CHILE

Artificial Intelligence Readiness Assessment Report

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Acronyms and Abbreviations

AI   Artificial Intelligence.

ANID   National Agency for Research and Development.

CENIA   National Centre of Artificial Intelligence of Chile.

CFT   Council for Transparency.

DGD   Digital Government Division of Chile.

DIPRES   Chile's Budget Direction.

ETO   Emerging Technology Observatory.

GBARD   Government Budget Allocations for R&D.

GDP   Gross Domestic Product.

GERD   Gross Expenditure in Research and Development.

IADB   Inter-American Development Bank.

IODC   International Open Data Charter.

ISOC   Internet Society.

LAC   Latin America and the Caribbean.

MEDT   Ministry of Economy, Development, and Tourism.

MSC   Ministerial Steering Committee.

MSCSTKI   Ministerial Steering Committee of Science, Technology, Knowledge, and Innovation.

MSDF   Ministry of Social Development and Family.

MSTKI   Ministry of Science, Technology, Knowledge and Innovation.

NAIP   National Artificial Intelligence Policy.

NGO   Non-Government Organisation.

ODIN   Open Data Inventory.

OECD   Organisation for Economic Co-operation and Development.

OGP   Open Government Partnership.

PCR   Political Constitution of the Republic of Chile.

PPP   Purchasing Power Parity.

RAM   Readiness Assessment Methodology.

R&D   Research and Development.

R&I   Research and Innovation.

SDGs   Sustainable Development Goals.

SEGPRES   Ministry General Secretariat of the Presidency.

SENCE   National Training and Employment Service.

SEREMI   Regional Ministerial Secretariats.

STEM   Science, Technology, Engineering and Mathematics.

SUBDERE   Undersecretariat of Administrative and Regional Development.

SUBTEL   Undersecretariat of Telecommunications.

Foreword

We have officially entered the Age of Artificial Intelligence. The world is now set to change at a pace not seen in decades, even centuries. AI-based tools and applications make our lives easier, smoother, and richer. They help us move efficiently, get informed, get credit, get a job, and get our taxes done.

But in its current form, AI reproduces and amplifies many of the social challenges we face. It is not acceptable that around half of the world's population still lacks adequate internet access. Upstream, the AI industry is highly concentrated, with just two countries – the United States and China – and a dozen companies accounting for a major share of the sector. This can lead only to greater inequality of outcomes – including gender disparities – downstream. Non-diverse AI teams, unrepresentative datasets, and opaque and biased algorithms can cause harm, particularly to those who are already vulnerable, whether companies or individuals, children and young people, women, or entire democracies.

That is why UNESCO drafted the Recommendation on the Ethics of Artificial Intelligence, which was adopted in 2021 by 193 countries to make sure 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 draw on to steer technological developments in a responsible direction, premised on the belief that light-touch regulation, which has until now remained the norm, is insufficient. We need capable governments that are well equipped, in terms of competencies, institutions and laws, to frame responsible AI development and protect the rule of law online, and public and private developers who are accountable for putting human rights and fundamental freedoms – not profits or geopolitical considerations – first.

The Readiness Assessment Methodology (RAM) is a diagnostic tool intended to assist Member States in upholding their commitment to the Recommendation by helping them understand how prepared they are to implement AI ethically and responsibly for all their citizens. By highlighting any institutional, regulatory or data gaps and obstacles, it enables UNESCO to tailor support for governments to fill those gaps to ensure an ethical AI ecosystem aligned with the Recommendation.

The RAM questionnaire forms the basis for the first section of this readiness assessment report, providing a comprehensive but detailed overview of laws, institutions, and the cultural, social, and human capital landscape shaping AI. This is then complemented in the second section by a summary of concerns and priorities raised during a national multistakeholder consultation that was conducted in 2023. Finally, the third section presents a roadmap and recommendations for building capacities across national institutions, laws and policies, and human capital, to achieve a responsible AI ecosystem aligned with the UNESCO Recommendation.

