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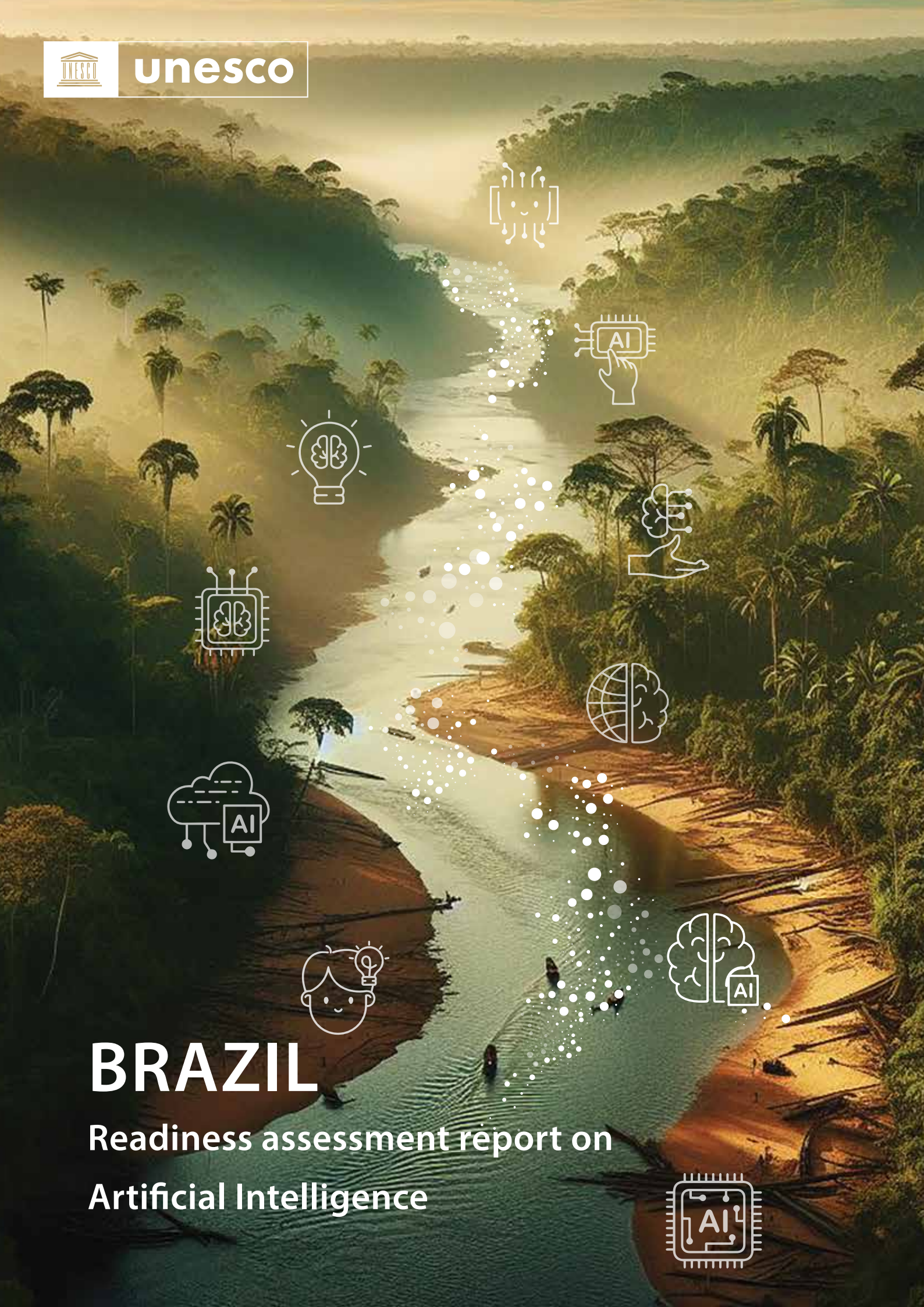

BRAZIL

Readiness assessment report on Artificial Intelligence

Acknowledgements

The United Nations Educational, Scientific and Cultural Organization (UNESCO) would like to thank those who participated in and contributed to the consultation process which, combined with the analysis of the AI governance structure in the country, culminated in the following report. We would like to express our special thanks to the following entities and organizations: *Algora Digital e Technoethics, Maranhão e Menezes Advogados, Janeraka Institute, Pontifical Catholic University of São Paulo (PUC-SP), Prado Vidigal Advogados, Institute for Research in Law and Technology of Recife (IP.rec), IPE - Inova Práticas Educacionais, National Data Protection Authority (ANPD), EPG Advogados, Brazilian Association of Software Companies (ABES), Association of Information and Communication Technology (ICT) and Digital Technology Companies (Brasscom), Alana Institute, Ministry of Foreign Affairs (MRE), Böckmann S/I, Bronstein Zilberberg Chueiri e Potenza Advogados (BZCP), 7S Projetos, Public Policy and Internet Laboratory – LAPIN, Federal University of Rio Grande do Sul (UFRGS), Derechos Digitales, Federal University of Bahia (UFBA), Pontifical Catholic University of Rio de Janeiro (PUC-Rio), Holistic AI, VMCA - Vinicius Marques de Carvalho Advogados, Microsoft, Brazilian Institute for Consumer Protection (IDEC), Conexão Malunga, GETIS - Group for Studies in Technology, Information, and Society, Centers for Studies on Violence – USP, International Association for Artificial Intelligence- i2ai, Transparency Brazil, TELEBRAS, COEQTO - State Coordination of Quilombola Communities in the State of Tocantins, Brazilian Institute for Consumers of Data Holders, Article 19 Brazil, Ministry of Cities, Ibmec, Institute of International Relations and Defense (IRID) / Federal University of Rio de Janeiro (UFRJ), Institute of Open Speech, Fatec Sebrae, Federal University of Health Sciences of Porto Alegre, Mozilla Foundation, Federal University of ABC (UFABC), University of Brasília, and OAB /SP São Paulo Bar Association.*

UNESCO in Brazil also acknowledges the Ministry of Science, Technology and Innovation (MCTI), Ministry of Foreign Affairs (MRE) and the organizers of the report, Professor Edson Prestes (UFRGS) – coordinator of the report and responsible for the team of consultants, Lutiana V. F. Barbosa (Federal Public Defender), Gustavo Carlos Macedo (Professor at Insper and Ibmec), Viviane C. Dallasta D. Grossi (Federal Public Defender), Professor Renan Maffei (UFRGS) and Cynthia Picolo Gonzaga de Azevedo (Executive Director at LAPIN). We also note the crucial support of UNESCO's Section on Bioethics and Ethics in Science and Technology and UNESCO collaborators Adrian James Wright and Angel Melguizo.

Published in 2025 by the United Nations Educational, Scientific and Cultural Organization
7, place de Fontenoy, 75352 Paris 07 SP, France

Cover photo: Illustration created by AI

Designed and printed by UNESCO

Printed in France

BRAZIL

Readiness assessment report on Artificial Intelligence

SHS/BIO/AI-RAM/2025/BRA

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List of Acronyms and Abbreviations

ABES	Brazilian Association of Software Companies
ABNT	Brazilian Association of Technical Standards
ACE-STEM	Altruism, Compassion and Empathy - Science, Technology, Engineering and Mathematics
ANATEL	National Telecommunications Agency
ANPD	National Data Protection Authority
BNCC	National Common Curricular Base
BNC	Training Common National Base for the Initial Training of Basic Education Teachers
Brasscom	Brazilian Association of Information and Communication Technology Companies
C4AI	Center For Artificial Intelligence
CAPES	Coordination for the Improvement of Higher Education Personnel
CPA	Applied Research Center in Artificial Intelligence
CDR	Coalizão Direitos na Rede (Network Rights Coalition)
CETIC.br	Regional Center for Studies on the Development of the Information Society
CGEE	General Coordination of Educational Studies
CGI.br	Internet Steering Committee in Brazil
CGU	Office of the Comptroller General
CNCT	National Catalogue of Technical Courses
CNJ	National Council of Justice
CNPD	National Council for the Protection of Personal Data and Privacy
CNPq	National Council for Scientific and Technological Development
CTIA	Temporary Internal Commission on Artificial Intelligence in Brazil
Dired	INEP Directorate of Educational Studies
DCN	National Curriculum Guidelines
DEWG	G20 Digital Economy Working Group
EBIA	Brazilian Artificial Intelligence Strategy
E-Digital	Brazilian Strategy for Digital Transformation
Embrapii	Brazilian Company of Industrial Research and Innovation
ENAP	National School of Public Administration
ESG	Environmental, Social and Corporate Governance Agenda
FAPEG	Goiás Research Support Foundation
FAPESP	São Paulo Research Foundation
FAT	Fairness, Accountability and Transparency
FEI	Faculty of Industrial Engineering
FINEP	Funding Authority for Studies and Projects
FUNAI	National Indigenous Foundation
FNDCT	National Fund for Scientific and Technological Development
GERD	Gross Domestic Expenditure on R&D
GNERD	Gross National Expenditure on R&D
GSI	Institutional Security Office of the Presidency of the Republic
AI	Artificial Intelligence
IBGE	Brazilian Institute of Geography and Statistics
IEEE	Institute of Electrical and Electronics Engineer
ILIA	Latin American Artificial Intelligence Index
INDL	National Inventory of Linguistic Diversity
INEP	Anísio Teixeira National Institute of Educational Studies and Research
INPI	National Institute of Industrial Property
IoT	Internet of Things
IPHAN	Institute of National Historical and Artistic Heritage
IRCAI	International Artificial Intelligence Research Center
ISO	International Organization for Standardization
ITA	Aeronautics Institute of Technology

LAC	Latin America and the Caribbean
LAI	Access to Information Law
LGPD	General Personal Data Protection Law
LNCC	National Laboratory of Scientific Computing
MCI	Brazilian Civil Rights Framework for the Internet
MCTI	Ministry of Science, Technology and Innovation
MDHC	Ministry of Human Rights and Citizenship
MDIC	Ministry of Development, Industry, Trade and Services
MDHC	Ministry of Human Rights and Citizenship
MDIC	Ministry of Development, Industry, Trade and Services
MEC	Ministry of Education
MEMP	Ministry of Entrepreneurship, Microenterprise and Small Business
MGI	Ministry of Management and Innovation in Public Services
MinC	Ministry of Culture
MIR	Ministry of Racial Equalit
MJSP	Ministry of Justice and Public Security
MMA	Ministry of Environment and Climate Change
MME	Ministry of Mines and Energy
MPI	Ministry of Indigenous Peoples
MPO	Ministry of Planning and Budget
MRE	Ministry of Foreign Affairs
MS	Ministry of Health
MTE	Ministry of Labor and Employment
NIC.br	Brazilian Network Information Center
NIST	US National Institute of Standards and Technology
OBIA	Brazilian Observatory of Artificial Intelligencey
OECD	Organization for Economic Cooperation and Development
SDG	Sustainable Development Goals
OAS	Organization of American States
NGO	Non-Governmental Organization
UN	United Nations
PBIA	Brazilian Artificial Intelligence Plan
RD&I	Research, Development and Innovation
R&D	Research and Development
GDP	Gross Domestic Product
PL	Bill
PNE	National Education Plan
PNED	National Digital Education Policy
PNBL	National Broadband Plan
PNIIS	National Policy on Health Information and Informatics
UNEP	United Nations Environment Programme
PUC-SP	Pontifical Catholic University of São Paulo
RAM	Readiness Assessment Methodology
SUS	Unified Health System
Stem	Science, Technology, Engineering and Mathematics
STF	Supreme Federal Court
TCU	Federal Court of Accounts
ICT	Information and Communication Technology
UIS	UNESCO Institute for Statistics
UIT	International Telecommunication Union
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNGPs	United Nations Guiding Principles on Business and Human Rights
UNICAMP	State University of Campinas
USP	University of São Paulo

Preface

We have officially entered the Age of Artificial Intelligence. The world is about to change at a speed not seen in decades, if not centuries. AI-powered tools and applications make our lives easier, smoother, and richer. They help us get around efficiently, get informed, get credit, get a job and even pay our taxes.

But AI also contributes to new harms and risks. In its current form, AI reproduces and amplifies many of the societal challenges we face. It is unacceptable that around a third of the world's population still lacks adequate internet access. It's worth mentioning that the AI industry is highly concentrated, practically centered on two countries - the United States and China - with a dozen companies accounting for a large portion of the sector. This can only lead to greater inequality in results, including gender disparities. Non-diverse AI teams, unrepresentative data sets and opaque and biased algorithms can cause harm, especially to those who are already vulnerable, whether they are companies or individuals, children and young people, women or entire democracies. The rapid adoption of powerful generative AI models by hundreds of millions of people has served as a sign of AI's enormous opportunities, but also of its substantial risks, ranging from inaccurate outputs ("hallucinations") to the creation of persuasive disinformation that is already driving fraud, eroding public trust and threatening democracy.

Emerging concerns about AI led UNESCO to draw up the Recommendation on the Ethics of Artificial Intelligence, which was adopted in 2021 by 193 countries to ensure that AI delivers fair, sustainable and inclusive outcomes. The Recommendation is based on the protection and promotion of human rights, human dignity and environmental sustainability, and these values are then translated into principles such as accountability, transparency and privacy. The Recommendation also sets out concrete policy actions that governments can take to steer technological development in a responsible direction, based on the belief that lightweight regulation, which has so far been the norm, is insufficient. We need capable governments, well-equipped in terms of skills, institutions and laws, to shape responsible AI development and protect the rule of law online, as well as public and private developers who are responsible for putting human rights and fundamental freedoms first, not profits or geopolitical considerations.

The Readiness Assessment Methodology (RAM) is a diagnostic tool designed to support UNESCO Member States in fulfilling their commitment to the Recommendation by helping them understand how prepared they are to implement AI in an ethical and responsible manner for all their citizens. By highlighting any institutional, regulatory or data gaps and obstacles, it allows UNESCO to adjust support to governments to fill these gaps and ensure an ethical AI ecosystem aligned with the Recommendation.

The RAM questionnaire forms the basis of the first section of this readiness assessment report, providing a comprehensive but detailed view of laws, institutions, and the cultural, social, and human capital landscape that shapes AI. This is complemented in the second section by a summary of concerns and priorities raised during a multi-sectoral national consultation held in 2023, when this survey began. Finally, the third section presents a roadmap and recommendations for developing capacities in national institutions, laws and policies, and human capital, to achieve a responsible AI ecosystem in line with the UNESCO Recommendation.

As one of the first countries to complete the RAM, Brazil takes a constructive and positive approach to these challenges. We would like to thank the Government of Brazil for encouraging UNESCO to develop this report, and we hope that it provides a solid empirical basis for the implementation of the various initiatives, such as the Brazilian Artificial Intelligence Plan, launched in July 2024, which seeks to boost the development of AI in Brazil through investments in research, infrastructure and training, with a focus on promoting technological innovation in an ethical and sustainable manner. The report presented here reveals how Brazil has advanced in the field of AI governance in recent years and is ready to further develop its position by establishing responsible and ethical AI governance at the heart of its vision for the future of this powerful technology. This demonstration of leadership in governance is particularly important, considering that during the G20 presidency in 2024, Brazil played a prominent role, contributing significantly to the advancement of global discussions on AI. In 2025, Brazil will continue to assert its regional leadership, presiding over BRICS and hosting the 30th United Nations Climate Change

Conference (COP30). These milestones represent important opportunities for Brazil to strengthen multilateral cooperation and consolidate its position as a promoter of ethical and responsible AI.

Although there is still no specific national legislation to regulate AI in Brazil, the country not only has relevant laws in areas pertinent to AI, such as data protection, but also advanced legislative discussions. In December 2023, the Federal Senate approved Bill No. 2338/2023, establishing principles, rules, and legal mechanisms to regulate AI through a risk- and rights-based approach, including algorithmic impact assessment and enforcement arrangement. This political and legislative activity reflects the significant potential economic impact of AI, with estimates that the impact of the AI market in Brazil in 2025 could reach approximately 4.80 billion dollars. Brazil is a major center of AI entrepreneurship: a 2023 report found that the vast majority of some 500 AI startups in Latin America were headquartered in Brazil, raising about R$ 2 billion in investments.

The RAM highlights Brazil's strengths, including in the areas of data policy and e-participation. Brazil scores relatively high on the Open Data Index (64 out of 100), and the 2019 OECD Data Index, which measures open government data policies, places Brazil above the Latin America, Caribbean, and OECD averages. Brazil has an access to information law, an open data policy along with a monitoring panel to evaluate it, and a national data sharing framework. The 2025 RTI Rating, which analyzes the quality of access to information laws, scored Brazil 108 out of 150. Brazil also ranks well in Electronic Government Development and 19th among 193 countries in E-Participation, indicating that Brazil is at the forefront of electronic participation in government. Brazil also now has its AI Observatory, launched in September 2024. With a budget allocated by the PBIA, the Observatory will seek to consolidate and disseminate knowledge about the impacts of AI, promoting analysis and providing indicators to guide policies and actions aimed at the responsible use of technology.

The report also identifies that trust in government sites is low and there are areas that need further development. Investment in research and development is below the G20 average, although above the average for developing countries in the group. Brazil also faces inequality challenges, with a significant gap between urban and rural areas in internet access and use, although this gap has narrowed significantly in the last decade, and most people have a mobile phone subscription and access to a 3G or 4G network. While schools' access to technology has increased considerably in recent years, substantial regional inequalities remain. There is also a large gender gap in STEM education: in 2017, only 37% of STEM graduates were women. Various government policies and programs aim to address gender and racial inequality, although none currently address diversity and inequality in the domain of AI itself. The area of indigenous languages and cultures is also a significant concern: with over 200 languages spoken in Brazil, there is a danger of linguistic and cultural erasure in data sets and AI tools if these languages and traditions are not incorporated into the development of technology. Although there are still gaps in action in this area, Brazil already has initiatives that seek to use AI to strengthen, preserve and revitalize Brazil's indigenous languages.

Finally, the RAM also highlights the general lack of specific policies or data on AI - a problem common to many countries around the world. For example, there are currently no AI-related procurement laws or policies or rules that address their potential social or environmental impacts. Similarly, there is no law or policy on the use of AI in the preservation of cultural heritage or indigenous languages. Data on specific investments in AI, market size and composition, research and development, industry adoption rate, skills or jobs are extremely limited and often not based on rigorous methodologies or data sources.

In line with the RAM questionnaire, national multistakeholder consultations brought together people from different regions, sectors and disciplines to focus on key thematic areas related to AI and its ethical implications and governance. A number of concerns have been raised, including equitable access to digital infrastructure and AI systems; the need for greater investment in research and development to ensure a greater degree of technological sovereignty, as well as better AI education to empower people to make more informed decisions; the need to incorporate indigenous languages and cultures into AI systems; fears around algorithmic discrimination; the need to use AI to protect the environment; and the imperative need to regulate AI and ensure its ethical development and use. At the same time, there was also recognition of the huge potential benefits of AI - 72% of respondents said they use AI in their professional activities.

