-sectoral, and value-driven. This includes lifecycle assessments for AI, green procurement standards, and explicit support for public-good use cases. Without these, AI risks reinforcing existing inequalities under a veneer of ethical ambition.



Chapter 7

CHALLENGES FOR SMES

7.1 Introduction: Why SMEs matter in the AI landscape?

Small and medium-sized enterprises (SMEs) form the backbone of the European economy. Representing 99% of all businesses in the EU and employing around 100 million people, they are critical to innovation, competitiveness, and social cohesion. However, in the context of the AI Act, many SMEs feel unequipped to deal with the regulatory, financial, and technical challenges associated with compliance.

Rafał Kamiński underscores the protective intention behind the AI Act: „It's a civil defense mechanism for the digital age—meant to shield citizens from the negative effects of unregulated technology. But that protection must also extend to the innovators who are building ethically from the ground up".

For SMEs, the Act can seem daunting. They are expected to navigate complex requirements from conformity assessments to transparency obligations, often without dedicated compliance teams or legal counsel. Ieva Martinkenaite points out, "There is a lot of talk about regulation, but without real investment and support, smaller players will struggle to keep up. We risk widening the innovation gap".

This chapter explores the unique challenges SMEs face in aligning with the AI Act, while also identifying opportunities for inclusive and adaptive governance that empowers them to thrive.

7.2 Disproportionate burden: legal, financial, and technical barriers

One of the most frequently cited concerns among SMEs is the disproportionate burden the AI Act imposes relative to their capacity. While large corporations may have dedicated compliance departments, smaller businesses often juggle multiple priorities with minimal resources.

Laurence Liew describes the dynamic from his vantage point in Southeast Asia: „SMEs globally face unique challenges with regulatory compliance due to their limited resources. In Singapore, our approach for AI governance is based on guidelines and frameworks, generally along the lines of the OECD principles. For regulated industries, we already have established regulations - which if you are a startup or SME operating in that space, would likely be familiar with."

Legal complexity is another issue. Many SMEs struggle to interpret the AI Act's technical language, let alone assess how it applies to their products or services. The lack of sufficient guidelines exacerbates these difficulties. Nozha Boujemaa warns, „We need more than law—we need translation into operational guidance and implementation. Ethical ambition must be paired with legal clarity, interoperable processes and institutional empathy".

There is also a fear that compliance demands will slow down experimentation and iterative development, key features of the innovation process in SMEs. As Ieva Martinkenaite adds, "Startups work in sprints, not policy cycles. The Act must find ways to protect agility without compromising accountability".

Addressing these challenges will require not just regulatory flexibility, but a strategic rethink of how compliance tools, funding mechanisms, and legal interpretation are made available and accessible to smaller players in the AI ecosystem.

7.3 The sandbox solution and its limits

Regulatory sandboxes are often cited as one of the AI Act's most SME-friendly provisions. These are controlled environments where companies can test AI systems under the supervision of national authorities, without being subject to immediate regulatory penalties. In theory, this mechanism allows startups to innovate safely. In practice, access and implementation are still uneven.

Samo Zorc stresses the need for simplification: "We need harmonised, lightweight procedures for SMEs to enter and utilize sandboxes in an egaile manner—not just frameworks designed for tech giants with legal departments".

Leo Karkkainen adds, "Sandboxes are only useful if the learnings translate into usable standards. Otherwise, they risk becoming pilot traps, exciting experiments that never scale".

Some Member States have begun integrating innovation support offices, pairing legal mentoring with technical audits in their sandbox programs. However, many SMEs remain unaware of these resources or struggle to navigate fragmented national portals. Language barriers, lack of outreach, and insufficient integration with funding mechanisms remain obstacles.

To realize the full potential of regulatory sandboxes, EU-wide coordination is needed—alongside dedicated SME channels and translation into sector-specific contexts.

7.4 Certification, procurement and market access

For many SMEs, one of the biggest hurdles under the AI Act is demonstrating compliance in a market that increasingly values certified, trustworthy AI. The absence of a central European certification body means companies must rely on dispersed, national-level procedures—which can be costly and confusing.

Nozha Boujemaa explains, "Without trusted tools to measure compliance, certification becomes a barrier, not a bridge. We need practical, scalable instruments to help SMEs validate and empower trust in their systems".

Tomasz Trzciński warned of the risks: "SMEs won't build large foundation models. They will use certified components and deploy them in specific contexts. If the components aren't certified, SMEs can't proceed".

Public procurement is another area of concern. SMEs frequently struggle to meet eligibility criteria in tenders that demand proof of AI compliance. This locks them out of the very projects that could sustain responsible innovation.

Samo Zorc emphasizes, "We must standardize access to registries, templates, and certification and documentation practices related to AI. Otherwise, compliance becomes guesswork—and only the well-resourced can afford to guess".

A centralized, multilingual portal offering guidance, validation tools, and templates for certification and procurement could significantly level the playing field for SMEs across Europe.