As the very first country to complete the RAM and the country report, Chile is blazing the trail not only for Latin America but the world. We applaud the initiative the Chilean government has taken to update its AI strategy putting ethics and governance front and centre, and thank them for inviting UNESCO to assist in this endeavour.

The report presented here reveals a complex and rapidly-changing landscape. In the legal and regulatory dimension, the 2021 National Artificial Intelligence Policy (NAIP) represents a substantive and wide-ranging commitment to developing AI. One of the key recommendations of this report is to fully integrate the UNESCO Recommendation into the NAIP's axis of Ethics, Regulation, and Socioeconomic Impacts. Notably, the RAM reveals the pressing need to update legislation around data protection and cybersecurity to meet the challenges of AI. It also highlights several areas the Chilean government is actively working to develop. For example, in the case of open data, Chile is ranked 75th in the Open Data Inventory, but is a signatory of the International Open Data Charter and is working to provide guidelines to government bodies on publishing open datasets. Rules for government procurement of AI systems, disinformation, and redress mechanisms for harms caused by AI systems do not yet exist, although some measures to address these are underway.

The RAM also underlines significant gender gaps in STEM, although here again policy measures and various programs are being developed to promote diversity and inclusiveness. There is also not yet a specific policy to address the impacts of AI on the environment, or for the use of AI in the preservation of cultural heritage or indigenous languages. The science and education

dimension reveals comparatively low public expenditure on research and development (0.34% of GDP in 2020) compared with other OECD countries, but Chile enjoys a high level of mobile and broadband infrastructure and connectivity. While there is not yet a specific policy on AI in education, a strategy is being implemented to bridge gaps in access to technology, connectivity and skills, and the government is also developing a national labour prospects strategy that will consider the impacts of AI on jobs.

Following on from the RAM questionnaire, national multistakeholder consultations brought together more than 300 people from across different regions, sectors and disciplines to focus on key thematic areas relating to AI and its ethical implications and governance. The results point to a nuanced but optimistic view of AI. On the one hand are clear concerns for the future, particularly in areas such as privacy and surveillance, the need for transparency, and the potential impact on jobs. But on the other, there is great enthusiasm about the opportunities for improving productivity and resource allocation, energising democracy, and reducing environmental impacts. The view from the consultation is clear, however, that a firm ethical basis and innovative regulation that can keep pace with AI's rapid development are essential to ensuring trustworthy technology and beneficial outcomes.

We see these opportunities and concerns reflected in the final section of this report, which presents a set of comprehensive yet focused recommendations that span the different dimensions of the RAM and the key areas of regulation, institutional frameworks, and capacity building. These include prioritising personal data protection and cybersecurity laws to address the gaps in existing legislation, and implementing multistakeholder and adaptive governance firmly based on the ethical principles of the UNESCO Recommendation. In relation to strengthening Chile's institutional framework, recommendations include updating the NAIP, collecting more data on AI use, and innovative proposals such as formulating AI strategies at the municipal level to suit local priorities, and convening a working group to assess the impact of AI on culture. In the area of capacity building, the focus is on developing human capital in the domain of AI – including promoting diversity, inclusion and gender equality in STEM – attracting investment in AI technological infrastructure, enhancing environmental impacts, and assessing and mitigating the impact of AI on the workforce via job retraining plans.

Overall, this report presents a fundamentally optimistic vision that we at UNESCO share: that ethical governance and responsible regulation of AI is entirely consistent with innovation and economic growth, and is essential for ensuring a technological ecosystem that benefits the public good. In drawing a clear line from the RAM data through to the multistakeholder consultations and the recommendations, Chile has a clear roadmap for how to get there.

It was a pleasure working with the Government of Chile to conduct this exercise. We are grateful not only for their engagement with the RAM, but also for the leadership role that Chile has taken in establishing the Regional Council for Artificial Intelligence in Latin America and the Caribbean with the support of CAF – Development Bank of Latin America and the Caribbean. These initiatives and Chile's engagement with them have been state-of-the-art – pioneering ethical AI governance globally – and I am sure they will contribute to AI technology that delivers fair, sustainable, and inclusive outcomes.