The last section of this report presents a set of recommendations covering the different dimensions of the RAM and the key areas of regulation, institutional structures and capacity building. The recommendations aim to fill policy gaps and identified concerns and build on existing strengths to fully align Brazil with the UNESCO Recommendation on the Ethics of Artificial Intelligence. This includes the implementation of a binding legal instrument to regulate AI and guarantee human rights in accordance with the Recommendation, including the establishment of an independent oversight arrangement and the development of tools such as regulatory testing environments.

The recommendations also call for specific measures to use AI to protect and promote material and immaterial cultures, including indigenous languages, to protect and respect the human rights of children and adolescents in the context of the use of AI in education and to ensure that environmental sustainability is at the heart of debates on AI, among others. To maximize the opportunities presented by AI, recommendations include introducing ethical AI training and education

across the economy, as well as greater international cooperation and Brazilian leadership in multilateral forums. In response to the current lack of data on AI, the report calls for the creation of a national database of AI-related information to better inform future policies.

Overall, this report presents a vision for ethical governance and responsible regulation of AI that is fully consistent with innovation and sustainable economic growth and is essential to ensuring a technological ecosystem that benefits the public good. By drawing a clear line from the Readiness Assessment Methodology (RAM) data to multisectoral consultations and recommendations, Brazil has a robust roadmap on how to get there.

It was a pleasure working with Brazil to conduct this exercise. We thank you for your active collaboration in completing the RAM and look forward to deepening this cooperation even further as we work to establish solid safeguards, capable institutions and appropriate rules to ensure that we make the most of this powerful technology in a way that benefits everyone.

Gabriela Ramos
Assistant Director-General for Social and Human Sciences at UNESCO

Executive Summary

In November 2021, the 193 member states of UNESCO signed the Recommendation on the Ethics of Artificial Intelligence, the first global normative instrument in this field. In addition to bringing ethical values and principles to the development and use of Artificial Intelligence (AI), the Recommendation identified key tools for its implementation, including the Readiness Assessment Methodology.

The Readiness Assessment Methodology (RAM[1]) is a tool designed to help countries understand where they stand on the scale of readiness to implement AI ethically and responsibly for all their citizens, and to identify what institutional and regulatory changes are needed. It also aims to incentivize Member States to strengthen their evidence-based AI policies and to invest in areas that need further development. The RAM is divided into five dimensions: (i) Legal/Regulatory (ii) Social/Cultural (iii) Scientific/Educational (iv) Economic and (v) Technical/Infrastructural. Each dimension has a set of questions grouped into different categories, with specific indicators and sub-indicators that include qualitative and quantitative indices.

This report presents the result of the application of RAM in Brazil, providing a comprehensive view of the Brazilian state of readiness from the analysis of each dimension, and proposing a list of recommendations to the Brazilian government aimed at advancing ethical AI in the country. It is divided into three parts: the diagnosis of the national AI landscape, which provides an overview of the current AI public policy landscape in Brazil, the multistakeholder national roadmap, which details the public consultation process carried out in the context of the RAM, and the main recommendations for actions that the Brazilian government should take to create a healthy ecosystem without leaving anyone behind. It is worth noting that the data collected and the proposed recommendations will be made available on the UNESCO Global Observatory to facilitate the exchange of best practices and dialog between countries. It should be highlighted that the purpose of using the RAM is not to categorize countries in an antagonistic manner, but rather to allow for positive exchanges and greater global synergy to address issues related to AI.

The **first part of the report**, titled "Diagnosis of the national AI landscape", provides an overview of the AI area in Brazil and an analysis of the five RAM dimensions (Legal/Regulatory, Social/Cultural, Economic, Scientific/Educational and Technical/Infrastructural).

The **Legal/Regulatory Dimension** presents a diagnosis of the main legal issues related to AI in Brazil. First, it addresses the political and regulatory debate on AI, highlighting the Brazilian AI Plan and Bill Nº. 2338/2023, among other laws in force that have the potential to directly and indirectly affect the regulation of AI. It then discusses laws related to privacy, data protection, data sharing and accessibility, procurement laws and policies, freedom of information/access to knowledge laws, due process and accountability, online safety and integrity of discourse, and, finally, public sector capacity.

The **Social/Cultural Dimension** presents the relevant factors for the ethical development and implementation of AI systems, including socio-cultural inclusion and diversity, public awareness and relevant values for the expansion of ethical AI solutions. It has been observed that when teams developing and deploying AI systems are highly homogeneous, AI systems may fail to adequately reflect the complexity and diversity of the society in which they are embedded, reproducing and reinforcing existing structural biases. This dimension also discusses sustainability and environmental issues, including the possible existence of approaches to the environmental impact of AI systems.

The **Scientific/Educational Dimension** is divided into two parts. The first presents the situation of scientific production on AI in Brazil, as well as figures related to its scientific community, academic publications, Research and Development (R&D), research centers, among others. The second part, on education, mapped data on the existence and availability of educational opportunities for students, such as AI-related degree programs, lifelong education programs for AI developers, and the general public. In addition, the dimension mapped existing and research-available data on school infrastructure and connectivity.

1 https://www.unesco.org/en/articles/readiness-assessment-methodology-tool-recommendation-ethics-artificial-intelligence

In the **Economic Dimension**, the report describes the current situation of Brazil in light of the growing global AI market, in addition to diagnosing fundamental market aspects for economic development such as investments in R&D, GDP growth projections, and the number and types of companies using AI. The economic diagnosis also identifies areas of potential growth for the development and application of AI in Brazil..

Finally, the **Technical/Infrastructural Dimension**, addresses issues related to infrastructure, connectivity, applied standards, computational capabilities, and statistical performance. Among the metrics evaluated were the size of population gaps in Internet access and energy, the country's participation in the development of international standards related to AI, the concentration of data center locations in specific regions of the national territory, cloud computing capabilities, and others.

The **second part of the report** "Developing a Multistakeholder National Roadmap," details the process of public consultation that took place in the country. The call to listen to society was widely disseminated to the Brazilian government, academic communities, the private sector, civil society organizations, and the people in general. The Brazilian society had the opportunity to participate in the virtual meetings and to be informed about the diagnosis of the national AI panorama, to express themselves and to exchange ideas on how to overcome the numerous challenges identified. Furthermore, it was possible to submit written contributions through an online form, where it was possible to collect suggestions for the diagnosis made, as well as for more specific problems already experienced in the digital domain.

The public consultations proved to be extremely important as a space for exchanging ideas, criticisms, and contributions from different sectors of Brazilian society on the future of AI. In particular, public consultations also served to give voice to representatives of vulnerable and often excluded groups in debates on AI, such as indigenous and quilombola communities.

The **third and final part of the report** presents a set of 17 Recommendations for the use of RAM that resulted from the research. Although the recommendations are complementary, they are divided into three sections: Regulation, Institutional Framework, and Human and Institutional Training. It is worth mentioning that some recommendations fit into more than one section.

The regulatory recommendations aim to contribute to the advancement of the public debate on the elaboration, approval and implementation of laws and standards aimed at ensuring the ethical use of AI in Brazil, as well as the adoption of objective measures by the Brazilian government to implement such initiatives. These recommendations consider the urgent task of reconciling the defense of human rights with the right to economic and sustainable development.

Next, the recommendations in the "Institutional Framework" section address the need to adapt the AI governance structure in Brazil to the challenges facing the country. These include the creation of bodies responsible for managing general and specific aspects of AI, as well as the need to maintain a coordinated national policy between the various public administration bodies. Equally important, the recommendations underscore the need for engagement and participation of diverse actors for a national AI policy that is democratic, inclusive and transformative.

Finally, the recommendations on "Human and Institutional Training" seek to guide policies that ensure the inclusion of the Brazilian population in the movement of social and technological transformation that defines our time. These recommendations also aim to ensure the protection and freedom of the country's population through access to education and representation in the environments of development, monitoring and control of AI technologies in Brazil, according to the interests of Brazilian society.

RECOMMENDATIONS

Recommendation 1. Promoting and implementing the UNESCO Recommendation on AI Ethics

Recommendation 2. Creating and maintaining a national database and statistics on AI

Recommendation 3. Adopting an AI Legal Framework that aligns with the UN's 2030 Agenda.

Recommendation 4.TPromoting Human Rights Impact Assessment, including environmental issues, in AI systems considering the SDGs, the UN Guiding Principles on Business and Human Rights, the UNESCO Recommendation on the Ethics of AI and the Ibero-American Charter on Artificial Intelligence in Public Administrations.

Recommendation 5. Promoting diversity and social participation.

Recommendation 6. Ensuring the use of AI technologies in the protection and promotion of tangible and intangible cultures.

Recommendation 7. Establishing measures to protect the rights of children, adolescents and the elderly in the use of AI education and in other interactions.

Recommendation 8. Inserting environmental sustainability as a central axis in debates and decision-making on AI, guaranteeing the participation of native peoples.

Recommendation 9 Promoting a debate on neuro-rights and the regulation of neuro-technologies for the protection of mental integrity.

Recommendation 10. Broadening the debate on the use of AI in public safety, focusing on human rights and combating discriminatory biases, suspending the use of facial recognition and predictive policing technologies until their effectiveness is proven.

Recommendation 11. Orienting Brazilian foreign policy through the lens of digital autonomy and the defense of human rights.

Recommendation 12. Supporting regulation and fostering regulatory sandboxes for sustainable AI development while respecting human rights.

Recommendation 13. Establishing an independent oversight arrangement, integrating relevant actors for inclusive AI governance.

Recommendation 14. Leading the debate on the creation of risk management frameworks in the development of sectoral AI.

Recommendation 15. Incorporating an other-centered approach in AI initiatives to promote a harmonious, humanized, and inclusive advancement.

Recommendation 16. Promoting AI systems in healthcare that ensure quality of life and well-being, with equity in access to healthcare and innovations.

Recommendation 17. Promoting Brazil's leading role, through the performance of Brazilian experts, in the development of international standards for AI systems.

DIAGNOSIS OF THE NATIONAL AI LANDSCAPE

1.1 OVERVIEW

The process of implementing the **Readiness Assessment Methodology (RAM)** in Brazil, initiated in 2023 and consolidated in 2025, highlighted progress, but also that significant challenges still need to be addressed. Issues such as the significant inclusion of marginalized groups and transparency in the processes of development and use of artificial intelligence (AI) demand constant attention and improvement. On the other hand, important advances were noted, demonstrating a maturation in the country's regulatory, policy and infrastructure approaches. These elements, combined, reflect both progress and opportunities for improvement for ethical and responsible implementation of AI in Brazil. It should also be noted that the data collected in this analysis are very dynamic, requiring constant updating to adequately reflect the rapid changes in the global scenario and local context, especially when conducting a **critical analysis of the country's state of readiness**.

Brazil has supported numerous relevant international initiatives in the field of AI ethics, which have resulted in multilateral instruments relevant to the global scenario, such as the UNESCO Recommendation on the Ethics of Artificial Intelligence, the Recommendation of the Council of the Organization for Economic Cooperation and Development (OECD) on AI, as well as active participation in multilateral discussions, such as the G20. At the national level, in 2021, the Ministry of Science, Technology and Innovation (MCTI) launched the **Brazilian Artificial Intelligence Strategy - EBIA** - (EBIA, 2021), which is currently under review. It is important to highlight that, at the time of the RAM, the EBIA was the main public policy for AI in Brazil, being, therefore, mentioned in some sections. Still, all references to the EBIA remain relevant in the current context, especially in the Brazilian AI Plan 2024-2028 (PBIA, 2024). The Plan, which was created at the request of President Luiz Inácio Lula da Silva, was delivered by the MCTI in July 2024, with a proposal for 31 immediate actions and 54 structuring actions.

With the motto "AI for the good of all", the PBIA aims to consolidate Brazil's global role in the ethical and responsible use of AI through strategies such as promoting partnerships, encouraging startups, improving the regulatory ecosystem and strengthening technological infrastructures, which are detailed in the following sections. In the field of regulation, **Bill Nº. 2338/2023** (PL 2338/2023) stands out, which, after years of discussion, was approved by the Federal Senate in December 2024, following for consideration by the Chamber of Deputies.

In this context, Brazil has been charting ways to better guide principles and rights in the field of AI. The PBIA highlights the importance of transparency in AI to ensure data privacy, cybersecurity, and the protection of rights such as intellectual property and copyrights. Bill 2338/2023 requires, for example, that AI agents provide clear information about the functioning of high-risk AI systems (art. 6, I); identify automated interactions (art. 5, I); and use simple language appropriate to the person's age and level of understanding (art. 5, § 2 and art. 7). The General Personal Data Protection Law (LGPD) of 2018, in turn, provides, in article 20, § 1 that "the controller must provide, upon request, clear and adequate information on the criteria and procedures used for the automated decision, subject to commercial and industrial secrecy" (LGPD, 2018).

Brazil's advances in the field of AI also expose significant challenges, especially in balancing the interests of different sectors. One of the critical points is in disputes involving the guarantee of full protection of human rights without compromising industry and innovation. In this context, it is essential to ensure the inclusion of historically marginalized voices. Although the development of the EBIA and PBIA has involved consultations with various actors, including civil society, it is necessary to adopt more robust and targeted strategies to promote the active participation of vulnerable groups.

In addition, it should be noted that Bill Nº. 2338/2023, the result of the work of a committee of jurists, faced criticism for the lack of ethnic and racial diversity in its composition. Although the Federal Senate held relevant public hearings (CJSUBIA, 2022) and heard several sectors, indigenous peoples and other traditional communities, such as quilombolas,

were excluded from the discussions and preparation. An additional challenge is to ensure that decision-making spaces are occupied by diverse and interdisciplinary teams, integrating social sciences, humanities, technology and exact sciences, to enrich the debate and ensure the representation of multiple perspectives.

Among opportunities and challenges, Brazil is at a strategic and dynamic moment in national and global discussions on AI, with relevant initiatives on different fronts. The following sections present a detailed analysis of the Brazilian scenario, based on the results obtained through the application of the Readiness Assessment Methodology, highlighting the advances, challenges and opportunities identified.

1.2 LEGAL AND REGULATORY DIMENSION

1.2.1 AI policy and regulation

Initially, it is important to provide a brief historical overview of the EBIA. It was created with the aim of promoting the responsible development of AI in the country, in line with OECD guidelines and addressing issues such as ethics, transparency, and the promotion of human rights. Although the strategy was the result of a process of public consultations with contributions from various sectors, the lack of a detailed implementation plan and the absence of specific budgetary resources for its execution were identified as significant challenges. The EBIA review, which began in December 2023, continues to be relevant when discussing public policies on AI in Brazil. In this context, the PBIA can be seen as an enhanced version of the EBIA, more effectively addressing the issues identified earlier.

Currently, the main comprehensive instruments in the legal and regulatory dimension are the **Brazilian AI Plan** and **Bill 2338/2023**. However, other Brazilian laws in force have the potential to directly and indirectly affect the regulation of AI, such as Law N°. 12.965/2014, which establishes the Brazilian Civil Rights Framework for the Internet (MCI, 2014), the General Personal Data Protection Law (LGPD, 2018), which will be discussed in the next topic, and legal anti-discrimination instruments related to children (in Art. 5 of Law No. 8069/1990 and in art. 2 of Decree N°. 99710/1990), the elderly (in art. 4 of Law N°. 10741/2003), people with disabilities (in art. 4 of Law N°. 13146/2015 and in art. 5 of Decree N°. 6949/2009), black people (in Law No. 7716/1989) and women (in art. 1-2 of Decree N°. 4377/2002).

The **Brazilian 2024-2028 AI Plan** was developed with the collaboration of more than 300 participants and 117 institutions, covering the public, private and civil society sectors. Despite this collective effort, the participation of vulnerable groups was limited, highlighting the need for more active inclusion in future initiatives. Structured in five thematic axes — Infrastructure and AI Development; Dissemination, Training and Capacity Building in AI; AI for Improvement of Public Services; AI for Business Innovation; and Support to the Regulatory and Governance Process of AI — the plan has a budget of R$ 23 billion for 2024-2028 period. These resources come mostly from state sources, including R$ 12.72 billion in credits from the National Fund for Scientific and Technological Development (FNDCT) and the Brazilian Development Bank (BNDES), R$ 5.57 billion in non-refundable resources from the FNDCT and R$ 2.90 billion from the Federal Budget.

It will be **implemented in phases**, starting with "Immediate Impact Actions" to modernize public services, followed by "Structuring Actions" aimed at technological and scientific infrastructure, such as the implementation of a supercomputer, language models in Portuguese, professional training, AI research and a robust regulatory framework. The plan highlights inclusion, by using AI to reduce inequalities; sovereignty, by prioritizing language models in Portuguese and national infrastructure; and sustainability, by promoting energy efficiency and renewable energy in data centers.

The Plan incorporates UNESCO principles and guidelines in several aspects. The Infrastructure and AI Development axis focuses on one of the aspects of environmental sustainability, with the use of supercomputers powered by renewable energies and the development of technologies that respect cultural diversity. In the Dissemination, Training and Capacity Building in the AI axis, alignment is shown in the promotion of inclusive education and the strengthening of technical capacities to prepare qualified professionals. In addition, Support for the AI Regulatory and Governance Process axis reflects the priority given by UNESCO to the protection of human rights and the promotion of transparency, establishing a regulatory framework that ensures the responsible use of technology.

As one of the actions foreseen in the PBIA, on September 3, 2024, Brazil launched the **OBIA - Brazilian Observatory of Artificial Intelligence** (OBIA, 2024). Acting as a hub for multidisciplinary cooperation, the OBIA aims to bring together experts, data and research to foster debates and subsidize public policies aligned with the challenges and opportunities of AI in Brazil. It is under the coordination of NIC.br, a non-profit civil entity that implements the initiatives

of the Brazilian Internet Steering Committee, made up of multi-sectoral members, including the government. The OBIA also has the support of partners such as academia, the International Center for AI Research (IRCAI) and the Organization for Economic Cooperation and Development (OECD).

The PBIA was launched at an opportune time for international dialog on artificial intelligence, with Brazil hosting the **G20** in 2024. During this presidency, the Brazilian government has given unprecedented prominence to issues such as AI, information integrity, digital public infrastructure and meaningful connectivity. These debates were mainly led by the G20 Digital Economy Working Group (DEWG), culminating in the **Maceió Ministerial Declaration of September 13, 202**4 (DEWG, 2024), which reaffirms the commitment to the ethical and responsible use of technology for sustainable development and reduction of inequalities. The document highlights risk-based governance, respect for human rights, international cooperation and the role of AI in inclusive solutions, with databases that reflect socio-cultural and geographical diversity.

Artificial intelligence was also highlighted in the **G20 Leaders' Declaration**, presented during the summit held in Rio de Janeiro on November 18 and 19, 2024 (G20, 2024), which emphasized the importance of responsible AI governance, in line with the principles of the UNESCO Recommendation on AI Ethics and the MERCOSUR Declaration of Human Rights Principles on Artificial Intelligence. The statement highlighted ethics, transparency, human oversight and mitigation of bias, reinforcing commitments to digital inclusion and reducing gender and ethnic-racial gaps. However, it is worth noting that, although it addresses essential principles for ethical and responsible AI, actions aimed at reducing the environmental impact of AI, such as energy consumption, and practical measures to include vulnerable communities in the development and application of technological solutions were lacking. Even in light of the challenges of multilateral negotiations, Brazil stood out by strategically leading the G20, ensuring the inclusion of topics such as sustainability and equity in the debate.