Laurence Liew

Director of AI Innovation, AI Singapore

"In Singapore, we're embedding AI Act principles into engineer training. European SMEs should use these standards not just to comply, but to compete".

7.5 Opportunities for SMEs under the AI Act

Despite the challenges, the AI Act also offers unique opportunities for SMEs to grow and innovate within a trusted and transparent regulatory environment. By setting a single legal framework for all Member States, the Act reduces the risk of fragmented compliance regimes and creates a level playing field—at least in principle.

Leo Karkkainen reflects on this promise: "Clarity is a competitive asset. When SMEs understand what's required of them, they can build solutions faster, better, and in ways that users trust".

The AI Act also explicitly encourages Member States to support SMEs through regulatory sandboxes, technical assistance, and proportionate enforcement. Several pilot programs are already demonstrating how early guidance can accelerate product development and reduce compliance anxiety.

Rafał Kamiński believes the Act can foster a more equitable innovation ecosystem: "This regulation is not just a restraint—it's a scaffolding. If applied right, it can elevate SMEs, not just protect from harm".

Additionally, the demand for ethical and human-centric AI solutions is growing, particularly in public services, education, and healthcare. SMEs that align their offerings with the values enshrined in the AI Act may find new markets, partnerships, and reputational advantages.

Laurence Liew notes that standardization is already creating educational ripple effects: "In Singapore, we're embedding AI Act principles into engineer training. European SMEs should use these standards not just to comply, but to compete".

To unlock these benefits, SMEs will need tailored toolkits, access to certified components, and ongoing support from industry networks and public institutions. The AI Act opens a door—but walking through it will require coordinated effort and committed partnership from across the innovation ecosystem.

7.6 Summary: leveling the playing field

The AI Act represents both a challenge and a catalyst for Europe's SMEs. While it introduces a demanding compliance regime, it also offers a framework to build ethical, trustworthy AI that can compete globally. The stakes are high, too much rigidity could stifle innovation, while too little clarity could reinforce inequalities.

Rafał Kamiński

Advisor to the Member of the European Parliament

"This regulation is not just a restraint—it's a scaffolding. If applied right, it can elevate SMEs, not just protect from harm".

Throughout this chapter, experts have voiced clear messages:

- Regulatory clarity must be paired with actionable support.
- Certification and compliance must become accessible, not exclusive.
- Sandboxes must serve their purpose as innovation enablers, not merely regulatory simulations.

SMEs are not smaller versions of big tech, they operate with different resources, cycles, and risks. To harness their potential, the AI Act must evolve in ways that recognize and address these structural differences.

The AI Act must not become a compliance trap, it must become a springboard for inclusive, ethical innovation. SMEs are ready to lead, but they need a system that works with them, not just over them.

AUTHORS' KEY TAKEAWAYS

1. AI Act must differentiate by design, not only by scale.

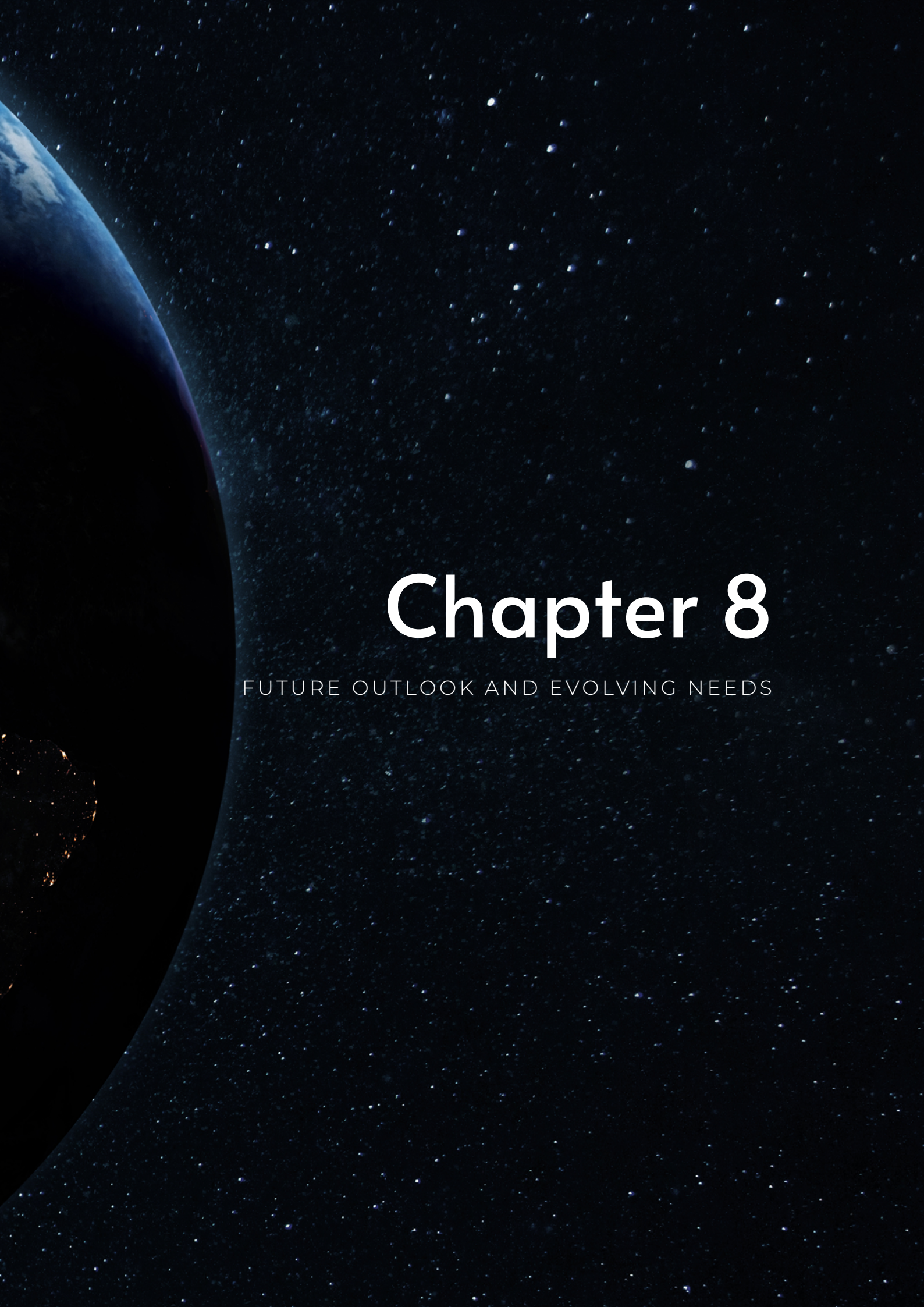
While the Act acknowledges SME-specific conditions, many of its core mechanisms (certification, compliance, procurement) remain tailored to large organizations. Proportionality in enforcement is necessary but not sufficient. Structural tools (e.g. SME-first sandboxes, multilingual guidance portals) must be designed for the constraints and working modes of smaller firms.