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

Executive Summary

In November 2021, 193 Member States of UNESCO adopted the Recommendation on the Ethics of Artificial Intelligence. This global standard aims to leverage the positive impact of AI while addressing its inherent risks. Countries around the world are now in the process of implementing the Recommendation, with UNESCO supporting them through various capacity-building efforts. In this context, UNESCO is partnering with the Patrick J. McGovern Foundation on Harnessing the Power of AI to Promote Equal Opportunities in the Digital World initiative, to translate the Recommendation into national institutional and regulatory frameworks, along with building a national consensus on the shared vision for AI.

As a result of this shared effort, the Readiness Assessment Methodology (RAM) has been created by UNESCO. The RAM is a macro-level instrument that will help countries understand where they stand on the scale of preparedness to implement AI ethically and responsibly for all their citizens, highlighting what institutional and regulatory changes will be needed. Furthermore, the output of the RAM will also help UNESCO tailor the policy reform and institutional capacity efforts to the needs of different countries. This will ensure that the country has in place human capacity, policies and regulations to address the challenges brought by AI such as reinforcing traditional biases and ensure that people and their interests are always at the centre of AI development.

The implementation of the RAM consists of three stages:

1. Diagnosis of National AI landscape,

2. Developing a National AI Multi-Stakeholder Roadmap and

3. Main Policy Recommendations for a National AI Strategy.

Chile is one of the first countries in the world to implement the RAM, marking it as a pioneer in Latin America with an Artificial Intelligence strategy known for its broad participatory process, which serves as a global reference. At this stage, the government is in the process of reshaping its strategy to adopt a more ethical and equitable approach.

Chile's current AI strategy includes a significant ethical component primarily developed within the framework of axis 3 of the policy, titled "Ethics, Legal and Regulatory Aspects, and Socioeconomic Impacts." This component proposes actions aimed at mitigating ethical risks across various sectors, reviewing regulatory frameworks, enhancing security measures and addressing gender-related impacts. While Chile has identified potential ethical challenges associated with the design and use of AI through its ethical component, it recognises the necessity to update some of its policies to align with the UNESCO Recommendation on the Ethics of AI, promoting a more comprehensive approach to the ethical use of AI. It also acknowledges the need to intensify efforts in preventing and measuring the social impacts of AI, along with establishing effective governance mechanisms to implement AI policies.

In terms of assessing Chile's AI landscape, the country published its NAIP in 2021. The NAIP outlines a governance structure and presents an Action Plan with key priorities in public policy initiatives. The NAIP is based on three core thematic axes that underpin the national AI strategy: the first axis focuses on Enabling Factors; the second axis centres on Development and Adoption; and the third axis emphasises Ethics, Regulation, and Socioeconomic Impacts.

The regulatory framework governing Artificial Intelligence plays a pivotal role in ensuring the ethical deployment of AI systems. The legal and regulatory framework section encompasses an evaluation of effective mechanisms to safeguard and uphold citizens' rights while monitoring, mitigating and compensating for unforeseen adverse outcomes arising from AI system deployments. Chile exhibits a robust body of legal and policy instruments designed to promote AI development, transparency, due process, public procurement, and capacity-building, among other aspects. However, there is room for improvement in areas related to personal data protection and data sharing.

Consideration of social and cultural dimensions is paramount in assessing the ethical components of AI system deployments, particularly in preventing biases throughout the entire AI system lifecycle and fostering a fair and inclusive AI ecosystem. This section

addresses various topics, including the inclusion of women in STEM and AI development environments, as well as the incorporation of social and cultural diversity to ensure the ethical application of AI. Chile demonstrates strengths in digital access and widespread Internet usage among its population. Nevertheless, significant gender and urban-rural inclusion gaps exist, and Chile is actively implementing policies to address these issues. Additionally, challenges related to sustainability and environmental protection persist in the social context.