In the field of regulation, **Bill 2338/2023** was approved in the Federal Senate on December 10, 2024, representing a milestone in discussions on AI in Brazil. The bill arose from a historic debate, initiated in the Chamber of Deputies in 2020, characterized by sensitive and polarized positions. During its processing in the Senate, a committee of jurists was created to contribute to the preparation of the text, public hearings and consultations with international experts were promoted. However, it is worth noting that, over years of discussion, several marginalized groups remained absent from the process. Only one Indigenous person was heard in a public space, as a result of civil society's efforts (CTIA, 2023). Bill 2338/2023 adopts a risk- and rights-based approach, including mechanisms for the protection of rights, obligations for AI agents, risk classification, governance measures, and a monitoring system Despite consolidating a long accumulation of discussions, the text, which is now under analysis in the Chamber of Deputies, still faces disputes of interests, especially in areas such as social protection, copyright and environmental impacts, reflecting the complexity of regulating AI in Brazil in an inclusive and transversal manner.

Finally, it is important to note that the use of AI is increasingly present in the Judiciary Branch, with examples such as the robots Alice, Mônica, and Sofia at the Federal Court of Accounts (TCU), Victor at the Federal Supreme Court (STF), Bem-te-vi at the Superior Labor Court (TST), and Elis at the Court of Justice of Pernambuco (TJ-PE). The **National Justice Council** (CNJ), recognizing the advancements of AI, began reviewing Resolution No. 332/2020 (Res332, 2020), establishing a dedicated working group and holding public hearings in September 2024 (CNJ, 2024). The draft of the new resolution suggests measures such as combating discriminatory biases, risk classification of AI and supervision systems (CNJmin, 2024). However, aspects such as the clarity of responsibilities in the AI usage chain and the effective inclusion of civil society and the technical community in governance processes still need to be improved. So far, the CNJ has not finalized the resolution update.

1.2.2 Data Protection and Privacy Laws

Constitutional Amendment 115 of 2022, included the protection of personal data in the list of fundamental rights and guarantees of the Constitution of the Federative Republic of Brazil of 1988 (Amendment 115, 2022). In addition, Brazil has the **General Personal Data Protection Law** of 2018, which has been in force since September 2020. The LGPD aims to protect the fundamental rights of liberty and privacy and the free development of the individual's personality. Pursuant to art. 17, "every individual is assured the ownership of their personal data and guaranteed the fundamental rights of freedom, intimacy and privacy". The LGPD provided for the creation of a supervisory authority, giving rise to the **National Data Protection Authority** (ANPD). Its mandate is set forth in art. 55-J of the LGPD, which includes ensuring the protection of personal data and privacy, preparing guidelines for the national policy on the protection of personal data and privacy, supervising and applying sanctions, considering petitions, promoting knowledge of the protection of personal data, encouraging the adoption of standards, promoting cooperation with data protection authorities in other countries, preparing annual reports, editing

regulations and procedures, conducting audits, ensuring that the processing of data of the elderly population is carried out in a simple, direct, accessible and adequate manner to their understanding.

The ANPD is composed of a Board of Directors, which currently has four of its five board vacancies filled, an advisory and multisectoral body called the National Council for the Protection of Personal Data and Privacy (CNPD), among other structures. According to the LGPD, the CNPD is responsible, among other things, for issuing annual reports on the implementation of the national data protection policy. To date, the CNPD has issued only one report, which refers to the year 2022 (CNPDRep, 2022) and does not evaluate the effectiveness of the Brazilian data protection law.

The **LGPD** has a notification and consent framework that specifies when it applies. In article 5, item XII defines consent as a "a free, informed and unambiguous expression by which the data subject agrees to the processing of their personal data for a particular purpose". It must be "given in writing or by any other means that demonstrates the expression of the subject's will" (art. 8). In addition, the data subject has the right to be "informed of the possibility of not giving consent and of the consequences of refusal" and to revoke consent (art. 18, items VIII and IX). In this regard, one of the cases in which the processing of personal data may be stopped is "communication to the data subject, including the exercise of the right to revoke consent". Further, according to art. 18, VI of the LGPD, the data subject has the right to obtain from the controller the deletion of the personal data processed with their consent.

Among the principles governing the processing of personal data, the LGPD provides for the principle of transparency, which means "to guarantee to data subjects clear, accurate and easily accessible information about the processing and the respective processing agents, while respecting commercial and industrial secrets" (art. 6, VI). In addition, "the controller must adopt measures to ensure the transparency of data processing based on its legitimate interest" (art. 9, § 2).

The LGPD includes data minimization requirements, and the principles of purpose, adequacy, and necessity must be observed. It also defines a privacy impact report as "a controller's documentation containing a description of the personal data processing operations that may give rise to risks to civil liberties and fundamental rights, as well as measures, safeguards and risk mitigation mechanisms" (art. 5, XVII). The ANPD can also "request from the controller a report on the impact on the protection of personal data when the processing is based on its legitimate interest, while respecting commercial and industrial secrets" (art. 10, § 3), in addition to requiring public authorities to publish such reports and proposing the adoption of standards and good practices for the processing of personal data by this sector.

The definition of sensitive personal data in art. 5, II, of the LGPD includes "data concerning racial or ethnic origin, religious or philosophical beliefs, political opinions, trade-union membership or membership of a religious, philosophical or political organization, data concerning health or sex life, genetic or biometric data, when linked to a natural person". The law stipulates that this type of personal data may only be processed with the consent of the data subject or without consent if it is indispensable for the specific purposes provided for by the law. It should be noted that in relation to health data, "communication or sharing between controllers of sensitive personal data relating to health for the purpose of obtaining an economic advantage (...)" (art. 11, § 4), with some legal exceptions.

The LGPD includes compensation programs. It is provided for in art. 42 that "the controller or the operator who, as a result of the exercise of the activity of processing personal data, causes to others patrimonial, moral, individual or collective damage, in violation of the legislation on the protection of personal data, is obliged to repair it". Data processors who violate the LGPD are subject to warnings, fines, publication of the violation, blocking or deletion of personal data related to the violation, suspension of the operation of the database to which the violation relates, or partial or total prohibition of carrying out activities related to data processing (art. 52).

There is also an entire chapter dedicated to the processing of personal data by the government. Furthermore, according to art. 4, III, the LGPD does not apply to the processing of personal data carried out for the exclusive purposes of public security, national defense, state security or the investigation and suppression of criminal offences. It is worth noting that despite the provision of exceptions to the LGPD, data protection law stipulates that its principles, guarantees of rights and due process still apply in these contexts. In addition, the LGPD authorizes the processing of sensitive personal data without the consent of the data subject in the case of "processing and sharing of data necessary for the execution of public policies provided for by laws and regulations".

The LGPD also provides provisions on security, technical and administrative measures for the protection of personal data. According to the **2024 Global Cybersecurity Index** from the International Telecommunication Union (ITU), Brazil is the second country in the Americas in terms of cybersecurity maturity. The study, which assesses countries' ability to protect data and respond to cyber threats, highlights Brazil's progress in areas such as public policies, infrastructure and adaptation to new risks.

It is also relevant to mention that the **ANPD** has directed efforts to the topic of AI in a more specific way, with actions foreseen in its strategic agenda for the 2025-2026 biennium, such as the definition of interpretative parameters for the application of art. 20 of the LGPD, which deals with the right to review automated decisions. To this end, a public consultation was conducted to gather input on the topic. Other actions of the ANPD include a pilot program designed in 2023 for a regulatory sandbox focused on AI and data protection. As usual, the ANPD carries out public consultations to incorporate the contributions of society in the formulation of its guidelines and initiatives.

1.2.3 Data Sharing and Accessibility

Brazil's score on the **Open Data Inventory** (ODIN) is 64 on a scale of 0 (less statistical offers and openness) and 100 (more statistical offers and openness). This inventory assessed the integrity of official statistical offerings from 195 countries and whether their official data met international standards for openness (ODIN, 2023). While this score is reasonable, Brazil has not signed the International Open Data Charter (ODC, 2023), which aims to promote the adoption and implementation of principles, standards, and good practices for sharing open data globally.

Decree No. 8.777/2016 establishes the **Open Data Policy of the Federal Executive Branch**. Therefore, it is important to note that open databases can be used to feed artificial intelligence systems (PDAPEF, 2016) and for research. One of the objectives of the Federal Executive Branch's Open Data Policy is to "promote empirically based scientific research on public management" (PDAPEF, 2016).

Brazil has a national data sharing framework (GDBarometer, 2023). In this context, **Decree Nº. 10.046 of October 9, 2019**, provides for the governance of data sharing within the exclusive scope of the Federal Public Administration and establishes the Citizen Base Registry and the Central Data Governance Committee, which brings together representatives from different sectors. After questions about its possible unconstitutionality, the decree was submitted to the analysis of the Supreme Federal Court (STF), which declared it constitutional, emphasizing, however, the need to comply with the rules of privacy and data protection and the LGPD (STF, 2022).

The **LGPD** provides that data sharing between the public and private sectors is informed to the National Data Protection Authority and depends on the consent of the data subject. This law also defines the sharing of personal data as "the communication, dissemination, international transfer, interconnection or joint processing of personal data by public agencies and institutions within the framework of their legal powers, or between them and private entities, on a reciprocal basis, with specific authorization, for one or more processing modalities allowed by these public entities, or between private entities" (art. 5, XVI) .

The LGPD also has a chapter dedicated to international data transfers and specifies the cases in which they are allowed, which are: for states or international organizations that provide an adequate data protection framework to the LGPD, for the controller to ensure compliance with the LGPD through specific mechanisms, such as standard contractual clauses and binding corporate rules, when the transfer is necessary for international legal cooperation, when there is need to protect life or physical security, when the national authority authorizes the transfer, and when the transfer is necessary for the execution of public policy or the legal attribution of public service, among other cases (art. 33).

Brazil has binding standards and government policies on open data (GDBarometer, 2023). Even if it does not specifically deal with "open data" in the most technical and broad sense, the main legal instrument is the Access to Information Act or LAI (Law no. 12.527/2011), which provides for the obligations of public entities to disclose information data of public interest (LAI, 2011).

On the other hand, the **Brazilian Strategy for Digital Transformation** (E-Digital) 2022-2026 includes as one of its strategic actions "improving the open data policy of the Federal Executive Branch, involving all federal entities and civil society; promoting and funding interoperability and data-based processes and the co-creation of tools, systems and platforms; and promoting the standardization of ways to access and offer public data" (E-Digital, 2022).

The Federal Government's "**Open Data Monitoring Panel**", created by the Office of the Comptroller General (CGU), monitors the effectiveness of the government open data policies (PMDA, 2023). This platform informs which databases are open, the publication schedule, and also monitors federal agencies' compliance with the open data policy. On December 20, 2024, the CGU launched a new version of the Brazilian Open Data Portal, incorporating functionalities aimed at increasing transparency and social participation (CGU, 2024).

According to the **OECD's OURdata 2023 Index**, which assesses governments' efforts to design and implement national open data policies, Brazil stands out in the "high performance" category, alongside countries such as Norway, Canada, Colombia and Finland (OECDOURdata, 2023). However, to date, no government evaluation of the national data sharing structure has been carried out. The Central Data Governance Committee has issued 15 resolutions, but none assesses the effectiveness of the data sharing framework (CCGD, 2025).

1.2.4 Procurement Laws and Policies

The **Administrative Tenders and Contracts** Law Nº. 14.133/2021 does not address the acquisition of AI systems or products/services that include AI components (LLCA, 2021). In addition, there is no reference to the acquisition of AI systems or products/services that include AI components in the Federal Government Procurement portal (Procurement, 2023). There is no special approval process prior to the acquisition of such systems, nor is any AI certification required or approved by the Brazilian government.

There is also no certified list of suppliers of AI systems, products, services and/or components. Furthermore, Law Nº. 10.973/2004, which, among other things, provides for incentives for innovation and scientific and technological research in the productive environment, provides for the possibility of waiving competitive bidding in the case of technological contracts, although it does not specifically refer to AI. Finally, Complementary Law Nº. 182/2021, which "establishes the legal framework for startups and innovative entrepreneurship", provides for the **Public Contract for Innovative Solution**.

1.2.5 Freedom of Information/Access to Knowledge Laws

As mentioned above, in Brazil the **Access to Information Law (LAI)** regulates access to the information provided for in item XXXIII of art. 5, in item II of § 3 of art. 37 and in § 2 of art. 216 of the Brazilian Federal Constitution. Notably, said art. 5, item XXXIII, establishes that "everyone has the right to obtain from public bodies information of particular interest or of collective or general interest, which is provided to them under the terms of the law, under penalty of liability, except those whose secrecy is essential for the security of society and the State".

The LAI regulates the constitutional right of citizens to access information of public interest. It applies to the three powers of the Federal Government, the States, the Federal District and the Municipalities, and establishes as a fundamental principle that access to public information is the rule, while secrecy is the exception. In order to ensure the full exercise of the right of access provided for in the Federal Constitution, this law establishes the mechanisms, deadlines and procedures for the provision of information requested by interested parties from the public administration. Additionally, the LAI requires public agencies and institutions to proactively disclose a minimum list of information on their online portals.

There are several national and international NGOs, as well as Brazilian institutions, dedicated to monitoring and evaluating the effectiveness and efficiency of the LAI, such as Transparency Brazil (Transparency, 2025), the Open Knowledge Foundation (OKFN, 2025), and the Federal Government's Open Data Portal (PBDA, 2025). Regarding the evaluation of the effectiveness of the law, it must be noted that art. 40, item II of the LAI provides for the monitoring and performance of periodic reports by each agency and organization in relation to its compliance.

According to the **RTI Rating** (RTI, 2025), which analyzes the quality of the world's access to information laws, Brazil scores 108 points out of 150. The index takes into account the following indicators: right of access 6/6, scope of application 29/30, application procedures 19/30, exceptions and refusals 16/30, appeals 22/30, sanctions and protection 3/8 and promotion measures 13/16. It is worth mentioning that those who use and/or share data have obligations to inform the parties involved, pursuant to arts. 5, item XVI; 7, §5; art. 9, item V; art. 18, item VII; arts. 20, 26, 27 and 30 of the LGPD.

The **LGPD** was also created to protect the fundamental rights of privacy and liberty and to give the data subject more control over the processing of their personal data. To this end, the LGPD establishes rules to be followed by the public and private sectors. As already mentioned, it provides that the processing and disclosure of data by the public administration is limited to the data necessary for the execution of a specific public policy, that is, the collection of data must be carried out strictly for the provision and improvement of the proposed service - with adequate and well-defined purposes and criteria. As such, public administration must be transparent about the collection of data from identifiable and identified individuals, as well as the sharing and use of that data.

1.2.6 Due Process and Accountability

The right to due process is a constitutional principle in Brazil. It is provided for in art. 5, item LIV of the **Federal Constitution**, which guarantees that an individual may be deprived of their liberty or have their rights restricted only through a judicial process, by a natural judge, ensuring the adversarial process and an adequate defense. In addition, Law nº. 13.105/2015, which instituted the **Code of Civil Procedure**, also regulates the rules that guarantee due process of law in the civil sphere, ensuring transparency and fairness in judicial proceedings. The right to due process as a fundamental principle open to multiple interpretations, allows us to infer other norms and rights, such as the fundamental right to adversary proceedings and ample defense, the motivation of decisions, the reasonable duration of the process, among others, generating a minimum core of guarantees in its content.

In Brazil, the possibility of the incidence of due process in any private relations is supported by the theory of direct and immediate horizontal effectiveness of fundamental rights in private relations, recognized by the 2nd Panel of the Supreme Federal Court (STF, 2006). In the context of the protection of personal data, the **LGPD** ensures that the data subject has the right to request the review of decisions taken solely on the basis of automated processing of personal data that affect their interests, such as those that define their personal, professional, consumer and credit profile or aspects of their personalities, according to art. 20 of the LGPD. The right to information on automated decisions, therefore, is directly linked to transparency and the right to review decisions, since the LGPD requires the holder to be clearly informed about automated decision-making processes involving AI. It is worth mentioning that **Bill 2338/2023** provides in its art. 5, I, that any person or group affected by AI systems has the right to be informed, in a clear, free and accessible manner, about their interactions with these systems, including the automation of the interaction, except in cases of cybersecurity and cyber defense.

In Brazil, there is still no specific law to regulate liability for damages caused by AI, but Bill 2338/2023 also addresses the topic in its Chapter V. The proposal determines that liability for damages arising from the use of AI must follow the regimes of the Consumer Protection Code, for consumer relations, and the Civil Code, for other situations, in addition to specific criteria provided for in the Bill, such as the degree of autonomy and risk of the system and the nature of the agents involved. It also provides for the reversal of the burden of proof in cases of victim hyposufficiency or technical difficulties in proving, and maintains the responsibility of participants in AI tests for damage caused during experiments.

Meanwhile, the General Data Protection Law, the Civil Code, the Consumer Protection Code and the Internet Civil Framework have served as beacons so far. It is important to mention that AI systems applied in the public and private sectors in Brazil raise the discussion of their regulation, issues of legal certainty and civil liability.

1.2.7 Online Safety and Integrity of Discourse

In Brazil, Law nº. 12.965/2014, known as the **Civil Rights Framework for the Internet** (MCI), establishes the principles, guarantees, rights and duties for the use of the Internet, including guidelines for notification and removal of content (MCI, 2014). Article 18 determines that internet connection providers will not be liable for damages resulting from content generated by a third party. In addition, art. 19, provides that internet application providers can only be held civilly liable for damages caused by content generated by third parties if they do not remove the content after a specific court order, which must clearly identify the infringing material. This mechanism is also discussed in the context of Bill 2630/2020 (Bill 2630/2020).

Bill Nº. 2630/2020, also called the Brazilian Law on Freedom, Responsibility and Transparency on the Internet or, popularly known as the Fake News Law, aims to regulate digital platforms, combat illegal content and promote transparency in recommendation algorithms. However, after intense political disputes and the strong influence of technology companies, the process of the bill was interrupted in the Chamber of Deputies. A working group has been set up to discuss a possible new legislative proposal (CTC, 2024), but there are no updates to date.

Seeking to preserve the integrity of electoral discourse and combat the negative impacts of disinformation during elections, the **Superior Electoral Court (TSE)** issued Resolution Nº. 23.732, of February 27, 2024, amending rules on electoral propaganda (Res23732, 2024). Among the provisions, the resolution prohibits "the use, in electoral advertising, whatever its form or modality, of content manufactured or manipulated to disseminate notoriously untrue or decontextualized facts with the potential to cause damage to the balance of the election or the integrity of the electoral process". In addition, it requires AI-generated content to be clearly identified. To date, there is no official data on the applicability of the resolution in the last elections.