2. SMEs need legal clarity, but even more so, operational access.

The barrier is no longer just interpretation, it is implementation. Without ready-to-use templates, trusted registries, and harmonized certification paths, regulatory ambiguity becomes a resource drain, privileging better-funded actors.

3. The AI Act can catalyze inclusive innovation, but only if it actively addresses structural asymmetries in technological development..

Experts suggest reimagining regulation as "scaffolding" rather than "shielding." If appropriately executed, the AI Act could unlock strategic opportunities for SMEs in public sector AI, ethical tech markets, and cross-border digital ecosystems.



Chapter 8

FUTURE OUTLOOK AND EVOLVING NEEDS

8.1 Introduction

The AI Act is not the endpoint of Europe's digital regulation journey, it is a beginning. As artificial intelligence technologies evolve at unprecedented speed, regulations must move from being static rulebooks to dynamic governance frameworks. Ensuring that the Act remains relevant, adaptable, and inclusive will be the defining test of its long-term impact.

Sebastian Hallensleben frames this challenge succinctly: „The AI Act set up a baseline. But what we need next is the capacity to react legally, institutionally, and intellectually to changes we cannot yet foresee".

Ana Prică-Cruceanu adds a human-centered layer: "We must design governance systems that grow with people, not just around the tech. Lifelong learning and digital maturity are as important as innovation metrics".

Cyrus Hodes reminds us that agility must be matched by integrity: "We're facing a wave of general-purpose AI and emergent behaviors. Our frameworks must evolve without losing their ethical core".

This chapter explores how the EU and its global partners can move beyond initial compliance and toward a more resilient, future-ready regulatory paradigm.

8.2 Anticipating technological acceleration

The AI landscape is changing rapidly, with technologies such as general-purpose AI, autonomous agents, and multimodal systems pushing beyond what current regulations can easily accommodate. These developments pose fundamental questions about risk classification, governance models, and the role of the human in decision-making loops.

Marko Grobelnik reflects on the scale of disruption: "What we're seeing is not just faster machines, but fundamentally different forms of cognition. We are entering a phase where systems can detect unknown patterns before humans even know to look for them".

Amir Banifatemi echoes this sentiment: "It's not just the systems that evolve - it's the context. Resilience now means preparing institutions, societies, and infrastructures to adapt, not just evaluate."

One key gap in the current AI Act is its limited ability to handle open-ended learning and emergent behaviors. These are characteristics of next-generation models that do not operate in fixed contexts and may evolve well beyond their intended use.

Yuko Harayama, drawing from the Society 5.0 framework, argues for anticipatory governance: "Policy should not chase technology it should scaffold it. That means designing adaptive, modular regulation that can evolve with knowledge, not just with markets".

To meet this challenge, the future of the AI Act must include:

- Continuous risk reassessment mechanisms.
- Flexible rulebooks for GPAI and system-of-systems architectures.
- nternational foresight collaborations to map technological frontiers.

What lies ahead is not just faster AI, but more autonomous, more integrated, and more unpredictable systems. Our regulatory models must be ready to govern what we do not yet fully understand.