Considering that scientific and educational components play a significant role in advancing AI, assessing them is a relevant method for evaluating a country's readiness for AI development. The scientific aspect is measured by the country's performance in research and innovation (R&I), which includes research and development (R&D) expenditure, research output, ethical AI research and AI talent innovation output. In this regard, Chile consistently demonstrates lower performance compared to OECD countries. However, several educational policies are currently being implemented to address this issue.

The economic dimension considers critical aspects within the AI development and deployment ecosystem, including those related to the labour market, intermediate consumption and investment and production for AI. In this context, Chile is implementing interesting policies on this topic. However, a lack of relevant data has been identified.

The technical and infrastructure dimensions pertain to a country's installed capacity for developing and deploying AI solutions. This capacity includes factors like computing power, the availability of data centres, connectivity and Internet access, among others. These elements are crucial enablers for a country's ability to develop AI systems, as they determine the capabilities for processing information based on the available infrastructure. In this aspect, Chile demonstrates remarkable performance in areas such as connectivity and Internet access within the global context. However, other aspects of installed capacity, such as the availability of data centres and computing power, still lag behind.

Concerning the development of the multi-stakeholder roadmap, Chile boasts an active local AI ecosystem that involves various stakeholders, including the national government, local governments, academia, private sector companies, civil society and international organisations. Within the public sector, MSTKI leads the development of the NAIP and coordinates its policies in local contexts across the country through the Regional Ministerial Secretariats (SEREMI) and other public agencies. Academia is also a crucial player in the AI ecosystem, conducting research and development projects on AI-related topics at universities and research centres.

Private sector companies actively contribute to the AI ecosystem, primarily by developing AI solutions and participating in discussions regarding AI initiatives in the public domain. Civil society, as well as the general public, show significant interest in AI development in Chile, making them important participants in the local ecosystem. Some Non-Governmental Organisations (NGOs) aim to promote the deployment of AI and digital technologies, while others focus on advocating for the protection of rights and equitable development in the AI and digital technology sectors. Finally, various international organisations have played a significant role in promoting the development of ethical AI systems.

During the months of June and July 2023, various participatory sessions were held with different actors from the local AI ecosystem, aimed at gathering additional information and generating new actions for the development of AI in Chile. The MSKTI, in collaboration with UNESCO, established six thematic areas of discussion relevant to the AI agenda for the coming years:

1. The Future of Work and AI.

2. The Future of Democracy and AI.

3. The Future of AI in Government.

4. The Future of Human-AI Interaction in Health, Education, and Security.

5. The Future of Regulation and AI.

6. The Future of the Environment and AI.

In each of these sessions, participants were asked to identify challenges and opportunities related to the specific topic to be addressed. The results of these sessions were used as inputs for the next section, where the main recommendations were developed.

The main policy recommendations cover three different aspects: regulation, the institutional framework, and capacity building and training. Concerning regulation, substantive recommendations have been proposed to support a participatory dialogue for the development of an AI bill, enhance personal data protection and explore regulatory experimentation to promote AI development. In terms of the institutional framework, it is recommended to update current policies such as the national strategy and its action plan, as well as create early assessment mechanisms for the new strategy's implementation. Lastly, regarding capacity building

and training, a range of recommendations has been formulated based on gaps identified during the implementation of RAM in the diagnostic stage.

Chile has exhibited notable characteristics, including high performance in various indexes, a robust local AI ecosystem, a well-established strategy and a remarkable continuity in its national strategy across two different coalition governments. These characteristics have created favourable conditions for fostering AI development and establishing medium and long-term commitments. This sets a positive outlook for the implementation of the national strategy, along with any potential modifications resulting from the application of UNESCO's principles. In this context, the implementation of RAM represents a significant opportunity to develop sustainable and equitable AI systems within the local ecosystem, serving as a prominent example in the regional context.