Finally, it should be noted that the **Federal Supreme Court (STF)** is discussing MCI rules in four cases (STF, 2024), with RE 1,037,396 with recognized general repercussion (RE1037396, 2017). These judgments debate the liability of internet application providers for damages caused by content generated by third parties, especially if the requirement for a prior court order to remove content is compatible with the constitutional rights to freedom of expression and the protection of honor. The decision may redefine the balance between the responsibility of intermediaries and the protection of freedom of expression, directly impacting the Brazilian digital environment.

1.2.8 Public Sector Capacity

According to the World Bank, which evaluated the country's digital government maturity index (GovTech data), Brazil has two mandatory programs for the federal public service: **"Capacita GOV.Br**" and "**Moderniza Brasil**" (WBGovTech, 2022). Such programs are mandatory for new civil servants, according to the World Bank report. The **National School of Public Administration** (ENAP) is also a capacity generator for the public sector, since it has a specific focus on innovation in this area (ENAP, 2023).

Capacita GOV.Br focuses on digital transformation and is intended for servants of the Federal Executive Branch, such as Information and Communication Technology (ICT) professionals, analysts and public business managers, legal professionals and senior executives. The digital transformation, through the qualification and increase of digital capabilities, was developed with the purpose of training professionals to work in the dissemination of the culture of digital design in different areas of the Federal Executive Branch. Courses offered include data science, security and privacy, and digital transformation, the scope of which is closer to developing digital skills with a focus on AI. The Moderniza Brasil program, on the other hand, is a broader policy aimed at modernizing the State and digital transformation of services.

1.3 SOCIAL/CULTURAL DIMENSION

1.3.1 Diversity, Inclusion and Equality

Studies show that, in Brazil, there is no difference in internet access between females and males (CETIC, 2024). There is, however, an urban-rural gap in relation to households with internet access. According to the **Regional Center for Studies for the Development of the Information Society (CETIC.br**), in 2024 the percentage of households with internet in urban areas was 85%, and in rural areas 74%. That is, the percentage in the urban area is 11% higher. This difference was much more significant, at 33% in 2016.

Regarding gender and education, a **World Bank** survey indicated that in 2017, 37% of people graduated in Science, Technology, Engineering and Mathematics (STEM) in Brazil were female (WBGender, 2025). According to the **World Economic Forum**, "only 10.7% of Brazilian university women are enrolled in STEM programs, compared to 28.6% of men" (WEFGender, 2021). The percentage of top performers in science or mathematics who expect to work as science and engineering professionals at age 30 in Brazil is 34.2% for boys and 20.2% for girls, corresponding to a difference between girls and boys of -14.0% (OECDPISA, 2018). There is no Brazilian law with the specific objective of reducing the digital gender gap. However, both the PBIA and the National Digital Education Policy (PNED, 2023) have as their objectives the promotion of digital inclusion, which can indirectly impact gender equity. The PBIA even foresees AI training actions for specific audiences, including women and the hearing impaired.

Furthermore, there are government programs, such as **Future Scientists**, to "stimulate the contact of students and teachers from the public school system with the areas of Science, Technology, Engineering and Mathematics, in order to contribute to gender equity in the professional market" (PFCMCTI, 2023). There is also the **Girls in STEM** bill: **Educating Future Scientists**, an initiative of the British Council in collaboration with the Museum of Tomorrow, in Rio de Janeiro. The program supports projects developed in Elementary and High School institutions that promote the inclusion of girls in scientific and technological areas (Girls in STEM, 2024). Although there is progress in this context, no evaluation of these programs was found.

In Brazil, there are some public policies and programs that aim to reduce the socioeconomic digital gap between rural and urban areas, such as the Federal Government's **National Broadband Plan** (PNBL) created in 2010, which aims to expand internet access in remote and needy regions (PNBL, 2010). In addition, Decree nº. 9.845/2019 that establishes the **National Internet of Things Plan** and provides for the Chamber for the Management and Monitoring of the Development of Machine-to-Machine and Internet of Things (IoT) Communication Systems states that "an act of the Minister of State for Science, Technology, Innovation and Communications will indicate the prioritized environments for the application of IoT solutions and will include at least health, urban, industrial and rural environments" (PNIC, 2019). The **Wi-Fi Brazil Program** also contributes to this agenda by seeking to expand internet access in hard-to-reach regions, especially in the most vulnerable communities (Wi-FiBrasil, 2022).

In addition, Law Nº. 14.620/2023, which establishes the **Minha Casa Minha Vida** Housing Program, states that one of its objectives is "to stimulate and facilitate the implementation of connectivity infrastructure and telecommunications and Internet services in order to reduce digital, cultural and informational gaps". However, it is not specific to reducing the socio-economic or rural/urban digital divide, and no evaluation of its effectiveness has been found. The existence of government programs to reduce the digital socioeconomic gap have been noted, however, such as Connected Students (AlunosConec, 2022), Proinfo, the Electronic Government Program: Citizen Service (GESAC, 2017), Computers for Inclusion, Wi-Fi Brazil Program and Investments in Digital Inclusion (InclusaoDig, 2022). In addition to these programs, the Internet Steering Committee in Brazil has driven actions to reduce digital inequality throughout the country, promoting projects aimed at digital inclusion, especially in areas more distant from large urban centers.

Regarding the diversity in the AI workforce in Brazil, it is noted that there is no specific law or policy to improve this issue. Technology companies, for example, are not required to publish diversity statistics. In addition, no affirmative action standard is applied to improve diversity throughout the AI lifecycle in Brazil. Further, in academia, universities are also not obliged to publish diversity statistics. However, the **Quota Law** Nº. 12.711/2012, which regulates admission to federal universities and federal technical secondary schools, requires federal universities to comply with the diversity standards it establishes (LC 12711/2012).

When it comes to the public sphere, government contractors must adhere to certain diversity standards. For example, the **Law on Tenders and Administrative Contracts** requires compliance with requirements to reserve positions for people with disabilities (LLCA, 2021). Those hired to provide labor services with 25 or more employees must have at least 8% women who are victims of domestic violence (Dec11430, 2023). Additionally, Bill Nº. 2.067/2021 aims to determine that companies hired by the government to perform services reserve at least 30% for workers of African descent (PL2067, 2021).

It is also important to consider the languages spoken in the Brazilian territory. This is another aspect of diversity, inclusion and equality. According to the Constitution of the Federative Republic of Brazil, Portuguese is the official language of the country, with online content and data available to train AI systems in this language. Regarding the **Global Data Barometer**, Brazil's data and language governance score is 90 out of 100 (GDBarometer, 2025).

However, it should be noted that there are **274 indigenous languages in Brazil** that are not considered official (FUNAI, 2022). Although small, some online content and data can already be displayed in indigenous languages. An example is the initiative of the **Indian Museum** (MIndio, 2021), an agency of the National Indigenous Foundation, which provides dictionaries of indigenous languages of the Jaapim platform in Taurepang, Galibi-Marworno, Karipuna, Arutani, Moré-Kuyubim, Baniwa-Koripako, Sanöma, Guató, Ye'kwana, Sanöma and Kawahiva languages, on an Android platform. There is also a virtual Tupi-Guarani dictionary (Tupi, 2025), among others. Also worth mentioning is the initiative of the University of São Paulo (USP), through the Artificial Intelligence Center (C4AI), and IBM Research, to employ AI-based solutions to strengthen, preserve and revitalize Brazilian indigenous languages, in collaboration with local communities (USP, 2023). It is expected that more initiatives in this area will be developed, with the active involvement of indigenous communities themselves, to avoid the risk of historical erasure of these populations.

1.3.2 Public Engagement and Trust

The **Brazilian Electronic Government Development Index** is 0.8403, on a scale of 0 to 1, which implies that Brazil occupies the 50th position among the 193 Member States of the United Nations (UN) (EGOVKB, 2024). This index represents the state of e-government development in UN member states by assessing, for example, "the standards of website development in a country", considering "access characteristics, such as the infrastructure and educational levels, to reflect how a country is using information technologies to promote access and inclusion of its people".

The Brazilian **E-Participation Index** is 0.8630, on a scale of 0 to 1. This indicates that Brazil occupies the 19th position among the 193 UN member states and that the country is at the forefront of electronic participation mechanisms implemented by the government compared to other states (EGOVKB, 2024). In the Inclusive Internet Index, out of 100 countries, Brazil was ranked 19th in terms of trust in websites and apps (Impact, 2022) And in terms of trust, according to a 2022 Ipsos survey in Brazil, 50% of respondents said they trust companies that use artificial intelligence as much as they trust other companies (IPSOS, 2022). In a **PEW Research Center 2020** survey, 53% of respondents said that the development of AI has been mostly positive for society, while 39% said it has been negative; respondents who did not respond are not shown (PEW, 2020). According to the **Edelman Trust Barometer 2024**, Brazil has 57% trust in AI companies (Edelman, 2024).

1.3.3 Environmental and Sustainability Policies

There are no laws or policies that specifically address the environmental and sustainability impacts of AI in Brazil. There is no specific mention of the environmental impact of AI demands on energy and other natural resources and the associated carbon footprint. There is also no concrete mention of the environmental impacts of use cases where AI technology facilitates, for example, the massive use of autonomous personal vehicles that increase the concentration of greenhouse gases in the atmosphere, or the use of AI to increase the exploitation of fossil fuels.

On the other hand, the Ministry of Development, Industry, Trade and Services (MDIC) is discussing the **Strategy for Implementing Public Policy for Attracting Data Centers**. This policy is based on a study commissioned in 2023 by MDIC and the Brazilian Agency for Industrial Development (ABDI), carried out by consulting companies, which mapped opportunities in the data center segment, presented international benchmarks and several recommendations for the strategy (ABDI, 2023). However, it practically did not address environmental risks or mitigation strategies, also indicating the Ministry

of the Environment (MMA) as a partner in the execution of de-bureaucratization actions, such as exemption from licensing. The focus of the strategy is on technological innovation, without a critical analysis of adverse environmental issues. In addition, the MDIC and BNDES are leading initiatives to enable these infrastructures with financing and tax incentives (BNDES, 20234), while the debate takes place without active listening from society, raising concerns about the inclusion of environmental and social perspectives in the formulation of policies.

In Brazil, the general environmental rule for all activities that include "the construction, installation, expansion and operation of facilities and activities that use environmental resources, actually or potentially polluting or in any way capable of causing environmental degradation, are subject to prior environmental authorization" (NEP, 1981). According to Decree Nº. 99.274/1990, which regulates the **National Environmental Policy**, the environmental license must contain "an environmental diagnosis of the area", "a description of the proposed action and its alternatives" and "the identification, analysis and prediction of significant, positive and negative impacts".

Bill 2338/2023, on the other hand, has as one of the foundations "the protection of the environment and sustainable development". It mentions sustainability-related provisions, including the promotion of environmental certifications, R&D and incentives for the expansion of sustainable data centers. The bill also provides for the mandatory algorithmic impact assessment, but does not detail its specific elements and criteria. In addition, the bill obliges AI agents to report serious incidents, including environmental damage, to the competent authority, but without offering clear mechanisms to ensure effective environmental protection (Bill 2338, 2023). The **PBIA** already brings some actions related to the environment, focusing on the use of AI for the benefit of the environment and the promotion of sustainable practices and renewable energies, including support for the establishment of data centers. The PBIA, however, does not offer clear guidelines or specific mechanisms to address issues such as the high energy consumption of AI systems, exploitation of natural resources, or the management of technological waste (PBIA, 2024).

None of the mentioned policies cite the Sustainable Development Goals (SDGs) or the Social and Environmental Governance (ESG) agenda.

1.3.4 Health and Social Welfare

Brazil revised its digital health policy in 2021. Called the **National Health Information and Informatics Policy** (PNIIS), it was criticized due to the lack of a participatory process, to define "the guiding principles and guidelines for the public and private sectors to effectively integrate health information systems, promoting innovation, supporting the digital transformation of health work processes and improving governance in the use of information, information technology solutions and digital health, as well as transparency, safety and access to health information by the population and improving citizen health" (PNIIS, 2021). In addition, it is worth mentioning that the **Digital Health Strategy for Brazil 2020-2028** (ESD28, 2020) continues to be evaluated by the Ministry of Health. In 2023, there would have been advances in the computerization of Basic Health Units, connectivity and integration of information systems. However, issues remain such as the need for professional development and improvements in digital health (MonitESD28, 2023). Although social participation is mentioned as a central element for the governance of the Strategy (PAM&AESD, 2023), it is worth noting that spaces such as the Technical Chamber for Digital Health and Communication of the National Health Council are the result of popular demands for participatory processes - based on a diagnosis of their fragility.

In addition, it is worth mentioning that the PNIIS mentions AI technologies. One of the PNIIS guidelines for the health connectivity environment is to "promote the dissemination of health data and information and the use of artificial intelligence to meet the needs of users, professionals, managers, service providers and social control, as well as the need for exchange with training, teaching and research institutions, among others" (PNIIS, 2021). This is a forecast that needs to be debated for a regulation that observes the guidelines of the Unified Health System - SUS.

Finally, Brazil's digital health policy includes physical and mental health. One of its principles is to "develop initiatives that focus on citizens and their physical and mental well-being". However, it does not consider the impact of AI on children and other vulnerable groups (PNIIS, 2021).

1.3.5 Culture

With respect to culture, no specific law or policy was found on the use of AI to preserve cultural heritage. The **Material Cultural Heritage Policy** (PPCM, 2018), consolidated by the National Historical and Artistic Heritage Institute (IPHAN) and instituted by Ordinance Nº. 375, of September 19, 2018, does not mention the use of AI in this context. There is, however, the objective of the PBIA to promote the development and use of AI to solve cultural challenges, including the development of language models in Portuguese, with national data and representative of Brazil's cultural, social and linguistic diversity. It is worth mentioning the efforts of other entities to investigate the possibilities of using AI to preserve cultural heritage, such as

"Artificial Intelligence and Culture: perspectives for cultural diversity in the digital age", developed by the **Information and Communication Center** (NIC.br), which is associated with the Internet Steering Committee in Brazil (CETICStudy, 2022).

Furthermore, no specific policy was found regarding the use of AI to preserve minority and indigenous languages. The official instrument for the recognition of languages as heritage in Brazil is the **National Inventory of Linguistic Diversity** (INDL), established by Federal Decree Nº. 7.387/2010. It mentions the "promotion of the preservation and availability of documentary and bibliographic collections of interest to safeguard linguistic diversity", without referring to artificial intelligence (INDL, 2010).

1.4 SCIENTIFIC/EDUCATIONAL DIMENSION

1.4.1 Research and Innovation

R&D expenses

In 2020, Brazil's Gross Domestic Product (GDP) was R$ 7.64 trillion. In 2023, the country's GDP was R$ 10.9 trillion and the last published quarter (3rd quarter of 2024) indicated R$ 2,989.9 billion. Compared to the 3rd quarter of 2023, the GDP increased by 4.0% (IBGE, 2024). According to the **National Indicators of Science, Technology and Innovation of the Ministry of Science, Technology and Innovation** (INCTI, 2022), Brazil will invest R$ 87.126 billion in Research and Development in 2020, representing 1.14% of Brazil's GDP. About 37.7% of the investments come from the federal government, 15.8% from the states and 46.5% from the private sector, out of a total of R$ 87,126 billion.

The available data do not allow us to determine whether these investments refer to R&D expenditure within the national territory (Gross Domestic Expenditure on R&D, GERD) or within and outside the national territory (Gross National Expenditure on R&D, GNERD). According to the database of the **UNESCO Institute of Statistics** (UIS, 2022), Brazil's R&D expenditure (1.16 GNERD) is below the average of the other G20 countries as a whole (about 1.87 GNERD, according to Table 1.1), but above the average of the developing countries in the group.

Brazil also has 11 **Applied Research Centers in Artificial Intelligence** (CPA), supported by MCTI, Research Foundation of the State of São Paulo (FAPESP) and CGI.br. The CPAs are hubs of innovation and scientific excellence dedicated to the advancement of AI technologies in Brazil. Focusing on areas such as healthcare, agribusiness, and industry, the centers promote collaboration between universities, companies, and civil society organizations. They are supported for an initial period of five years, with the possibility of renewal for an additional five years, totaling up to ten years, depending on performance and results achieved. Each CPA may receive up to R$ 1 million annually from FAPESP, in addition to up to an additional R$ 1 million from one or more partner companies (CPA, 2024).

Embrapii (Brazilian Company for Industrial Research and Innovation), in partnership with MCTI, also promotes **Competence Centers**, which work with research in frontier technologies. An example is the Competence Center for Immersive Technologies Applied to Virtual Worlds (CEIA-UFG), inaugurated in Goiânia (GO). The CEIA will receive R$ 60 million from the MCTI over 42 months and will have an additional investment of R$ 20 million from a consortium formed by the Goiás Research Support Foundation (FAPEG), Sebrae-GO and private companies to develop research in technologies aimed at simulating the physical world through virtual reality. Focusing on sectors such as education, health and industry, the center seeks to develop innovative solutions in virtual, augmented and mixed reality, promoting collaboration between companies and academia (Embrapii, 2024).

The **Brazilian AI Plan** emphasizes the strategic role of R&D. In axis 1, dedicated to AI Infrastructure and Development, an investment of R$ 5.79 billion is planned, distributed among 13 actions, including R$ 873 million destined exclusively to the AI R&D Program. Among the initiatives in this area are the creation of a National Network of AI Centers of Excellence, the National Institute of Informatics, and the encouragement of collaborations with universities and research institutions in Latin America, the Caribbean, and Africa.

The PBIA also allocates resources for R&D in other areas, such as supporting doctoral scholarships in AI abroad (area 2); building a unified database of educational data (area 3); fostering the integration of master's and doctoral experts in AI into micro, small, and medium-sized enterprises (area 4); and creating the National Center for Algorithmic Transparency and Trusted AI (area 5). It is also worth remembering that the PBIA emphasizes the strengthening of the Brazilian Observatory of Artificial Intelligence, provided for in axis 5, with a minimum allocation of R$ 11.75 million for this initiative. Innovation in AI must occur through various means, such as parliamentary amendments, public calls at Finep (Financier of Studies and Projects), CNPq (National Council for Scientific and Technological Development) and Embrapii.

Also, according to the **Latin American Artificial Intelligence Index** (ILIA), which evaluates the scientific, structural and governance development of AI in 19 countries in Latin America and the Caribbean, Brazil occupies the 2nd position in the overall ranking, with a score of 69.30/100, while Chile ranks first with 73.07 points. The R&D+A (Research, Development and Adoption) dimension saw the greatest advancements, with the Development subdimension increasing by 60 points and Adoption rising by 53 points, placing the country in the 1st regional position in this area. On the other hand, in the sub-dimension of Professional Training in AI, Brazil obtained 40.81 points, occupying the 10th position in the ranking, highlighting the need to improve professional training programs in AI (ILIA, 2024).