8.3 Revisiting risk, purpose and trust in a fluid AI landscape

The current structure of the AI Act is based on predefined risk categories and the intended purpose of AI systems. However, in an increasingly fluid technological environment, both concepts are being challenged.

Olivia J. Erdelyi highlights a fundamental tension: "What regulators often call trustworthiness, philosophers call reliability. These are not the same. As AI becomes more anthropomorphic, we must rethink what kind of emotional and social consequences 'trust' really entails".

Merve Hickok draws attention to operational realities: "Intended purpose is a legal fiction. Once a system is deployed, it mutates through

user behavior, integrations, and unforeseen applications. We need frameworks that monitor reality—not just declarations".
Yuko Harayama, reflecting on policy formation in Japan and G7 contexts, emphasizes the need for harmonized flexibility: "If we over-specify in law, we freeze progress. If we under-specify, we expose people to risk. The challenge is to define processes that evolve with systems, not just categorize them at launch".

This rethinking of risk and trust also invites us to:

- Develop real-time audit and feedback mechanisms.
- Move from snapshot regulation to lifecycle-based oversight.
- Explore new legal instruments such as algorithmic fiduciaries or digital ombudspersons.

8.4 Governance, standards and institutional evolution

As AI technologies evolve, so too must the institutions that govern them. The success of the AI Act will depend on its ability to adapt not only its text, but also the bodies and mechanisms that implement it.

Samo Zorg, reflecting on his role in standard-setting, explains: "Harmonised standards are key. But they must not become frozen documents. Standards need revision cycles that match the speed of innovation".

Nicolas Miailhe argues for iterative regulation: "The AI Act should not be seen as the final word. We need a living law approach, with experimental zones, built-in review clauses, and agile supervisory structures".

Gry Hasselbalch stresses the political dimension: "We must address not just the code, but the power structures behind the code. Implementation must guard against capture—by corporations, ideologies, or inertia".

Future-ready AI governance will require:

- A central EU observatory for monitoring emergent risks.
- Agile mechanisms for revising annexes and standards.
- Transdisciplinary advisory bodies with real influence on enforcement.

Only by embedding regulatory evolution into its core can the AI Act remain credible in a world where the pace of change is exponential, not incremental.

Gry Hasselbalch

PhD. Co-founder DataEthics.eu

"We must address not just the code, but the power structures behind the code. Implementation must guard against capture—by corporations, ideologies, or inertia".

8.5 Societal readiness and digital maturity

No matter how adaptive the regulation, its success ultimately depends on the societal, institutional, and educational foundations that surround it. Digital maturity and public trust are not achieved through legal text alone they must be cultivated through consistent engagement, transparency, and capacity-building and proper interventions of public agencies.

Ana Prică-Cruceanu emphasizes the educational dimension: "We can't regulate our way into ethical AI. We need digital education that reaches all sectors from policymakers to end-users. Sustainable transformation begins in the classroom".

Tomasz Trzciński adds a global perspective: "AI can't be a race if we're not all starting from the same line. We need to level the playing field so that regulation doesn't just protect those already ahead, but lifts those being left behind".

Citizens must be empowered to understand and question AI-driven systems. Democratic institutions must be equipped to oversee and evaluate them. And companies must be supported in integrating ethical and transparent practices into their core strategies—not just their compliance checklists.

The road to societal readiness includes:

- Digital literacy campaigns tailored to diverse communities.
- Tools for algorithmic transparency and participatory evaluation.
- Ethics and sustainability embedded in technical education curricula.

The AI Act provides a platform. But it is the readiness and maturity of societies that will determine whether its principles are realized or remain aspirational.

Yuko Harayama

Secretary General of the Global Partnership on AI (GPAI) Tokyo Expert Support Center

If we over-specify in law, we freeze progress. If we under-specify, we expose people to risk. The challenge is to define processes that evolve with systems, not just categorize them at launch".

8.6 Summary and strategic horizon

The AI Act represents a bold attempt to govern one of the most transformative technologies of our time. But as this chapter has made clear, the real work begins now: aligning dynamic systems with evolving values, capabilities, and risks, while reinforcing the continuous self-development of individuals within these systems.

This requires:

- Regulation that adapts, not ossifies.
- Institutions that learn, not just enforce.
- Societies that participate, not just comply.

As Vilas Dhar reflected, "Policy must become a living process of alignment and accountability. Our challenge is to scaffold intelligence, both —human and artificial, —within shared ethical boundaries".

The future of AI regulation will not lie in the illusion of predicting every risk—but in cultivating institutions, cultures, and ethical reflexes capable of adapting to what we do not yet know. This is the essence of CompassionAI: governance rooted not in control, but in care, resilience, and shared responsibility. If treated as a living foundation, the AI Act can help Europe and the world build a digital future that is not only intelligent, but wise.

Tomasz Trzciński

The IDEAS Institut, Warsaw University of Technology, Tooploox.

"AI can't be a race if we're not all starting from the same line. We need to level the playing field so that regulation doesn't just protect those already ahead, but lifts those being left behind".