This initiative is part of UNESCO's endeavour to contribute to a more ethical and promising future for AI systems globally. UNESCO is committed to upholding values such as respect, the protection and promotion of human rights, fundamental freedoms, human dignity, environmental and ecosystem well-being, ensuring diversity and inclusiveness, and fostering peaceful, just and interconnected societies. When properly managed, the emergence of new technologies like Artificial Intelligence can be harnessed for the collective benefit of humanity. In this context, the RAM serves as a means to ensure that a better future is attainable for all nations, leaving no one behind.

DIAGNOSIS OF THE NATIONAL AI LANDSCAPE

Chile published its National Artificial Intelligence Policy (NAIP) in 2021. The NAIP defines a governance structure and establishes an Action Plan with priorities in public policy initiatives (MSTKI, 2021b). The elaboration of the NAIP was led by the Ministry of Science, Technology, Knowledge and Innovation (MSTKI), with the support of a Ministerial Steering Committee of Science, Technology, Knowledge and Innovation (MSCSTKI) composed by the MSTKI, the Ministry of Economy, Development and Tourism (MEDT), and the Ministry of Education as shown in figure 1.

Figure 1. Chile's AI National Governance
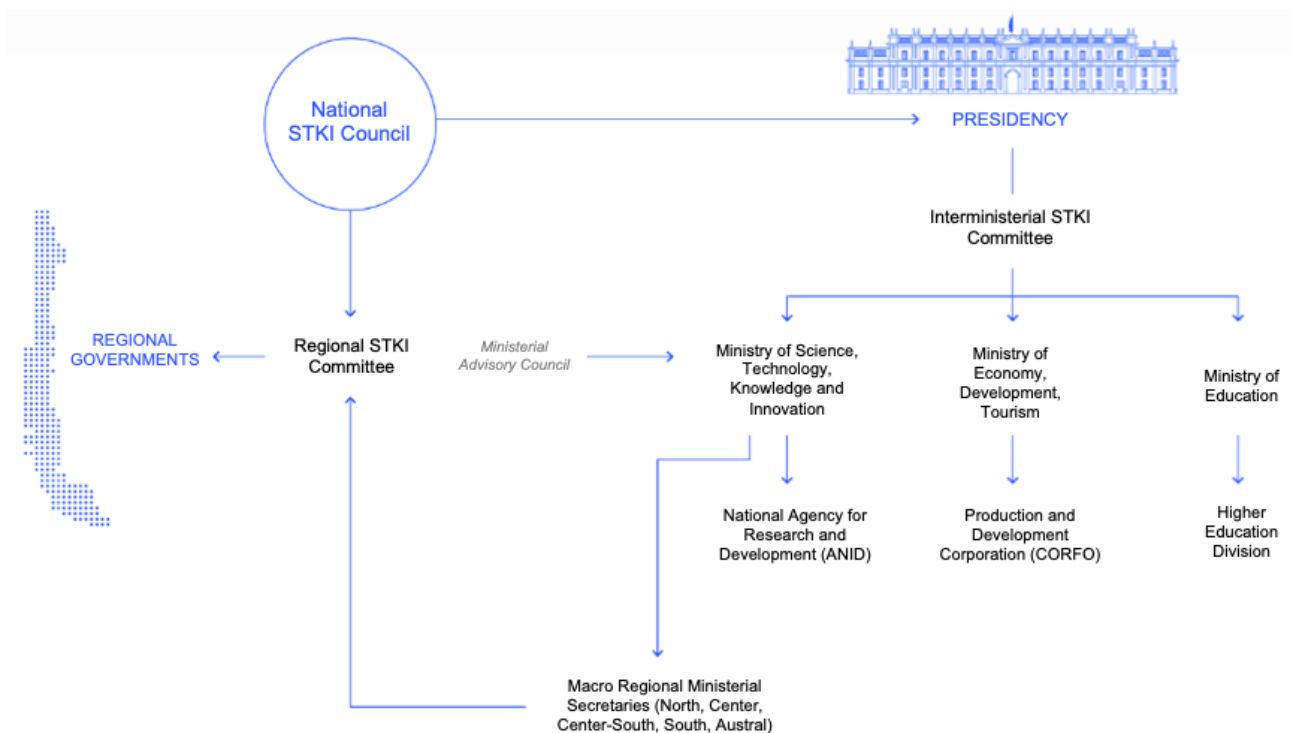
Source: Consejo Nacional de CTCI. https://consejoctci.cl/rol-del-consejo/