Survey results

According to **OECD** data (OECD.AI, 2023), Brazil would have reached a total of 10,327 AI-related publications in 2019, 10,793 in 2020, 11,829 in 2021, and 10,584 in 2022. The number of publications per capita (* 10^6) for this period would be 48.93 in 2019, 50.77 in 2020, 55.27 in 2021, and 49.45 in 2022. Regarding the numbers of citations per capita (* 10^6), the figures would have been 380 in 2019, 322 in 2020, 222 in 2021, and 84 in 2022.[2]. It is important to point out that the report presented to CAPES in 2024, "Panorama of Changes in Research in Brazil" by the consultancy Clarivate, indicates significantly different data. According to the study, Brazil would have 6,304 scientific publications on AI registered in the period from 2019 to 2023 (CLARIVATE, 2024). Regarding the number of publications at the **ACM FAccT Conference** (Fairness, Accountability, and Transparency), at least 5 articles by Brazilian researchers were accepted in 2024 (FAccT, 2024).

Indicator	*GERD as a percentage of GDP*					
Country	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*
South Africa	0,73147	0,74992	0,76257	0,68773	0,6143	..
Germany	2,93379	2,94039	3,0471	3,11011	3,16779	3,1093
Saudi Arabia	..	..	..	..	..	0,51991
Argentina	0,62262	0,55815	0,55631	0,49435	0,47813	0,52522
Australia	1,92071	..	1,87977	..	1,82892	..
Brazil	1,37093	1,28637	1,1175	1,16769	1,21096	1,16704
Canada	1,69324	1,72873	1,6858	1,67578	1,59123	1,69638
China	2,05701	2,10033	2,11603	2,14058	2,24463	2,40666
United States	2,787	2,85345	2,90548	3,01234	3,17383	3,42287
France	2,22702	2,22238	2,19888	2,19666	2,19179	2,34717
India	0,6931	0,66984	0,66603	0,65529	..	..
Indonesia	..	0,24535	0,23805	0,22632	0,27129	0,28077
Italy	1,3385	1,36642	1,37013	1,42443	1,46159	1,5274
Japan	3,24071	3,10666	3,16636	3,22114	3,21489	3,2746
Mexico	0,42943	0,38778	0,32832	0,30711	0,28394	0,29638
United Kingdom	1,64633	1,65693	1,66947	1,71835	1,72091	..
Republic of Korea	3,9782	3,98704	4,29206	4,51633	4,62703	4,79571
Russia	1,10085	1,10238	1,10967	0,99002	1,03531	1,09371
Turkey	0,87689	0,93816	0,95272	1,02517	1,06578	1,08864

Table 1.1 **- GERD as a percentage of GDP (Source: UIS, 2022)**

***The European Union was not included in the table above for the purpose of facilitating reading in the countries**

****Differences in the GDP calculation methodology and in the correction of the values explain the difference in the percentage described by the MCTI and the UIS for Brazilian values**

2 It should be noted that the data cited from the OECD.AI database suggest a decrease in the number and relevance of scientific publications on AI in Brazil. This information is contrary to the set of findings of this report. Therefore, it is possible that the data is inaccurate or outdated.

Ethical AI Research

Although the research identified specific initiatives to create and promote research in ethics and AI in Brazil, no official data was found on the per capita number of conferences and research centers in AI ethics. Similarly, no data was found on the number of AI researchers (computer scientists, data scientists, roboticists, and AI ethicists) per capita in universities.

AI Talent Innovation Production

In Brazil, there are 4 **Kaggle** grandmasters, out of a total of 222 worldwide[3]. Kaggle is a data science competition platform that brings together a community of data scientists and machine learning programmers. The platform is free and has been managed by Google since 2017.

Kaggle is a data science competition platform that brings together a community of data scientists and machine learning programmers. The platform is free and has been managed by Google since 2017.

A Kaggle Master is the highest skill level among users, a title reserved for those who have demonstrated a high level of skill and relevant contributions to the Kaggle community. The data does not allow us to say whether the 4 Kaggle masters in Brazil are Brazilian, nor whether there are Brazilians counted among the Kaggle masters in other countries.

Regarding AI patents per capita, no related information was found in the database of the **National Institute of Industrial Property** (INPI). Finally, there is no evidence on the number of AI repositories per capita on GitHub (OECD.AI, 2023).

1.4.2 Education

Education strategy

In Brazil, Law no. 14.533/2023 establishes the **National Digital Education Policy** (PNED) (PNED, 2023) and amends related legislation: Laws nº. 9.394/1996 (Law of National Education Guidelines and Bases), 9.448/1997, 10.260/2001, and 10.753/2003, with the objective of integrating AI and/or other digital tools into the educational system training the teaching staff. There is also the **Connected Education Innovation Program**, developed by the Ministry of Education (MEC) and partners, which aims to support the universalization of high-speed Internet access and promote the pedagogical use of digital technologies in basic education (PIEC, 2025).

In addition, Law Nº. 13.005/2014 approved the **National Education Plan** (PNE), establishing goals and strategies to improve education in Brazil by December 31, 2025 - deadline extended by Law Nº. 14.934/2024. In order to monitor and evaluate the achievement of these goals, the **National Institute of Educational Studies and Research Anísio Teixeira** (INEP) has been charged with preparing and publishing studies that verify the progress made in the implementation of these goals.

The **General Coordination of Educational Studies** (CGEE) of the Directorate of Educational Studies (Dired) - Inep is responsible for the preparation and publication of reports and panels to monitor the objectives of the PNE, as well as studies on topics relevant to educational policy, available in the Education Policy Studies and Research Notebooks, whose series began in 2018. CGEE/Dired produced and disseminated evidence on the development of education in Brazil. The publication of the "Educational Policy Studies and Research Notebooks – Volume 8: Contributions to the New National Education Plan" represents an important addition to the ongoing discussions on educational planning.

There are laws and policies in place regarding the training of educators/teachers to teach ethics applied to AI/technology. The PNED indicates actions related to "the creation of a strategy for the training and recycling of teachers in ICT and enabling technologies" and "the development, in educational networks and institutions, of projects aimed at promoting digital skills and innovative teaching and learning methods, fundamental for academic development". The PBIA also provides incentives to train teachers in digital literacy and pedagogical use of AI.

Furthermore, the Ministry of Education has previously published several instruments on continuing education for basic education teachers. For example, **MEC Order Nº. 882/2020** ratified the new guidelines for the training of basic education teachers with the adequacy of curricula for teaching based on the National Common Curricular Base (BNCC). These guidelines provide guidance on the need to address the dynamics of the learning process with technology so that teachers can develop new approaches and active and innovative methodologies in face-to-face, distance and correspondence learning modalities.

The normative complements the **National Curriculum Guidelines (DCNs)** and the Common National Base for the Initial Training of Basic Education Teachers (BNC Training), which were ratified in December 2019. The document also states that

3 Last accessed 13 December 2023 (Kaggle, 2023).

professional development should focus on pedagogical content knowledge, the use of active learning methods, collaborative peer work, extended duration, and systemic coherence.

Brazil also has **Cetic.br**, whose mission is to monitor the adoption of information and communication technologies (ICT) in Brazil. Created in 2005, Cetic.br is a department of NIC.br, linked to CGI.br. Since 2010, it has been conducting research through interviews with school communities (students, teachers, pedagogical coordinators and principals) to map the access, use and appropriation of information and communication technologies in public schools and private elementary education (CETIC, 2025).

Educational infrastructure

According to **UNESCO indicator surveys** (SDG4, 2024), in 2019, the proportion of primary schools of elementary school I with internet access for educational purposes was 59.8%, while those of elementary school II was 91.3% in 2017; and those of high school, in 2022, was 65.9%.

According to the ICT Education 2023 survey, 89% of schools in the early years of elementary education have internet access; 93% of schools in the final years of elementary education; and 98% of schools in high school or vocational education. However, while 99% of schools located in urban areas have access to the network, this percentage was 81% in schools located in rural areas (CETIC, 2023). The **National Telecommunications Agency** (Anatel) has also mapped school connectivity (ANATEL, 2024), with data updated in March 2024, indicating that there are 137,914 public schools in Brazil, 7,522 (5.5%) of which do not have Internet access.

Similarly, according to the **UNESCO** survey (SDG4, 2024), in Brazil, in 2019, the proportion of elementary schools with access to computers for educational purposes was 59.8%, while for middle schools it was 91.3%; for high schools, in 2021, it was 65.9%. The latest **ICT Education** survey (CETIC, 2023), even when schools are connected to the Internet, the challenge of providing access in places suitable for use in teaching and learning activities remains, with large disparities between different regions of the country.

Curriculum Content

The **PNED** states that "the Digital School Education area aims to ensure the integration of digital education in school environments, at all levels and modalities, by promoting digital and information literacy and the learning of computing, programming, robotics and other digital skills". As such, the BNCC is a normative document that defines the organic and progressive set of essential learning that all students must develop throughout the stages and modalities of basic education.

As defined in the **Law of Guidelines and Bases of National Education** (LDB, 1996), the Base must guide the curricula of the educational systems and networks of the federal units, as well as the pedagogical proposals of all public and private schools of early childhood, elementary and secondary education, throughout Brazil. The Foundation defines the knowledge, competencies, and skills that students are expected to develop throughout their basic education. Guided by the ethical, political and aesthetic principles outlined in the National Curriculum Guidelines for Basic Education, the Base contributes to the goals of integral human formation and the construction of a just, democratic and inclusive society.

In February 2017, Brazil took an important step in this direction. The **High School Reform** (Law nº. 13.415/2017) established that the high school curriculum would be defined by the BNCC, with 60% of the workload consisting of common content and 40% of optional content. Additionally, with a projected budget of R$ 183.24 million between 2024 and 2028, the PBIA includes the "AI in Undergraduate Degree" initiative, which involves the creation of undergraduate courses focused on artificial intelligence and related areas, as well as encouraging elective courses in programming, data science, and AI. The goal is to create at least 5,000 new vacancies in AI courses in the next three years, with the automatic availability of vacancies in data science and AI courses in the Higher Education Student Financing Fund (FIES) program.

Finally, it is worth mentioning that, although there is no exact data on the number per capita, several universities offer specific courses in AI and data science, such as bachelor's, master's and doctoral programs at the University of São Paulo - USP, the State University of Campinas - Unicamp and the Federal University of ABC - UFABC. Interdisciplinary courses, especially at federal and state universities, have included topics such as AI ethics, philosophy of technology and social impacts such as "Technology, Science and Culture" (Unicamp) and "Ethics and Technology" (USP). In technical and high schools, institutions like those in the *Sistema S* (Senai) also include topics related to AI, and training programs offered by institutions such as SENAI and Fundação Getúlio Vargas (FGV) address applied AI and its ethical implications.

Educational Performance

According to the UNESCO Statistical Database (UIS, 2023), the percentage of graduates from STEM programs in Brazil will be 17.49% of the total number of people completing or graduating in the country in 2020.

According to the **Brazilian Computer Society** (SBC, 2020), the bachelor's degree programs in computer science, information systems, computer engineering, software engineering, and undergraduate programs in computer science will have 33,503 graduates in 2020. In terms of ICT programs, the percentage of graduates from this field was 3.91% of the total number of graduates in the country in 2020 (UIS, 2023).

According to the EBIA (EBIA, 2021), there is limited consolidated data to estimate the number of AI professionals in the country. Using data from the CNPq Lattes platform (October/2019) as a parameter, it is possible to observe that the number of AI professionals in Brazil is 4,429 specialists (CNPq, 2019). Thus, according to the Coursera Global Skills Report, which allows us to understand the global panorama of skills and credentials, Brazil occupies the 28th position out of 100 countries (Coursera, 2023).

Public Access to AI Education

The **National Catalogue of Technical Courses** (CNCT), created in 2008, is an instrument that regulates the provision of technical vocational courses at the secondary level, in order to guide institutions, students and society in general. It is a reference to support the planning of courses and corresponding professional qualifications and mid-level technical specializations. The CNCT is periodically updated to contemplate new socio-educational demands, and is already in its 4th edition. The document presents 215 courses, grouped into the following technological area: 1. Environment and Health; 2. Industrial Control and Processes; 3. Educational and Social Development; 4. Cultural Production and Design; 5. Tourism, Hospitality and Leisure; 6. Information and Communication; 7. Management and Business; 8. Safety; 9. Infrastructure; 10. Food Production; 11. Industrial Production; 12. Natural Resources and 13. Military (CNCT, 2020).

In Brazil, there are institutions that offer free courses in Portuguese on AI and AI ethics to the general public, such as the courses "Ethics in AI" and "Artificial Intelligence in the Context of Public Service" of the Gov Virtual School, an initiative of the National School of Public Administration - Enap (EVG, 2025); SENAI´s "Ethics in AI" (SENAI, 2025); FGV´s "Introduction to Artificial Intelligence: Basic Concepts" (FGV, 2025); and others on platforms such as Udemy, Coursera, and StartSe.

1.5. ECONOMIC DIMENSION

1.5.1 The AI Economy in Brazil

There is a global consensus that AI will continue to have a significant impact on the economies of all countries, albeit in different ways depending on their position in the technology market. To evaluate this diagnosis, it is necessary to observe data on trade, infrastructure and material and human capacities. Accurate data on the AI economy in Brazil is still scarce and difficult to find on available government platforms.

Without specifying the number of companies that work with AI as a primary or secondary activity, data from the **Brazilian Ministry of Development, Industry, Commerce, and Services** indicate that the country totaled 22 million active companies as of December 2024 (including micro, small, and large businesses) (MDIC, 2024).

Some unofficial sources allow us to project the contribution of AI to the Brazilian economy in recent years and in the next decade. According to the Statista database (Statista, 2024), the projection of the impact of the AI market on the Brazilian GDP is significant in any of the optimistic, moderate or conservative scenarios - as shown in Figure 1.1.

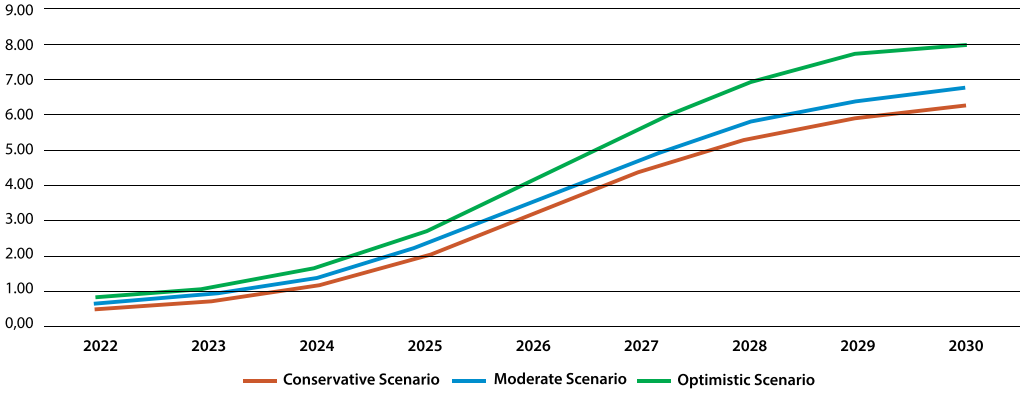

Figure 1.1 - **Impact of the AI Market on Brazil's PIC (in percentage).** **(Source: Statista, 2023)** *** data is current until March 2024, from that date onwards it is a projection**

According to the report **Survey on the Use of Information and Communication Technologies in Brazilian Companies - ICT Empresas** 2023, 13% of the companies interviewed declared using AI in their operations (CETIC, 2023). Of these, the use of AI would be predominant in large companies (41%) in Brazil, while the smaller ones with up to 49 people would be 11%. According to the **Brazilian Institute of Geography and Statistics** (PINTEC, 2023), in 2022, 16.9% of the 9,586 industrial companies with 100 or more employees will use artificial intelligence.

In terms of other advanced digital technologies that go hand in hand with AI, the use of cloud computing was reported by 73.6% of these companies, followed by the Internet of Things (48.6%), robotics (27.7%), big data analytics (23.4%), and additive manufacturing (19.2%). Finally, the **Statista** database projects that the impact of the AI market in Brazil in 2025 may represent approximately 4.80 billion dollars.

The available data on the number of AI startups, or the proportion of these startups in relation to the total number of companies in Brazil, remains incomplete and unofficial. Unofficial studies suggest significant trends in the AI and startup market. Among the surveys, Sebrae's **2022-2023 Brazil Startup Report** stands out, which indicated the existence of at least 7,000 startups in the country, but without identifying those focused on AI. The study indicates that, at the time of the analysis, the Information Technology sector would be at the top of the ranking of segments served by startups in Brazil, reaching 23.34% Another study conducted in 2024 by the Brazilian Association of Startups indicated that there is a base of at least 14,000 startups in Brazil, with Edtech, Fintech, and Tech being the top 3 sectors among the startups (ABS, 2024). The **2023 District Artificial Intelligence Report** (Distrito, 2023) mapped nearly 500 active AI startups in Latin America, with Brazil standing out for housing the majority of them. In 2022, these Brazilian AI startups reportedly raised a total of R$ 2 billion in investments, with Brazil accounting for 73.65% of the total AI startups in Latin America, leading the development and innovation of AI in the region. This number reflects a sharp increase since 2016, when the number of AI startups founded in the country increased significantly, according to the report.

It is worth highlighting that there is no consensus among experts on how to classify what an AI company is and whether the use of technology is an end activity or an intermediate activity. However, many of the startups that say they work with AI rank in the agricultural, education, real estate, logistics, media, marketing, compliance, environmental preservation, personnel management, health, finance, and retail sectors (Distrito, 2023).

A survey conducted by consulting firm PwC to measure the rapid growth of AI in the private sector during the COVID-19 pandemic (PwC, 2021) found a significant increase in AI optimism among business leaders and decision makers. According to the firm, respondents' optimism would have increased from 72% in 2020 to 92% in 2021, and the rate of AI adoption would have increased from 62% to 70% over the same period. In addition, according to the report, 94% of respondents say they have implemented or plan to implement AI-based systems in their organizations.

In addition to supporting AI research centers and other initiatives already addressed, the Federal Government has proposed investments, such as:

- ***Investments in AI Projects for Startups***: In 2023, the Ministry of Science, Technology and Innovation, together with the Finep and other agencies, launched the public notice "**Artificial Intelligence Solutions for the Government**", with an investment of R$ 36 million. (FINEP, 2023). This program aims to support startup projects developing AI-based solutions for applications in technological challenges of federal government agencies.
- ***Notice of R$ 80 Million for Startups***: In 2022, the Federal Government, through the MCTI, launched a specific tender to select AI innovation projects in startups in the thematic lines of agriculture, health, industry, tourism and smart cities, with a total of R$ 80 million in economic subsidy resources (MCTI, 2022).
- ***Additional government investments***: In addition to these specific programs, the federal government also has other financing initiatives, such as a R$ 180 million public call for technology parks, R$ 50 million for innovation centers, R$ 250 million from the CNPq/MCTI Universal Call, R$ 280 million for the National Institutes of Science and Technology (INCT), among others.

The PBIA also aims to foster and accelerate startups specialized in AI. Among the initiatives, notable ones include the proposal for "periodic calls to develop AI solutions that address public sector challenges and foster govtech startups" and the "creation of an investment fund to support AI startups," aiming to increase the quantity, revenue, and global presence of Brazilian AI startups (PBIA, 2024).