AUTHORS' KEY TAKEAWAYS

1. Regulatory maturity is about institutional learning, not legislative finality.

The AI Act is not a static endpoint, but a platform for iterative governance. Future relevance depends on embedding feedback mechanisms, revision pathways, and foresight capabilities within its operational logic, particularly to address the challenges posed by GPAI, emergent behaviors, and dynamic risk environments.

2. Trust in AI must evolve beyond technical compliance toward socio-cognitive alignment.

As AI systems grow more anthropomorphic, they risk crossing the threshold where familiarity turns into distrust. True credibility does not arise from imitation of the human, but from transparent function, accountable governance, and human-centered design that acknowledges the limits of technological empathy.

3. Societal readiness, not just legal readiness, will define regulatory success.

Digital maturity, public literacy, and institutional agility are prerequisites for effective AI governance. Without a parallel investment in capacity-building and public education for personalised individual education, even the most well-designed legal frameworks risk implementation failure.

Appendix

References & Sources

AI & Regulation Blog – Jean Monnet Network on Digital Governance	https://ai-laws.org	Commentary from legal scholars and policymakers on innovation bottlenecks in AI regulation.
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AI Now Institute – Algorithmic Accountability Reports	https://ai4people.org/ai4people-institute/	Comprehensive ethical and governance proposals that informed early EU thinking.
Alan Turing Institute	https://www.turing.ac.uk	Insights into the future of algorithmic oversight, participatory governance, and legal legitimacy in AI.
Directorate-General for Communications Networks, Content and Technology	https://digital-strategy.ec.europa.eu/en/policies/data-strategy	Foundational EU documents and roadmaps for data spaces, interoperability, and sovereignty.
EDPS – AI and Fundamental Rights	https://www.edps.europa.eu/_en	European Data Protection Supervisor's detailed perspectives on aligning data rights with ethical AI.
EU Digital Compass: 2030 Targets	https://eufordigital.eu/library/2030-digital-compass-the-european-way-for-the-digital-decade/	Describes Europe's goals for inclusive, green and sovereign digital infrastructure.
European Commission – Official AI Act Portal	https://digital-strategy.ec.europa.eu/en/policies/european-approach-artificial-intelligence	Official documents, FAQs, and implementation plans for the AI Act.
European Innovation Council (EIC) – SME Support Framework	https://eic.ec.europa.eu	Grant schemes, coaching, and procurement incentives aligned with responsible innovation objectives.
European Parliament – AI and Innovation Policy Briefs	https://www.europarl.europa.eu/thinktank/en/home	Explains tensions between regulation and innovation in EU digital policy.
Future of Life Institute	https://futureoflife.org	Exploration of governance frameworks for emerging forms of general-purpose AI.
Global Partnership on AI (GPAI)	https://gpai.ai	Key global initiatives, working groups, and research outputs on responsible AI.

Green Digital Coalition (GDIC)	https://greendigitalcoalition.eu	An EU-supported multi-stakeholder initiative exploring sustainability KPIs for digital services.
IEEE Global Initiative on Ethics of Autonomous and Intelligent Systemsa	https://ethicsinaction.ieee.org/	Global consensus-building platform for AI ethics standards and applied guidelines.
ISO/IEC JTC 1/SC 42 – Artificial Intelligence	https://www.iso.org/committee/6794475.html	Overview of global standards related to AI systems, lifecycle, risk, and transparency.
MyData Global – Human-Centric Data Governance	https://mydata.org	International movement promoting individual agency and trust-based models in data ecosystems.
OECD.AI Policy Observatory	https://oecd.ai	Comparative AI policy data, trends, and insights from OECD and G20 nations.
Open Data Institute – Data Institutions Toolkit	https://www.theodi.org	Frameworks and case studies for designing sustainable, inclusive, and collaborative data governance models.
Stanford HAI	https://hai.stanford.edu	AI Regulation Across the Globe.
The Ada Lovelace Institute – Data Governance Reports	https://adalovelaceinstitute.org	Deep-dives into algorithmic accountability, participatory data governance, and citizen-led data infrastructures.
The Global AI Ethics Consortium (GAIEC)	https://www.ieai.sot.tum.de/global-ai-ethics-consortium/	A global academic alliance focused on developing transdisciplinary AI ethics education and standards.
UNESCO AI Ethics Recommendation (2021)	https://unesdoc.unesco.org/ark:/48223/pf0000381137	The first global normative framework on the ethical use of AI, aligned with the values underpinning the AI Act.
World Bank	https://documents.worldbank.org/en/publication/documents-reports	Analysis of how innovation policies intersect with inclusive AI strategies globally
World Economic Forum	https://www.weforum.org	Shaping the Future of Technology Governance: AI and Machine Learning.