Finally, regarding the amount of private investment in AI in Brazil, official data on statistics such as the market value of shares, venture capital financing, foreign direct investment (FDI) or Business Expenditure on Research and Development is not available. Some data identified, although not official, comes from a study published by the Brazilian Association of Information Technology and Communication Companies and Digital Technologies (BRASSCOM), which indicates that the investment outlook for AI from 2024 to 2027 is approximately R$ 139.3 billion (31% annually) (Brasscom, 2024). Still, according to the survey, spending on generative AI in Brazil is expected to more than double, reaching a total of US$ 120 million in Latin America.

1.5.2 Labor Markets

No official data was found regarding the number of job vacancies requiring AI-related skills in Brazil. Also, no information was found regarding the number of data scientists employed in the country. However, the **AI Index Report of 2024** reports a 0.47% decrease in hiring in the field of AI in Brazil between 2018 and 2023 (AIINDEX, 2024).

The **AI Skill Penetration Rate** shows the prevalence of AI skills in occupations, or the intensity with which LinkedIn members use these skills in their jobs. This rate was calculated by looking at how often these skills were added by LinkedIn users themselves in a given job field from 2015 to 2023, and then weighting those numbers using a statistical model to derive the top 50 representative skills in that job field. The **Global and National AI Vibrancy Ranking** indicates that, on a scale of 0 to 100 for Relative AI Skills Penetration, with 0 being completely absent and 100 being completely present, Brazil scored 4 in 2020; 9.33 in 2021; 9.34 in 2022; and 9 in 2023 (AI Vibrancy Ranking, 2023). On LinkedIn, the AI talent network is calculated by counting the number of talents per country compared to the number of LinkedIn members in that country. A LinkedIn member is considered an AI talent if they have explicitly added AI skills to their profile and/or are currently employed by an AI company. According to the Global and National AI Vibrancy Ranking, on a scale of 0% to 0.5% for AI talent concentration, with 0 being completely absent and 0.5 being completely present, Brazil had 0.06% in 2020 and 2021; 0.07% in 2022; and 0.08% in 2023 (AI Vibrancy Ranking, 2023).

The **Brazilian AI Plan** (PBIA, 2024) also intends to allocate resources to mitigate the impacts of AI on the labor market, considering the need for retraining and upskilling of workers. The actions include encouraging continuous learning, valuing complementary human skills, and supporting training in technical skills related to AI. The Plan also seeks to promote the inclusion of vulnerable populations in the technological market and the reduction of regional and gender inequalities. The OBIA will also monitor the impacts of AI on the Brazilian labor market. Finally, it should be noted that in August 2024 the **Ministry of Labor and Employment** (MTE) created the Working Group on Artificial Intelligence, which will follow the PBIA guidelines, to discuss the impacts of AI on the labor market and develop public policies for professional retraining and adaptation to new demands (MTE, 2024).

1.5.3 Intermediate Consumption

Regarding the intermediate consumption of AI in Brazil, no official data were found on how much companies spend on AI services (including Software as a Service - SaaS and Platform as a Service - PaaS) as a share of intermediate consumption. However, according to a study by the **Brazilian Association of Software Studies** (ABES), the SaaS market in Brazil grew 26.5% between 2019 and 2020, while the PaaS market expanded 41.9% in the same period (ABES, 2021). A more recent study, from 2024, pointed out that the main business model of Brazilian startups is SaaS (39%) (ABS, 2024).

Even though there are no consolidated and official data on the production or import of AI services, Cetic.br's April 2024 publication mentions that, despite internal AI development initiatives in Brazil, the country still faces challenges regarding dependence on international suppliers (CETIC, 2024). In this sense, the **PBIA** emphasizes the need to develop national productive capacity in AI to reduce dependence on international suppliers, through the promotion of R&D and strategic partnerships. Three initiatives outlined in the plan deserve attention: the first, with an estimated budget of 765 million, aims to establish partnerships for the national development of supercomputer nodes and accelerator chips, with the goal of overcoming external dependence on critical components for AI. The second initiative, with R$ 1.1 billion, focuses on promoting the curation of national datasets and supporting the development of foundational models specialized in Portuguese, with the challenge of creating and improving AI databases tailored to Brazil's specific needs. The third initiative, with resources of R$ 1.8 billion, plans the upgrade of the Santos Dumont supercomputer at LNCC, aiming to place it among the top five most powerful in the world and significantly expand Brazil's processing capacity (PBIA, 2024).

1.5. 4 Investments and Production

According to the **Global Innovation Index** (GII, 2024), in the knowledge diffusion dimension, Brazil has a value/score of 2.1% for high-tech exports, placing it 58th out of 133 countries included in the study. High-tech exports and imports include high-tech products with high R&D intensity, as defined by the **Eurostat** (Statistical Office of the European Union) classification. Commodities belong to the following sectors: aerospace; computers and office machines; electronics - telecommunications, pharmaceuticals, scientific instruments, electrical machinery, chemicals, non-electrical machinery and weapons.

Finally, no specific information was found on the per capita expenditures of Brazilian companies in R&D in the computer programming, consulting and related activities sector, nor on the GDP per capita for the SIC 62.0 code (computer programming, consulting and related activities).

1.6 TECHNICAL AND INFRASTRUCTURAL DIMENSION

1.6.1 Infrastructure and Connectivity

In terms of infrastructure and connectivity, the annual surveys of **CETIC.br** measure several important statistics (CETIC, 2024). For example, the share of the population that owns a cell phone was 87% in 2024. In this case, 72% of people said they had 1 mobile phone line, 14% of people said they had 2 lines, 1% said they had 3 or more lines, and 12% said they had no mobile phone line (1% did not know or did not answer. The share of the population that uses the internet via mobile phone was 100%. In households with internet access, 14% use 3G or 4G. On the other hand, 71% of households use fixed broadband internet.

In the same CETIC.br surveys, it was found that 96% of people are regular internet users, while 10% have never accessed it. Regarding the gender gap, the research found that 89% of the male population uses the internet, while 88% of the female population does. The survey also measured that 87% of the male population has access to a mobile phone, while 88% of the female population does. Finally, the gap in internet access in households in urban and rural regions is 11%, where the percentage of households with internet access in the urban area is 85% and in the rural area is 74%. This difference was already much greater, being 34% in 2015.

Also, according to **Anatel**, until September 2024, 91.16% of the population covered by 3G networks was 91.71% and by 4G networks was 91.16% (ANATEL, 2024). Another point to note is that in December 2024, Brazil ranked 25th in the **Speedtest ranking**, with an average fixed broadband download speed of 185.78 Mbps, five positions higher than in January 2024. The global average is 96.45 Mbps (Speedtest, 2024).

According to data from the **Telegeography.com Transport Networks** report, formerly Global Bandwidth (GB), the average international bandwidth used in Brazil will reach 55 Tbps in 2021 (LACNIC, 2023). Finally, data from the **Continuous National Household Sample Survey** (PNAD, 2023), conducted by the Brazilian Institute of Geography and Statistics (IBGE), show that in 2022 almost all households in the country (99.8%) had access to electricity, either from the national grid or from an alternative source. In 73.7 million households (99.4%), electricity was provided by the national grid, and in 72.7 million (98.7%) this supply occurred full-time. Analyzing the household situation, there was a high coverage of electricity, both in the urban area (99.9%) and in the rural area (99.0%).

1.6.2 Standards Applied

In terms of standards applied, Brazil has been involved in the standardization activities of AI and digital technologies. One example is the participation of Brazilian researchers in the development of **international standards** of the Institute of Electrical and Electronics Engineers (IEEE), such as the standard 7007™-2021 - "*IEEE Ontological Standard for Ethically Driven Robotics and Automation Systems*", whose president and vice-president were Brazilian researchers Prof. Edson Prestes and Sandro Rama Fiorini (IEEE7007, 2021). In addition, the Brazilian Association of Technical Standards (ABNT) created the Artificial Intelligence Study Commission - ABNT CB21 CE42, which originally served as an observer member of the international AI subcommittee in JTC1 (ISO/IEC JTC1 SC42). Starting in July 2024, it began participating as a full member of the group, with the ability to influence regulatory decisions, including proposing new standards related to AI. (ABNTISO, 2023). The ABNT currently has five ISO/IEC standards related to AI, covering definitions, risk management, governance, bias, and management systems: ABNT NBR ISO/IEC 22989/2023, which addresses concepts and terminology; ISO/IEC 23894/2023, with risk management guidelines; ISO/IEC 38507/2023, which discusses governance implications of AI use; ISO/IEC 42001/2024, which focuses on AI management systems and their organizational functions; and ISO/IEC TR 24027/2024, focused on bias in AI systems and AI-assisted decision-making. Despite these advances, ABNT's standards on AI, elaborated as direct translations of ISO, point to the need for a more inclusive elaboration process, which considers local specificities and ongoing regulatory debates in the country.

1.6.3 Computing Capabilities

In the analysis of the country's computing capabilities, Brazil had 58 colocation data centers in operation, along with another 17 under construction/planning, according to a study published in 2023, commissioned by the **Ministry of Development, Industry, Commerce, and Services and the Brazilian Agency for Industrial Development** (ABDI, 2023). In addition,

there are a large number of data centers in institutions and public companies of the Federal Government. A 2018 audit report by the Federal Court of Accounts, which evaluated the federal government's information technology resource management system, found 183 data centers in 62 federal agencies that responded to the court's questions (TCU, 2018). Furthermore, according to the document "***The Global Cloud Ecosystem Index 2022***", the score of the indicator "***Colocation data centers per million population, 2020***" for Brazil is 4.4, where 10 is the highest value in relation to the population. This places the country in 47th position among the 76 countries analyzed by the study (GCEINDEX, 2022).

Regarding the processing capacity and execution of complex tasks, Brazil has the Santos Dumont supercomputer, installed at the National Laboratory of Scientific Computing (LNCC), in Rio de Janeiro. Used in cutting-edge AI research, it ranks 89th in the overall TOP500 ranking and, according to the survey, is the most powerful supercomputer in Latin America for academic research, with a capacity to perform around 20 quadrillion operations per second (TOP500, 2024).

This scenario can be further enhanced with a specific policy on AI-based cloud computing. There is a normative instruction (GSI, 2021) from the **Secretariat of Institutional Security of the Presidency of the Republic** providing for the use of cloud computing solutions by agencies and organizations of the Federal Public Administration. The guidelines for contracting cloud solutions have been published by the Digital Government Secretariat of the Ministry of Management and Innovation in Public Services (MGI) in a **Cloud Computing Software and Services Contracting Model** (MGI, 2023). In both the normative instruction and the contractual model, the only mention of AI is the prohibition of the use of federal entity information by the cloud service provider for (i) advertising, (ii) optimization of artificial intelligence mechanisms, or (iii) any unauthorized secondary use.

1.6.4 Statistical Performance

The last stage of analysis of the technical and infrastructural dimension refers to the statistical performance of the country. Among the performance indicators monitored by the **World Bank** (WorldBank, 2025), Brazil scored 72 out of 100 in the Data Products pillar, which indicates the production of indicators related to the 17 UN Sustainable Development Goals; 85 out of 100 in the Data Sources pillar, which assesses the availability of surveys and censuses on topics of interest; and 70 out of 100 in the Data Infrastructure pillar, which assesses, for example, the existence of legislation, governance, and standards.

Finally, it is worth mentioning that, since 2016, the country has had the **Open Data Policy** of the Federal Executive Branch, which defines and guides the set of standards, technologies and procedures related to the publication and management of data from agencies and organizations of the Federal Public Administration (PDAPEF, 2016). Management of the Open Data Policy is coordinated by the Office of the Comptroller General through the National Open Data Infrastructure. The policy is governed by the principles of data integrity and interoperability defined in the Interoperability Standards Architecture, which influences the planning of procurement, acquisition, and upgrade of technology systems and equipment. As mentioned above, the Open Data Plan, regulated by the resolutions of the National Open Data Infrastructure Steering Committee, is the instrument that operationalizes the Open Data Policy of the Federal Executive Branch, as it plans actions aimed at opening and maintaining open data in public organizations. The Brazilian Open Data Portal and the National Data Catalog is the main platform for the collection and availability of open government data (PBDA, 2025).

Regarding the evaluation of the effectiveness of this policy, the CGU presented an evaluation in 2017, reporting on the progress made in its implementation (CGU, 2017). The CGU also monitors compliance with the Open Data Policy on an ongoing basis through the **Open Data Monitoring Panel** (PMDA, 2025). The tool allows checking already published databases and publication schedules, in addition to monitoring compliance with the open data policy by various agencies and organizations of the Federal Government.

Developing a Multistakeholder National Roadmap

2.1 INTRODUCTION

Initially, it is important to note that the process of building the RAM in Brazil began in 2023, a period in which the EBIA was the main guiding instrument for AI policies in the country. However, the reflections generated during the development of the RAM remain relevant, applying to both the PBIA and other AI-related policies and initiatives in the country.

Brazil has been expanding the debate on the development and use of AI, especially since 2019, with the beginning of the construction of the EBIA, and in the Legislative, with the introduction of Bill No. 21-A/2020 in the Chamber of Deputies. Since then, several governmental, private, academic and civil society organizations have contributed to the advancement and improvement of this ecosystem.

On the government side, the **MCTI** is the ministry with the most prominent role in the area, being responsible for the implementation of the Brazilian AI Plan. In addition to the MCTI, other key players include the **Ministry of Foreign Affairs** and its perspective on expanding innovation diplomacy, especially considering Brazil's presence and recent leadership in international forums such as the G20, BRICS, and the 2025 United Nations Climate Change Conference (COP30); the **National Data Protection Authority** with its regulatory agenda proposing the study of intersectional topics related to AI; and the National Justice Council, which promotes increasing automation of procedures and efforts to update guidelines for AI use in the Judiciary Branch. Still in the public sphere, we highlight the growing role of the National Congress which, in December 2024, approved Bill 2338/2023 in the **Federal Senate after years of debates on the regulation of A**I.

The private sector, on the other hand, appears as one of the biggest influencers in the regulatory and public policy debate involving AI. Companies and associations related to the technology sector, such as **ABES**, **Brasscom** and **Zetta** have, in a constant and structured manner, participated in public discussions, exerting significant influence on the national agenda with a focus on innovation and economic development.

Academia is also an important player in this scenario, developing research and projects on AI, hosting AI centers, and participating in public hearings. Examples include the University of São Paulo (**USP**), which is home to the Center for Artificial Intelligence (**C4AI**), created with the support of IBM and the São Paulo Research Foundation (**Fapesp**), and which operates in partnership with the Technological Institute of Aeronautics (**ITA**), the Pontifical Catholic University of São Paulo (**PUC-SP**), and the Faculty of Industrial Engineering (**FEI**). Other examples include the State University of Campinas (**Unicamp**), which currently has an AI Research Center, and the already mentioned Center of Competence in Immersive Technologies Applied to Virtual Worlds (**CEIA-UFG**) in Goiânia, with support from the MCTI and partners.

Civil society organizations have also played a significant role in AI regulation, operating from the perspective of human rights, inclusion, and meaningful social participation. Non-governmental organizations in Brazil conduct research, training, and awareness-raising actions, as well as engage with other sectors of society. Notable organizations include the **Coalition for Digital Right**s (CDR), which brings together over 50 academic and civil society organizations in defense of digital rights, and the **Black Coalition for Rights**, formed by more than 200 associations advocating for the black movement in Brazil and the defense of LGBTQIA+ rights.

The growing discussion on regulation and policies in the field of AI positions Brazil as a strategic actor, especially for countries in the Global South. In this context, the Readiness Assessment Methodology process represented a valuable opportunity to

identify challenges and explore pathways for the ethical and responsible adoption of AI, in line with the criteria and principles established by the UNESCO Recommendation on the Ethics of Artificial Intelligence.

As an essential part of the RAM, this section describes the process of public consultations, which gathered contributions from various sectors of society to assess Brazil's state of readiness. Initially, the preparations and main concerns that preceded the public consultations are addressed. Subsequently, the details of the public sessions held virtually and in writing are described. Finally, the main conclusions are highlighted, covering social, political and economic aspects that reflect both the challenges and opportunities for Brazil's advancement in the development of ethical, responsible and inclusive AI.

2.2 ORGANIZATION AND CONCERNS PRIOR TO PUBLIC CONSULTATIONS

Between June and August 2023, interviews were conducted with government entities in order to deepen information beyond those publicly available and clarify doubts about initiatives under development or in operation involving AI. The **MEC**, **MRE**, **ANPD**, **TCU** and **MCTI** were contacted. Examples of topics covered include: in the MEC, ongoing or planned programs to increase diversity in STEM; in the MRE, the official government position on the implementation of the UNESCO recommendation; in the ANPD, the evaluation of the effectiveness of the LGPD; in the TCU, partnerships with R&D institutions for the development of AI systems applied to public administration; and in the MCTI, the analysis of the effectiveness and diversity in the creation of the AI Strategy.

After the initial mapping, ample publicity was given to public consultations, reflecting concerns about inclusion, accessibility and sectoral, racial, gender, territorial and expertise diversity. The objective was to reduce the polarization of the debate and ensure a representative and multisectoral approach. From communication to defining consultation formats, efforts have been made to ensure broad participation. A dedicated RAM website has been created, providing information on the methodology, advisory team and supporting materials, including UNESCO documents.

The portal included a "Contact Us" section to facilitate direct contact with the population. The public consultations were held in two formats: virtual participation on September 13 and 14, 2023 and submission of written contributions until October 15, 2023, both guided by three previously disclosed guiding questions, namely:

> ***i.*** *What areas and issues of national or international relevance to Brazilian society are not included in the strategic and regulatory discussions (EBIA, Laws, Bills, Standards) on Artificial Intelligence in Brazil?*
>
> ***ii.*** *What actions should the Brazilian government, the productive sector, academia and civil society take to ensure the responsible and sustainable development of Artificial Intelligence in the country?*
>
> ***iii.*** *What strategies should we use to increase and/or strengthen trust between different sectors of Brazilian society in the field of Artificial Intelligence?*

The registration of participations in the RAM public consultation process was carried out through a form, which collected essential data to ensure the diversity and representativeness of the process. The information included sector of activity; gender; sexual identity (optional); race; whether part of indigenous or other traditional groups; age; state; area of residence (urban or rural); and education.

To expand the scope of the consultations, more than one hundred public, private, academic entities, civil society organizations and other social groups were invited directly, in addition to the dissemination of the invitation on social media and other channels. Among the invited organizations are, for example, the Chief of Staff of the Presidency, the Secretariat of Social Communication, the Secretariat of Institutional Relations, the Attorney General of the Federal Government, the Comptroller General of the Federal Government, the Ministry of Agriculture and Livestock, the Ministry of Science, Technology and Innovation, the Ministry of Culture, the Ministry of Finance, Ministry of Development, Industry, Trade and Services, Ministry of Justice and Public Security, Ministry of Health, Ministry of Communications, Ministry of Human Rights and Citizenship, Homeless Workers Movement, ABES, Brasscom, Google, Meta, Microsoft, Kwai, Ripple, Nubank, CGI.br, Affiliated Center for the Fourth Industrial Revolution in Brazil (C4IR Brasil) and the Brazilian Institute of Capital Markets.

The disclosure of the RAM also occurred in public and academic events, interviews and debates, ensuring greater reach to the discussions. Examples include the panel "Ethics and Artificial Intelligence" at CGU's BR Data Week; the lecture "Your End Will Come From Forbidden Fruit" at the I Meeting of Global Risks at the Federal University of São Paulo; the presentation of

the work "Scientific Diplomacy for Artificial Intelligence: aspects of AI governance and regulation in the Global South" at the International Policy and Networks of Scientific and Technological Cooperation WG, the 73rd National Meeting of the National Association of Graduate Studies and Research in Social Sciences; the lecture "Artificial Intelligence, education and work" at the Swedish Chamber of Commerce in Brazil; the panel "Digital Risks: safe use of technology, AI and data protection" of the event Idealiza at the Brazilian Capital Market Institute; the lecture "Comparative Digital Sovereignty in Artificial Intelligence" at the Army Command and General Staff School. In addition, interviews were conducted for media outlets such as the Brazilian Center for Internships; and the Pod-RI podcast on "Artificial Intelligence and its applications at the international level". These actions highlight the effort to promote inclusion and ensure the representativeness of different sectors, regions and social groups in the RAM elaboration process.

2.3 PUBLIC CONSULTATIONS HELD ON SEPTEMBER 13 AND 14, 2023

The virtual public consultations took place on September 13 and 14, 2023 through the Zoom platform. The first one addressed the Legal/Regulatory and Economic dimensions. The second consultation focused on the Social/Cultural, Scientific/Educational and Technological/Infrastructural dimensions.

The dynamics consisted of the introduction on the RAM, followed by the presentation of the partial findings of the respective dimensions. Subsequently, the listening to society began. Three minutes were reserved for each exhibit, except for indigenous people or people with speech disabilities, who were given five minutes.

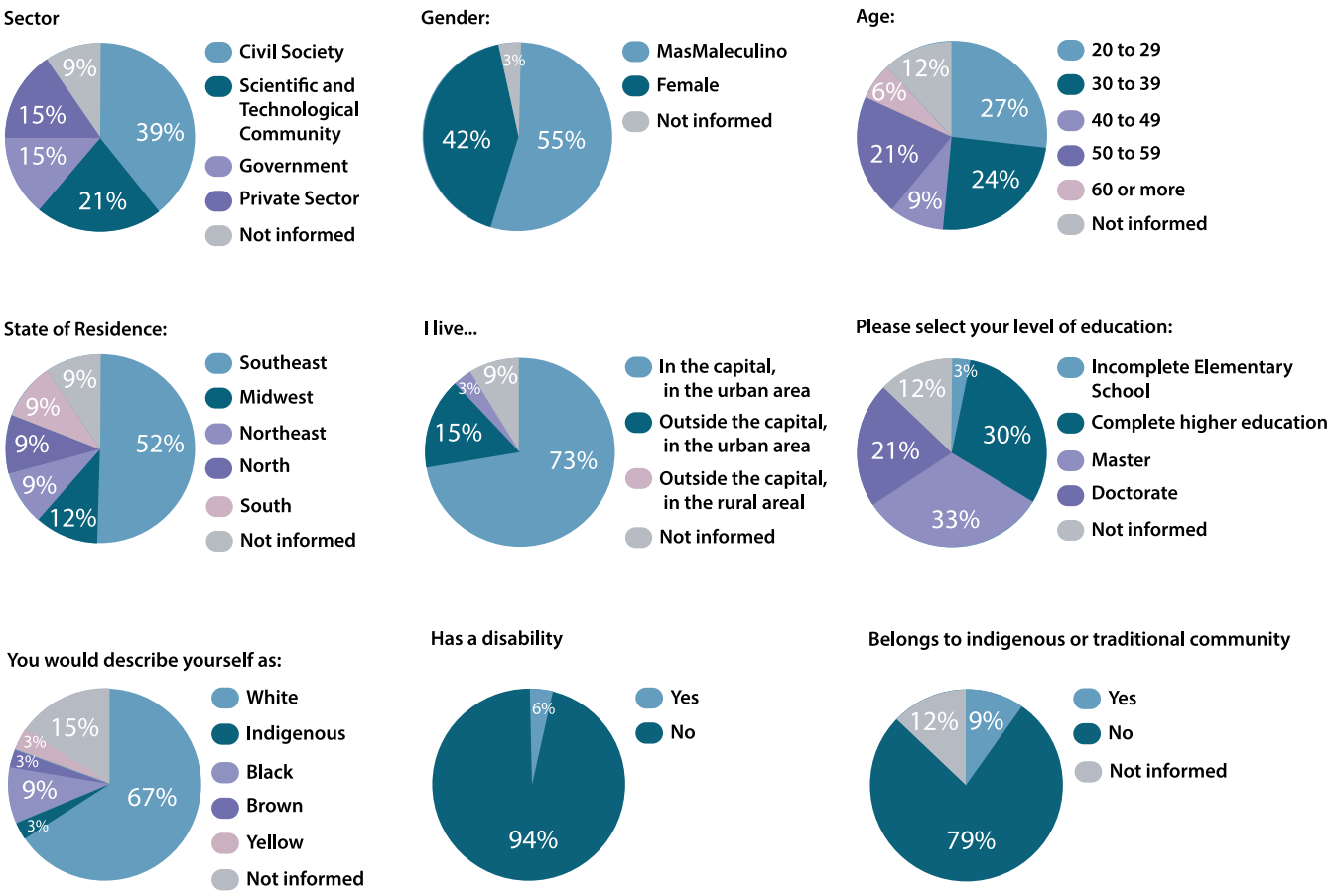

Figure 2.1: **Statistics of participants who attended public consultations**

In total, 89 people signed up, 33 of whom attended, with 22 on the first day and 19 on the second. The charts in Figure 2.1 show the statistics of the participants who attended the consultations.

Among the main **concerns** raised, social, environmental, economic and political issues were highlighted, such as:

- Incorporating native languages and other cultural expressions into AI-based systems;
- Promoting the inclusion of diverse people in decision-making spaces, especially historically marginalized groups, promoting active transparency, digital literacy and specific training in AI for the labor market;
- Ensuring the use of AI in favor of the environment and in the fight against environmental crimes;
- Providing basic infrastructure for internet access to the entire population;
- Increase investments in research, development, and talent retention;
- Advancing the regulatory debate on AI in an inclusive and multisectoral manner, resulting in a binding instrument that protects rights, provides for obligations, governance instruments and incentives for innovation;
- Expanding discussions on generative AI, especially considering the vulnerabilities of children and adolescents;
- Strengthening Brazil's role in the international AI agenda, focusing on the development of policies, standards and multilateral cooperation;
- Prioritizing the local development of AI-based technologies, as well as reflect the country's peculiarities in regulatory and public policy debates.

2.4 PUBLIC CONSULTATIONS THROUGH WRITTEN INPUT

The written consultation was open for contributions between September 1 and October 15, 2023. For this modality, a form was provided with the same guiding questions as for the virtual consultations and 21 additional and optional questions. The collection of information sought to explore specific points related to people´s experience, health, well-being, and familiarity with the opportunities and challenges of AI, such as:

i. *Have you ever been in an embarrassing situation because of a computer system that you knew was a system error and not a human error (e.g., rejected request, improper login, etc.)? If so, did you receive information or already know how to appeal such a decision? Could you tell us what happened?;;*

ii. *Do you trust your interactions with automated systems and find their results more objective than when you interact with a human??*

iii. *When it comes to facial recognition, do you feel uncomfortable sharing your facial biometrics?*

iv. *What are the main risks and/or benefits that you can imagine for the use of AI systems in the lives of children and adolescents, including in the school and consumer environments?*

v. *Do you feel that technology has made you happier, more positive, or with less difficult when writing?*

vi. *Do you believe that AI-based technologies, as well as the underlying processes involved in the production and supply chain of these technologies, pose risks to the environment for present and future generations, thereby jeopardizing the UN Sustainable Development Goals?*

Twenty-two written contributions were received, more than half of which from civil society and the scientific and technological community. Figure 2.2 shows the statistics of the participants in this modality.

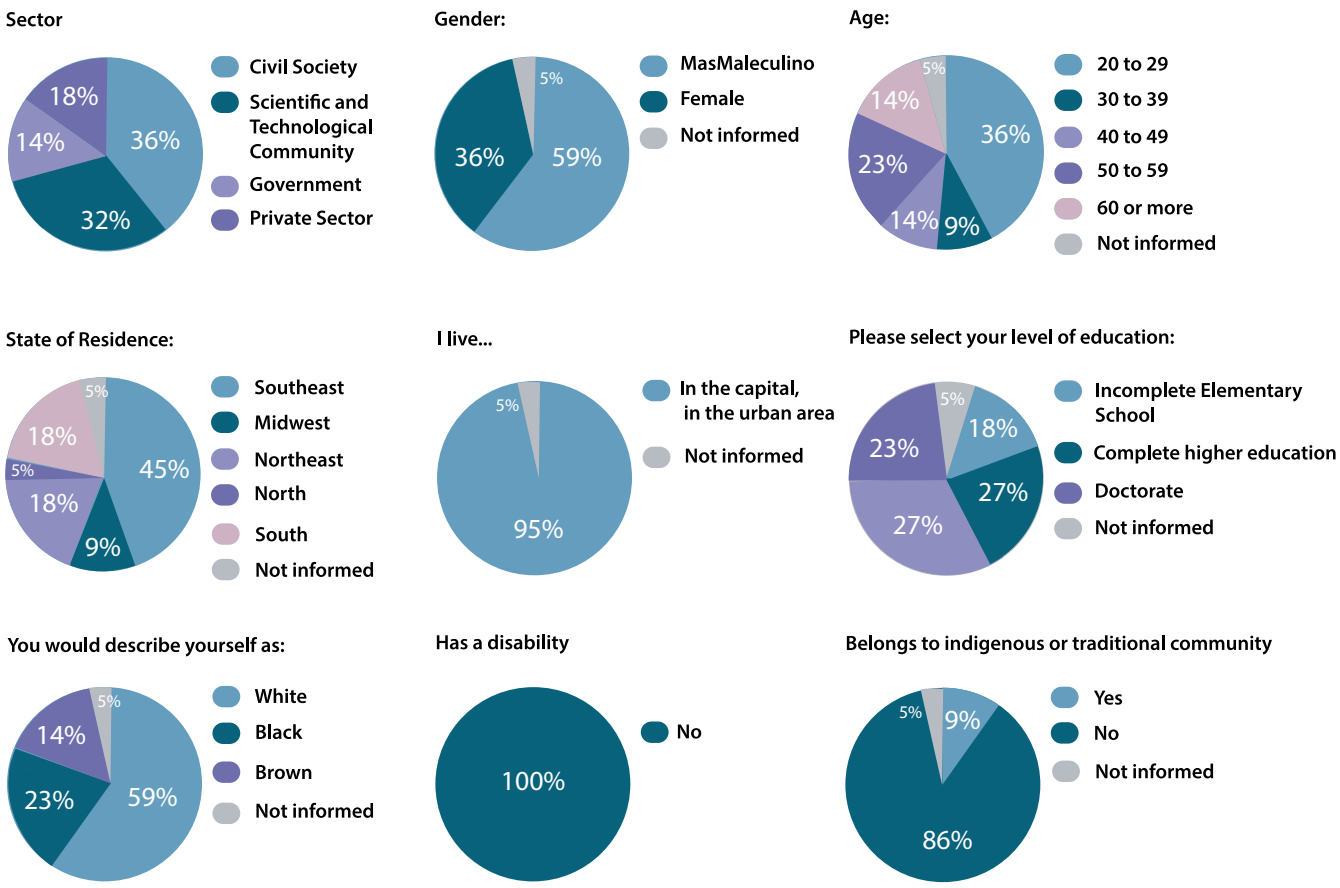

Figure 2.2: Statistics of participants who submitted written contributions.

In addition to the concerns raised during the virtual consultations, participants' concerns included the **need for reflection and action to**, for example:

1. *Ensuring responsible use and ethics throughout the AI life cycle, with special attention to combating discriminatory biases;*
2. *Promoting equitable access to the entire knowledge population about AI technologies and the rights of those affected by them;*
3. *Decentralizing discussions on AI in metropolitan regions, including regions outside of the Southeast/Midwest axis;*
4. *Implementing robust policies aimed at resilience and cybersecurity;*
5. *Ensuring the quality of databases to ensure greater accuracy in public policies;*
6. *Expanding the debate especially on generative AIs and copyright and intellectual property;*
7. *Prohibiting the use of lethal autonomous weapons and regulate the use of AI for war purposes;*
8. *Preserving human autonomy in light of automated processes, considering the impact on mental health;*
9. *Promoting an AI ecosystem that reinforces rights that already exist in the Brazilian legal system, such as those guaranteed by the General Personal Data Protection Law and the Access to Information Law;*
10. *Ensuring transparency and public scrutiny in public-private partnerships related to the development and use of AI.*

Meanwhile, the following was extracted from the **additional and optional** ,questions:

1. A significant majority (89%) of respondents indicated the need for greater understanding of AI for more conscious decision-making, mentioning factors such as the increasing automation of processes in all areas of life; the curiosity aroused in academic and discussion spaces; the need for professional training; and uncertainties about the effective benefits of the technology;

2. Reports of embarrassing situations involving AI include unauthorized bank account negative reporting; failures in biometric systems that restrict access; within the scope of consumer relations, the absence of human support making it difficult to solve problems; the obligation to give biometric data to be able to contract services; in cases of voice recognition, requirement to use verbal commands in tones and accents different from usual modes, avoiding the use of local slang;

3. Fifty-nine percent of people indicated distrust when interacting with automated systems, mainly due to the lack of transparency in the criteria and results generated;

4. Facial recognition has become a common practice, and most respondents (72%) express discomfort when subjected to these systems and a lack of information about the risks of this data collection;

5. Even requesting an alternative to facial recognition, participants reported that they had not found the means to do so, or had not been answered, or had been exposed to a bureaucracy that made them give up the alternative method;

6. People with disabilities have expectations that AI can help with daily activities. Reports included positive experiences, text-to-speech readers for blind people, tools to facilitate communication with deaf people and other response resources;

7. In terms of potential negative effects of a physical, mental, cognitive, or behavioral nature, concerns include reliance on technologies such as generative AI for decision making, discriminatory biases, social isolation, and behavioral modulation based on recurring product and service recommendations;

8. In the case of children and adolescents, the risks mapped include the vulnerability of these groups, the difficulty of having a critical sense to use AI only for positive purposes; digital and behavioral dependence; the retraction in the development of cognitive and work skills; the difficulty in maintaining concentration and memorization; the stimulation of image disorders, consumption, anxiety and depression. On the other hand, it is recognized that, with proper supervision, AI can be an ally in learning;

9. The significant majority of respondents from historically marginalized groups (86%), such as black people, quilombolas, indigenous people, LGBTQIA+, do not feel represented when interacting with AI systems, while 71% pointed out exclusion of them, indicating that this is, for example, because vulnerable groups are concerned with other issues; ethnic-racial, ethnic-cultural differences and social inequalities are not addressed as fundamental issues of dialog; and because the private sector lobby aims at innovation and not at mitigating risks to minorities;

10. The main fears reported with the massive adoption of AI relate to the lack of agents' knowledge about ethics; the risk of attack on the system, leading to the exposure of sensitive data; the extreme dependence on AI technologies and loss of human autonomy in critical decision-making; the massive surveillance, increase of inequalities, discrimination, hate speech, polarization, attacks on democracy and violations of human rights; the replacement of the workforce by automated systems, generating large-scale unemployment.

11. Figure 2.3 presents insights into the impacts of AI on well-being, including happiness, anxiety, positive thinking, sociability, and more.

	strongly disagree	slightly disagree	indifferent	slightly agree	strongly agree	did not respond
Do you feel that technology has made you happier?	4,55%	4,55%	9,09%	59,09%	4,55%	18,18%
Do you feel that technology has given you more positive thoughts?	13,64%	13,64%	27,27%	22,73%	0,00%	22,73%
Do you feel that technology has made you more sociable?	4,55%	31,82%	18,18%	27,27%	0,00%	18,18%
Do you feel that technology has made you less anxious?	31,82%	31,82%	18,18%	0,00%	0,00%	18,18%
Do you feel that technology has made it less difficult for you to remember situations/ people/words?	13,64%	22,73%	18,18%	18,18%	9,09%	18,18%
Do you feel that technology has made it less difficult for you to express yourself orally?	9,09%	22,73%	36,36%	36,36%	9,09%	18,18%
Do you feel that technology has made it easier for you to write?	9,09%	18,18%	31,82%	13,64%	9,09%	18,18%
Do you feel that technology makes you more tolerant of people like you in terms of gender, social class, religion, etc.?	9,09%	13,64%	40,91%	13,64%	4,55%	18,18%
Does technology make you feel like you have a digital existence separate from your physical life?	9,09%	22,73	22,73%	22,73%	4,55%	18,18%

Figure 2.3: Questions about well-being answered in the written contributions.

12. All respondents believe that Brazil should establish multilateral partnerships to regulate AI technologies, define and share good practices, including collaborations within the United Nations and the Organization of American States (OAS);

13. Only 59% of participants reported having a medium or high level of familiarity with the UNESCO Recommendation on AI Ethics, highlighting the need for greater effort in dissemination and training on it;

14. It was noted that 72% of people use AI in their professional activities, and 44% did not know whether the products they develop or use in the supply chain include AI-based components;

15. Only 17% of respondents consider themselves sufficiently prepared to deal with the ethical and legal requirements present in public policy proposals and AI regulation in Brazil;

16. Also, when faced with a dilemma or doubt about ethical and legal issues involving AI, people usually resort to generative AI tools, such as ChatGPT, in addition to academic articles, congresses, international documents (e.g. UNESCO and OECD), civil society and business publications, as well as online search engines;

17. There is a perception of confidence that AI regulation, as long as it is the result of extensive debate and observes regional and international aspects, has the potential to offer legal certainty without creating obstacles to innovation;

18. Finally, 76% of people believe that AI technologies pose risks to the environment, potentially compromising the UN Sustainable Development Goals, due to the consumption of natural resources and high energy costs associated with these technologies.

2.5. CONCLUSIONS OF THE CONSULTATIONS

The discussions offered reflections on social, political, regulatory, health, environmental and international relations issues. The **main conclusions** highlight:

- The **lack of significant representation**, especially in terms of race and territory, points to the need to rethink the dynamics of inclusion in AI debates. It is appropriate to think about the development of public policies that ensure an ongoing process of incorporating different perspectives into debates about AI;
- It is necessary that the regulation of AI in Brazil be built with **broad participation of society**, with emphasis on the inclusion of vulnerable groups. The future Legal Framework for AI in Brazil should provide, in a non-exhaustive manner, mechanisms to ensure rights, incentives and accountability;
- It is essential to **preserve the culture of traditional peoples**, including their native languages, ensuring their active participation from the development of AI systems;
- Rigor must be intensified **on sensitive issues related to children, adolescents, people with disabilities, mental health, the maintenance of democracy and weapons**;
- **Professional training and digital education in the context of AI were widely emphasized, ranging from** basic literacy to improving the curriculum base and creating new vocational courses;
- There are concerns about **national sovereignty**, with emphasis on the need to reduce dependence on foreign technologies through national innovation strategies;
- Given the fact that structural racism permeates the foundations of Brazilian society, there is an urgent call for initiatives to **combat discriminatory biases**, especially in the context of public security. As such, the social appeal for the non-use of facial recognition technologies is highlighted until its effectiveness in reducing violence and increasing the efficiency of criminal prosecution is proven;
- The issue of **adverse impacts on the environment** has emerged as central to the debate, with an emphasis on the need to address the use of natural resources, energy consumption, greenhouse gas emissions and deforestation. The integration of environmental concerns should be transversal to public and regulatory AI policies in Brazil;
- Finally, the **importance of international cooperation** in the development of AI policies stands out, especially in the context of Brazilian leadership in multilateral forums such as the G20, BRICS, COP30 and regional coordination to strengthen positions between Latin American and Caribbean countries.