Glossary

Term / Concept	Explanation
AI Act	A forthcoming European Union regulation (Artificial Intelligence Act) that establishes a risk-based framework for AI governance; it bans the most harmful AI practices and imposes strict requirements (e.g. transparency, human oversight) on high-risk systems to ensure they are safe, fair, and aligned with fundamental rights.
AI Ombuds	An independent ombudsman role proposed for the AI domain. An AI Ombuds would investigate complaints and oversee AI systems to ensure organizations uphold ethical standards and accountability beyond mere legal compliance.
Algorithmic Fiduciary	A concept advocating that entities deploying algorithms should have a fiduciary duty—an obligation to act in the best interests of users or society. In practice, an algorithmic fiduciary would be legally bound to prioritize users' rights and well-being when designing or operating AI systems.
Algorithmic Sandboxing	The practice of testing or running AI algorithms in a controlled, isolated environment (a "sandbox") to observe their behavior without affecting real-world systems. This approach allows developers to ensure safety and compliance of AI models before full deployment.
Black-box Systems	AI systems whose internal decision-making processes are opaque or not interpretable to humans, making it difficult to understand how they produce their outputs. Such lack of transparency impedes auditing and trust, especially in high-stakes applications.
CEN-CENELEC	Acronym for the European Committee for Standardization (CEN) and the European Committee for Electrotechnical Standardization (CENELEC). These European organizations develop harmonized technical standards across EU member states, including standards to support AI development and compliance.
Certification Cascade	A process in AI governance where the certification of foundational components or subsystems enables the certification of higher-level systems built on top of them. By ensuring base modules are certified, trust and compliance "cascade" upward, making it easier to certify complex integrated AI solutions.
Compliance by Design	An approach to AI system development in which compliance with legal regulations and ethical standards is integrated from the earliest design stages. The system is built with necessary safeguards and documentation so that it inherently meets regulatory requirements once deployed.
Compliance Enablement	Strategies and tools that make it easier for organizations to meet regulatory requirements as they innovate. Compliance enablement can include automated compliance checks, clear guidelines, and support services that embed legal adherence into business processes, reducing the burden on teams.
Context-sensitive Regulation	A regulatory approach that adapts rules and enforcement to the specific context of technology use. Rather than one-size-fits-all rules, context-sensitive regulation recognizes that appropriate requirements may vary by sector, use-case, or societal context to be effective and proportionate.
Contextual Ethics	An ethical framework that takes into account the specific circumstances, culture, and stakeholders surrounding an AI application. Contextual ethics recognizes that what is "ethical" can depend on context, emphasizing tailoring ethical guidelines to each situation rather than applying uniform rules blindly.

Term / Concept	Explanation
Data Commons	Shared data resources that are collectively managed and accessible to a community under agreed rules. A data commons allows multiple stakeholders to contribute to and benefit from a pool of data, governed to protect rights (like privacy) while maximizing shared value or public good.
Data Sovereignty	The principle that data is subject to the laws and control of the jurisdiction or community where it is collected. Data sovereignty emphasizes that individuals, organizations, or nations should have authority over their data (e.g. keeping European data under EU governance) rather than being dependent on foreign powers or companies.
Data Stewardship	The responsible management and oversight of data through its lifecycle. Data stewardship involves designated people or frameworks that ensure data is collected, stored, and used securely, ethically, and in accordance with policies—maintaining data quality, privacy, and value for stakeholders.
Emergent Behavior	Unexpected actions or outcomes produced by AI systems, especially complex ones, that were not explicitly programmed or intended by their developers. Critical for risk management in advanced AI governance.
Ethical Impact Assessment (EIA)	A formalized process to systematically evaluate the potential ethical impacts of an AI system across its development and deployment phases, often recommended as part of trustworthy AI governance.
Ethics-by-Design	The principle of embedding ethical considerations into the design and development process of AI systems from the outset. By practicing ethics-by-design, developers build in values like fairness, transparency, privacy, and accountability so that the resulting AI is aligned with ethical norms by default.
Explainable AI (XAI)	AI systems designed to make their operations understandable to humans. XAI aims to ensure that outputs, decision pathways, and logic can be traced, audited, and explained meaningfully, especially in high-risk contexts.
Federated Learning	A machine learning technique where a single model is trained across many decentralized devices or servers holding local data, without transferring that data to a central location. Federated learning improves privacy and security because raw data remains on local devices—only model updates are shared and aggregated.
Foresight Governance	A governance approach that uses strategic foresight to anticipate future technological developments and challenges. Foresight governance employs tools like horizon scanning and scenario planning so policymakers can craft regulations that are proactive, adaptable, and "future-proof" in the face of rapid AI innovation.
General-Purpose AI (GPAI)	AI systems designed to perform a wide range of tasks beyond single-purpose applications. GPAI can adapt, learn, and be fine-tuned for multiple domains, raising unique regulatory and ethical challenges under the AI Act.
GPAI	Acronym for the Global Partnership on Artificial Intelligence, an international initiative launched by multiple countries. GPAI brings together experts from governments, industry, and academia to collaborate on responsible AI development and shared research, helping bridge the gap between AI principles and practice globally.