Based on these reflections and suggestions, the recommendations were prepared and submitted to a feedback process from the participants, ensuring greater transparency and accuracy in the application of the Readiness Assessment Methodology.

III MAIN POLICY RECOMMENDATIONS

This section presents the recommendations resulting from the public consultations and data collection, reviewed based on the comments of the participants who chose to follow the process. Recommendations are organized into three main categories: Regulation, Institutional Framework and Human and Institutional Training.

3.1. REGULATION

Recommendation 1. Promoting and implementing the UNESCO Recommendation on AI Ethics.

In view of the norms contained in the 1988 Federal Constitution, particularly with regard to the promotion of peace, equality, development, democracy and human rights, in all their forms and for all peoples, whether Brazilian or foreign, it is recommended that the Brazilian government continue its efforts to effectively implement the UNESCO Recommendation, with an emphasis on promoting ethics, transparency and respect for human rights in the development and use of AI. Adopting a clear and robust legal framework for AI regulation will help ensure rights protection, sustainable innovation, and alignment with international best practices. In addition, it is recommended to the National Justice Council to incorporate the UNESCO Recommendation on AI Ethics in the update of Resolution No. 332/2020.

Main responsible institutions: All government institutions, especially the MRE, MCTI and CNJ

Recommendation 2. Creating and maintaining a national database and statistics on AI.

It is suggested that the national database support the formulation of AI Research, Development and Innovation (RD&I) policies in Brazil, facilitating the identification of researchers, institutions, funding sources, research areas and intellectual property issues. The OBIA is one of the main players in implementing this recommendation. It would also be useful to include a mapping of key AI developers, research entities, and civil society organizations, to strengthen collaboration on joint RD&I efforts.

Main responsible institutions: The MCTI, MGI, CGI.br

Recommendation 3. Adopting an AI Legal Framework that aligns with the UN's 2030 Agenda.

Brazil will benefit by building a regulatory ecosystem for AI that aligns with the UN 2030 Agenda, meeting the SDGs and reinforcing the country's international commitments. The standard should ensure transparency, the right to prior information, human review of automated decisions, interoperability especially in the Public Administration, promote diversity in the AI workforce, reduce gender, socioeconomic and rural/urban digital gaps, as well as adopt preventive and corrective environmental measures. It should also encourage digital literacy, ensure human rights due diligence, as per the United Nations Guiding Principles on Business and Human Rights (OHCHR, 2011). The attribution of responsibility to AI agents should be facilitated, prioritizing objective responsibility and reparation mechanisms. The Ibero-American Letter on Artificial Intelligence in Public Administration (CLAD, 2023) can serve as a reference, highlighting the independence of public authorities from private power in AI management. It is also recommended to advance the regulatory debate in the Chamber of Deputies based on the accumulation of discussions in recent years in the context of Bill 2338/2023.

Main responsible institutions: National Congress, Civil House of the Presidency of the Republic

Recommendation 4. Promoting Human Rights Impact Assessment, including environmental issues, in AI systems considering the SDGs, the UN Guiding Principles on Business and Human Rights, the UNESCO Recommendation on the Ethics of AI and the Ibero-American Charter on Artificial Intelligence in Public Administration.

It is suggested that a requirement be established to conduct human rights impact assessments prior to the development and use of AI systems, except for low-risk ones, as well as the implementation of periodic monitoring and assessments throughout their life cycle. These assessments should ensure critical reflection on the development and use of AI, defining necessary safeguards for the protection of human rights. The impact assessment must also explicitly address the environmental, social, economic and cultural risks of disproportionate impacts on vulnerable and historically discriminated groups, considering factors such as gender equality, respect for traditional peoples and communities, children, persons with disabilities and the elderly.

The guarantee of participation of affected groups and the right to prior consultation are also aligned with the SDGs. In addition, Brazilian institutions, both public and private, as well as the population affected by AI, would benefit from encouraging human rights impact assessments in AI systems. Still, in this context, it is essential to carry out an environmental impact assessment, especially with regard to the installation and maintenance of data centers and other digital infrastructures, including their evaluation before, during and after implementation, considering aspects such as energy consumption and exploitation of natural resources.

Main responsible institutions: National Congress, the MCTI, MDIC, MMA, MME

Recommendation 5. Promoting diversity and social participation.

It is essential that the Brazilian Government promote concrete actions, metrics and measurement instruments to ensure the protection and participation of vulnerable groups in AI discussions and decisions. It is crucial that traditionally silenced voices are included in a meaningful way, considering social, gender, race, environment, indigenous and quilombola causes, people with disabilities, children, adolescents, the elderly and LGBTQIA+ people. It is recommended that PBIA strengthen these actions, as it provides a budget for inclusion initiatives.

Main responsible institutions: The MCTI, MDHC, MPI

Recommendation 6. Ensuring the use of AI technologies in the protection and promotion of tangible and intangible cultures.

Given that artificial intelligence can perpetuate and create new forms of exclusion and dependency for traditional peoples and communities, it is recommended to implement initiatives and public policies to protect these communities. Similarly, AI technologies can be allied in the preservation and promotion of cultures of these communities, as long as they are guaranteed control over the use of this tool. For this reason, it is also recommended that policies be implemented to promote the digital training of communities in situations of social vulnerability, so that they can achieve full autonomy in the management, programming and development of their material and immaterial identities and assets.

Main responsible institutions: The MinC, MDH, MIR, MPI

Recommendation 7. Establishing measures to protect the rights of children, adolescents and the elderly in the use of AI education and in other interactions.

Given the vulnerability of these groups, measures must be taken to protect the rights of children and adolescents in the use of AI in education, guaranteeing privacy and preventing the abusive collection of sensitive data. The Brazilian Government should implement programs that engage educational communities, ensuring that AI is not used to classify or predetermine academic choices. In this sense, it is recommended to ban the use of AI for student profiling; commercial sharing of school data; the use of AI for disciplinary purposes; and the use of facial recognition and emotion recognition technologies. Entities such as the ANPD, MEC and MDHC are competent to promote training for educational institutions in accordance with the LGPD.

In addition, it is recommended to ensure that interactive AI systems with children, adolescents and the elderly provide appropriate and accessible responses. For this, it is essential to develop awareness programs for caregivers, schools, health professionals and institutions involved, considering the needs and vulnerabilities of these groups. It is suggested that the programs address the impacts of AI on behavior, neurological and psychological effects, digital safety, prevention of discriminatory biases, and combating ageism.

Main responsible institutions: National Congress, the ANPD, MEC, MDHC, MCTI, MS

Recommendation 8. Inserting environmental sustainability as a central axis in debates and decision-making on AI, guaranteeing the participation of native peoples.

Recognizing the environment as a beneficiary of AI will strengthen Brazil's competitiveness, in addition to reinforcing its commitment to the sustainable agenda and the fulfillment of the SDGs. In this context, it is recommended to create indicators to determine the country's progress in implementing the SDGs. It is also important to provide indigenous and traditional peoples with continuous training on the impacts of artificial intelligence and to ensure their participation in the development, implementation and evaluation of AI technologies that directly affect them.

AI has great potential to improve environmental monitoring and mitigate identified problems, as exemplified by the United Nations Environment Programme (UNEP), through the World Environmental Situation Room (WESR, 2023), and the use of AI in tracking production chains in the agricultural sector, which is fundamental to combating deforestation. In the context of data centers and AI infrastructures, it is essential to include environmental sustainability in discussions about their implementation, considering environmental impacts such as the carbon footprint and the use of natural resources.

Main responsible institutions: The MMA, MCTI, MDIC, MME

Recommendation 9. Promoting a debate on neuro-rights and the regulation of neuro-technologies for the protection of mental integrity.

In view of the advancement of neurotechnology, with connective techniques between the human brain and computer systems made from the use of AI, the Brazilian Government is recommended to create an institutional agenda with policies and initiatives that ensure the use of these technologies with respect for human dignity, preserving mental integrity and well-being. Constitutional Amendment Proposal No. 29 of 2023 is a step towards recognizing mental integrity and algorithmic transparency as fundamental rights. It is necessary to stimulate public debate on the impacts of these technologies on mental privacy, equality and democracy, and to guarantee adequate safeguards in the development and commercialization of neurotechnology.

Main responsible institutions: National Congress, the MS

Recommendation 10. Broadening the debate on the use of AI in public safety, focusing on human rights and combating discriminatory biases, suspending the use of facial recognition and predictive policing technologies until their effectiveness is proven

Facing the discriminatory bias of predictive technologies and biometric surveillance, especially considering the structural racism that permeates Brazilian society, is essential to ensure the ethical integration of AI in Brazilian public security. On the one hand, the use of AI can reinforce discriminatory biases, as demonstrated by the COMPASS system, which disproportionately affected people of African descent. On the other hand, when aligned with human rights, AI can contribute to highlight failures and abuses, such as a racist criminal system, and allow the reconsideration of cases, as proposed by the Recon Approach (Bell, 2021). In Brazil, it is essential that this debate expands in the Legislative, Executive and Judicial spheres. Although Constitutional Amendment 115/22 placed the protection of personal data as a fundamental right, the LGPD does not fully apply to the criminal sphere. Thus, the National Congress is recommended to advance in the enactment of a law for data protection in the context of criminal prosecution and public security. The lack of such legislation compromises people's safety, as there is no clarity on the legal requirements for the use of AI in surveillance and monitoring, nor transparency on its effectiveness in reducing crime and increasing public safety. It is recommended, therefore, to curb the use of AI in predictive systems, investigations, police inquiries and for the recognition of individuals without due proof and efficiency and safety, explainability and monitoring by a competent and autonomous body of the State.

Main responsible institutions: The National Congress, National Justice Council, MJSP, MDHC

3.2. INSTITUTIONAL FRAMEWORK

Recommendation 11. Orienting Brazilian foreign policy through the lens of digital autonomy and the defense of human rights.

Given the need for global governance for AI that benefits all peoples, it is recommended that Brazil promote the creation of a common platform for the flow of data between countries, to facilitate the resolution of global problems and promote the adoption of technical standards for interoperable, reliable and public interest-oriented AI. In this sense, Brazil can lead, in collaboration with international and multilateral organizations and forums such as the UN, OAS and the World Economic

Forum, the creation of a digital cooperation platform for data based on ontologies that facilitate dialog between different stakeholders, as recommended in the Guidelines for the governance of digital platforms (UNESCO, 2023).

It is also critical to support scientific and innovation diplomacy in the academic, industrial, and multilateral domains, such as the development of ontological standards (IEEE1872, 2015; IEEE7007, 2021) to facilitate communication and knowledge transfer between any group of humans, robots, and other artificial systems.

Main institution responsible: The MRE

Recommendation 12. Supporting regulation and fostering regulatory sandboxes for sustainable AI development while respecting human rights.

Regulatory sandboxes aim to promote responsible learning and adaptation, creating a safe environment for the development and enhancement of AI systems. They enable collaboration between the regulatory body and the regulated agent, encouraging responsible innovation, sustainability of solutions, respect for human rights, and alignment of expectations. The PBIA has the capacity to foster these initiatives, ensuring that they are preceded by impact assessments and monitoring of databases, with a focus on ethical compliance and human rights. The establishment of AI sandboxes should be preceded and monitored by impact assessments, scrutiny of the databases used and participation of society. It is suggested that such assessments address ethics and human rights compliance, aiming to eliminate discriminatory biases and other risks, ensure privacy and transparency, as well as enable popular participation. A relevant example is the public consultation held by the ANPD in 2023 on the AI and data protection regulatory sandbox pilot program. In this sense, the ANPD is also encouraged to continue with the progress of its project.

Main responsible institutions: National Congress, the MCTI, MGI, ANPD

Recommendation 13. Establishing an independent oversight arrangement, integrating relevant actors for inclusive AI governance.

It is recommended to establish an independent oversight arrangement for the development and use of AI, with technical and financial autonomy, and involving the relevant actors for inclusive governance. Bill 2338/2023, which proposes the National System for the Regulation and Governance of Artificial Intelligence, is an opportunity to integrate the ANPD, sectoral bodies, specialists and society. For this system to be effective, it must be structured in a transparent, harmonized and inclusive manner, with a multidisciplinary technical staff and clear mechanisms to ensure the representativeness and active participation of civil society. The governance structure needs to be dynamic, with continuous monitoring, clear definitions of regulators, strategic adjustments and permanent dialog channels, ensuring transparency and inclusion throughout the process.

Main responsible institutions: National Congress, Civil House of the Presidency of the Republic

Recommendation 14. Leading the debate on the creation of risk management frameworks in the development of sectoral A.I

Artificial intelligence applications can be used in different contexts, communities and regions, generating positive or negative impacts. AI systems that mimic humans, such as virtual assistants, can be easily recognized by adults, but easily fool children or impressionable people, for example. Similarly, robots with observational learning can efficiently collaborate with humans, but also propagate acts of violence if exposed to inappropriate contexts, such as homes with domestic violence. Given this, it is essential to define risks, permitted applications, mitigation strategies and accountability mechanisms, including aspects of environmental impacts and implementation of sustainable incentives or requirements. In this sense, the National Center for Algorithmic Transparency and Reliable AI, provided for in PBIA action 51, can play a prominent role in creating guidelines and monitoring to ensure ethical and responsible systems. It is recommended that this development be inclusive and representative of the local context, with the participation of academia, civil society and other actors such as associations and the ABNT. There are several examples, such as the Risk Management Framework developed by the National Institute of Standards and Technology (NIST), which can serve as a reference for future initiatives in Brazil.

In addition, it is critical that AI governance also consider its environmental impacts. In this sense, inter-ministerial coordination should be established to ensure that environmental impact assessments are carried out and to analyze the increase in energy and water costs arising from projects related to the digital industry, such as data centers or mining projects. The centrality of the Ministry of the Environment and the Ministry of Mines and Energy must be guaranteed in the identification and mitigation of environmental impacts, especially when creating incentives or state requirements for the construction of these projects, with the support of the respective regulatory entities.

Main responsible institutions: The MCTI, MMA, MME, MDIC, MGI

3.3. HUMAN AND INSTITUTIONAL TRAINING

Recommendation 15. Incorporating an other-centered approach in AI initiatives to promote a harmonious, humanized, and inclusive advancement.

In global efforts to mitigate the unwanted effects of digital technologies, it is essential to place human beings at the center of technological development, understanding their needs, values, principles and responsibilities. This goes beyond promoting or encouraging STEM courses, pointing to the need to promote empathy in our daily interactions. Incorporating empathy in education allows us not only to understand the perspectives of others, but also stimulates responsible and proactive action in technological development. However, empathy alone is not enough. It is essential to add compassion and altruism to this process. The incorporation of empathy, compassion and altruism in educational courses can be based on initiatives that apply them to solve real problems for the benefit of marginalized and disadvantaged groups (RASSIGHT, 2020)(AYO, 2023). In this sense, the principles that guide AI policies in Brazil must always consider the centrality of the human person and collectivities. It is recommended that the Brazilian Government implement policies that strengthen ACE-STEM actions, i.e., STEM with Altruism, Compassion and Empathy, to ensure a more sustainable and fair future for all people and the planet (PrestesFarina, 2019). From this perspective, collaboration, cooperation and coordination will be boosted, favoring solutions to local, regional and global problems

Main responsible institutions: The MCTI, MinC, MDHC, MEC

Recommendation 16. Promoting AI systems in healthcare that ensure quality of life and well-being, with equity in access.

The applications of AI in the health care area should benefit the entire population, ensuring equity in access to therapeutic innovations proven by international organizations to treat comorbidities listed in the International Classification of Diseases. It is crucial to create legislative and regulatory mechanisms suited to the principled framework and bureaucratic-operational structure of the SUS (Unified Health System) in light of these innovations, as well as to ensure the provision of necessary medical monitoring, taking into account the speed at which innovations are occurring today. Furthermore, there is a need to prohibit the use of secondary data from the public healthcare system for commercial purposes.Regarding potential negative impacts, such as physical, mental, intellectual, or behavioral effects, concerns arise about dependency on technology, manipulation of vulnerable individuals, encouragement of self-harm, promotion of violence, social isolation, and the modulation of behaviors through recurring recommendations of products and services.

Thus, by adopting the WHO's concept of mental health as "a state of well-being in which an individual is aware of their abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to contribute to their community" (World Health Organization [B108]), the IEEE 7010-2020 standard presents several indicators that must be considered in the design, deployment, and use of AI systems in health care.

Main responsible institutions: The MCTI, MS, National Congress

Recommendation 17. Promoting Brazil's leading role, through the performance of Brazilian experts, in the development of international norms and standards for AI systems.

Standards and technical standards are set by experts from technical-scientific communities, in bodies such as ISO (through ABNT) and associations such as IEEE (autonomously). They define specifications and procedures that aim to maximize the reliability of everyday products, methods and services. Currently, several standards in the field of AI ethics are being developed, in particular the IEEE 7000 series, counting on the timid presence of the Brazilians. The national presence in these communities, with active participation, is important in order to consider the problems and peculiarities of the country's population. The presence of Brazilian scientists in international AI standardization initiatives is still very limited and should be encouraged and valued through incentives such as action 54 of the PBIA to create a support network for Brazil's participation in the international AI debate. In addition, it is recommended that such standards, especially those related to AI, be publicly and unrestrictedly accessible, as they are safety standards applicable to the entire society and must be known by the entire population.

It is crucial to encourage the creation of national and complementary standards, indexes and parameters to the international models of diagnosis and evaluation of AI in all its aspects, through public notices and partnerships with researchers, experts and representatives of the various sectors of Brazilian society.

Main responsible institutions: The MCTI, MRE

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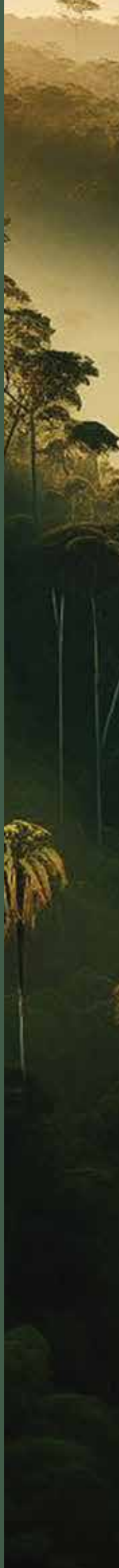

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