Green AI	An approach to artificial intelligence that prioritizes environmental sustainability. Green AI involves developing AI models and infrastructure that are energy-efficient and have a low carbon footprint, as well as using AI to advance climate action and environmental well-being as part of the digital transformation.
High-Risk AI Systems	AI systems classified under the AI Act as posing significant risks to health, safety, or fundamental rights, subject to stricter compliance obligations (e.g., biometric identification, critical infrastructure, healthcare applications).
HLEG	Acronym for the High-Level Expert Group on AI, a panel of experts convened by the European Commission. The HLEG developed influential guidance (like the Ethics Guidelines for Trustworthy AI) and provided recommendations that helped shape Europe's AI policy, ensuring it reflects ethical and societal considerations.
Human-in-the-Loop (HITL)	A design approach in AI systems where human intervention is built into critical decision points, ensuring oversight, correction capabilities, and accountability.
ISO / IEEE	Refers to two major international standard-setting bodies: ISO (International Organization for Standardization) and IEEE (Institute of Electrical and Electronics Engineers). Both develop globally recognized technical standards (including for AI safety, interoperability, and ethics) to ensure consistent and trustworthy technology practices across countries.
Iterative Compliance	An approach to regulatory compliance that is continuous and adaptive, revisiting obligations throughout an AI system's lifecycle. Instead of a one-time check, iterative compliance means ongoing monitoring, updates, and improvements to remain compliant as the technology and its use-case evolve over time.
Knowledge Asymmetry	A situation where one party has significantly more information or understanding than another in a transaction or system. In AI, knowledge asymmetry often refers to the gap between AI developers (who fully understand a system) and users or regulators (who do not), leading to power imbalances and challenges in ensuring transparency and informed consent.
Lifecycle Assessment (LCA)	A methodology for evaluating the environmental impact of a product or system across its entire life cycle—from raw material extraction and manufacturing to usage and end-of-life disposal. In the AI context, a Lifecycle Assessment can measure an AI system's carbon footprint and resource use at each stage, informing more sustainable tech design and deployment.
Lifecycle-based Oversight	A governance model that monitors an AI system throughout all stages of its life cycle (design, development, deployment, operation, and decommissioning). Lifecycle-based oversight ensures continuous accountability and safety checks, recognizing that risks and impacts may change over time and need ongoing supervision rather than one-off assessment.
Lifecycle-based Regulation	A regulatory framework applying rules and checkpoints at each phase of an AI system's life cycle. Lifecycle-based regulation might require assessments or certifications during development, pre-deployment testing, and post-deployment monitoring, ensuring the system remains compliant and safe from inception to end-of-use.

Term / Concept	Explanation
Living Law	The idea that laws and regulations should evolve continually to keep pace with societal change and technological innovation. A living law approach treats legal frameworks as dynamic and updateable (rather than fixed), so that AI governance can adapt as new insights, risks, or ethical understandings emerge.
OECD AI Principles	A set of internationally endorsed principles for trustworthy AI, adopted in 2019 by the OECD (Organization for Economic Cooperation and Development) and later supported by the G20. The OECD AI Principlespromote values like inclusive growth, human-centered values, transparency, robustness, and accountability, providing a global baseline for AI policy and ethics.
Post-market Monitoring	Ongoing oversight of AI systems after they are deployed on the market, ensuring continued compliance with regulations, detecting emergent risks, and maintaining safety and trustworthiness over time.
Procurement Parity	The principle of fairness in technology procurement, ensuring that smaller companies and innovative solutions can compete on equal footing with big players for contracts. Procurement parity calls for leveling the playing field in public tenders—e.g. by weighing ethical compliance and trustworthiness alongside price and experience—so startups and SMEs aren't disadvantaged in selling AI solutions to governments or large buyers.
Regenerative Systems	Systems designed not only to be sustainable but to restore and renew the resources they consume. In a digital context, regenerative systems might refer to technologies or AI-driven processes that actively contribute positive environmental or social benefits (such as restoring ecosystems or strengthening communities), rather than just minimizing harm.
Regulatory Asymmetry	An imbalance created when different jurisdictions or sectors have uneven regulatory requirements. Regulatory asymmetry in AI can lead to competitive disadvantages or loopholes—for example, if AI is strictly regulated in one region but loosely in another, companies might gravitate to the lax regime, undermining the stricter framework's intent.
Regulatory Capture (in AI)	A scenario in which the AI industry exerts excessive influence over regulators, causing rules to be shaped in favor of industry interests over the public interest. Regulatory capture risk means AI regulations could be diluted or skewed by lobbyists and major tech firms, potentially undermining safety, fairness, or accountability.
Regulatory Sandbox	A controlled experimental environment set up by regulators where companies can pilot innovative technologies or AI systems with temporary relaxations of certain rules. In a regulatory sandbox, developers operate under supervision and defined limits, allowing them to experiment and iterate on their AI solutions without immediate risk of penalties, while regulators observe and learn to inform better policy.
Risk-based Approach	A method of regulation that calibrates the strictness of rules to the level of risk posed by an activity or system. Under a risk-based approach (used by the AI Act), higher-risk AI applications face stricter requirements and oversight, moderate-risk ones have proportionate safeguards, and low-risk tools are subject to minimal intervention—focusing regulatory effort where potential harm is greatest.

SME-centered Sandbox	A regulatory sandbox program tailored specifically for small and medium-sized enterprises (SMEs). An SME-centered sandbox provides simplified procedures, mentorship, and support for startups and smaller firms to test and develop AI innovations under regulatory oversight, recognizing their limited resources and helping them navigate compliance as they innovate.
Society 5.0	A concept for a "super-smart society" originally proposed in Japan, envisioning a new societal stage that integrates cyberspace and physical space. Society 5.0 is a human-centered vision in which advanced technologies (AI, IoT, robotics, etc.) are harnessed to solve social challenges and foster well-being and sustainability, succeeding the Industry 4.0 era.
Sustainable AI Innovation	The development of AI technologies that are not only technically and commercially viable but also socially just, environmentally sustainable, and ethically grounded.
Sustainable Digital Transformation	A long-term, systemic process that aligns technological innovation with environmental responsibility, social inclusion, institutional resilience, and ethical governance. Sustainable digital transformation goes beyond efficiency or carbon reduction—it seeks to ensure that digital progress enhances human dignity, protects planetary boundaries, and supports equitable access to opportunities, skills, and services in a rapidly evolving technological landscape.
Synthetic Data	Data that is artificially generated rather than collected from real-world events. Synthetic data mimics the statistical characteristics of real data sets and is used to train or test AI models—allowing expansion of training data while protecting privacy (since no real personal data is directly used) or alleviating data scarcity.
System-of-systems Architecture	An architectural approach where a complex system is composed of multiple smaller, independent systems that interoperate. In AI and IoT contexts, a system-of-systems means various subsystems (each possibly with its own AI or function) are integrated to work together, which adds complexity in design, management, and ensuring the overall network is reliable, secure, and compliant.
Technological Sovereignty	The capacity of a nation or region to independently develop, control, and make decisions about critical technologies. Technological sovereignty in practice means reducing reliance on foreign technology providers and maintaining self-determination in the digital realm—so that a region like the EU can enforce its values and security standards in AI and digital infrastructure.
Third-party Conformity Assessment Bodies (CABs)	Independent organizations authorized under the AI Act to assess whether high-risk AI systems comply with relevant regulatory requirements before market placement.
Transatlantic Dialogue	Ongoing discussions and collaborations between Europe and North America (particularly the EU and the US) on policy and governance issues. In the AI context, a transatlantic dialogue refers to Europe–US engagement to align approaches to AI regulation and ethics, fostering cooperation and mutual understanding across the Atlantic for issues like standards, trade, and values in technology.

Term / Concept	Explanation
Trustworthiness	In the context of AI, the quality of deserving trust by consistently operating in a reliable, fair, transparent, and secure manner aligned with ethical norms. An AI system's trustworthiness means users and society can have confidence in its behavior and outcomes, beyond just technical performance—encompassing dimensions such as safety, fairness, privacy, and accountability.
Trustworthy AI Assessment Framework	Evaluation frameworks (e.g., based on HLEG or OECD guidelines) that provide tools to assess whether an AI system aligns with ethical, legal, and technical principles, including fairness, transparency, and human oversight.
Twin Transition	The simultaneous pursuit of digital transformation and green (sustainable) transformation. Twin transitiondenotes how Europe aims to leverage digital technologies (including AI) to drive environmental sustainability, ensuring that advances in AI and digitalization go hand-in-hand with progress on climate goals and resource efficiency.
UNESCO AI Ethics (2021)	Shorthand for UNESCO's Recommendation on the Ethics of Artificial Intelligence adopted in 2021. This UNESCO AI Ethics framework sets out universal values and principles (like respect for human rights, diversity, and environmental sustainability) to guide countries in the responsible development and use of AI.
White Paper on AI	Typically refers to the European Commission's 2020 White Paper on Artificial Intelligence. The White Paper on AI outlined the EU's vision for promoting AI excellence and trust, proposing a risk-based regulatory approach and measures to support innovation, which laid the groundwork for the later AI Act.

Thank you for joining us

At GAIA Foundation, we believe that artificial intelligence must serve life, not replace it.It must amplify human dignity, protect the planet, and foster resilience across societies. By reading this report, you have shown that you care about the future we are shaping together.

Our work in building Compassionate AI—technology guided by ethics, sustainability, and human values—depends on collective effort. Each contribution enables us to launch new research, empower diverse voices, and ensure that AI becomes a partner for good.

We would like to express our deepest gratitude to Pracodawcy RP and Answer 42 sp. z o.o., whose financial support made this research and publication possible. Their commitment to responsible innovation and independent inquiry reflects the values that this report seeks to promote.

The future of AI is not inevitable. It is a choice we must make—deliberately and together.

If you wish to support independent, forward-looking research that places humanity at the center of digital transformation, we invite you to join us.

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Thank you for standing with us.

Global Artificial Intelligence Alliance Foundation
18, Karolinki
02-365 Warsaw Poland

office@globalai.life
www.globalai.life