The NAIP establishes three thematic axes that serve as national strategy fundamentals. The first axis considers Enabling Factors, encompassing the development of technological infrastructure (connectivity and computing capacity), fostering of talent (development of knowledge and human capacity) and data. The second axis considers Development and Adoption, which encompasses fostering research, technological transfer and adopting Artificial Intelligence (AI) in the Industry and Government. Finally, the third axis considers Ethics, Regulation and Socioeconomic Impacts, which spans the governance in the use of AI tools, the impact on the labour market, consumer relations, intellectual property, cybersecurity, cyber defence and gender (MSKTI, 2021a).

Chile is currently incorporating UNESCO's Recommendation on the Ethics of Artificial Intelligence (2022), creating a Ministerial Steering Committee (MSC) whose first session was celebrated on August 4th 2023. The UNESCO's Recommendations will be incorporated to the third axe of the NAIP, which is currently being updated and it is planned to be published by the end of 2023.

The main obstacles identified by experts in the development of policies and regulations concerning AI in the country were as follows:

1. Creating new regulations and updating the existing regulations is a slow process, while AI evolves rapidly.

2. Lagged regulations in related areas, such as Personal Data Protection, hinder the development of AI regulations.

3. Coordination difficulties and challenges in establishing shared priorities among ministries since AI is a general-purpose technology that requires involvement from multiple ministries.

4. Significant financial constraints since Chile is a developing country with social priorities stemming from its current socio-political context.

5. The political presidential cycle of four years hinders the development and implementation of long-term policies that span different presidencies.

6. Substantial knowledge gaps have been reported regarding technology and its governance in the public sector.

7. Lack of studies and information that would allow the identification of gender inequalities that are generated–or exacerbated–due to the development of AI policies and regulations.

8. Need for clear governance on data quality and management so that government agencies can share information in an agile and secure manner.

9. Lack of an ethical analysis of the technologies being used, especially in vulnerable populations such as children, women and sexual minorities, among others.

In the following sections, Chile's national AI landscape will be discussed across various dimensions, including: legal and regulatory, social and cultural, scientific and educational, economic, and technical and infrastructural.

LEGAL AND REGULATORY

In this section, the legal and regulatory dimensions will be discussed. The regulatory framework within which Artificial Intelligence is situated is crucial to ensuring the ethical deployment of AI systems. The legal and regulatory framework should include effective mechanisms for safeguarding and upholding citizens' rights, as well as monitoring, mitigating and compensating for any unforeseen adverse outcomes resulting from the deployment of AI systems. Examples of the legal framework include regulations concerning Artificial Intelligence, data protection and privacy, data sharing and accessibility and freedom of information, among others.

AI POLICY AND REGULATION

Chile has its NAIP in effect, issued by Decree No. 20 in December 2021 by the MSTKI. The NAIP includes a specific dimension of ethical considerations for AI deployment, covering governance in the use of AI tools, the impact on the labour market, consumer relations, intellectual property, cybersecurity, cyber defence and gender. Additionally, one of the four principles of the NAIP is the respect for Human Rights. In relation to this aspect, the NAIP emphasises that actions and applications of AI solutions should be directed towards improving people's quality of life and addressing potential harmful unforeseen effects (MSTKI, 2021a, p 18).

The development process of the NAIP was led by the Future Team of the MSTKI, a diverse group of professionals from various fields, including engineers, lawyers, sociologists, economists, and psychologists. Moreover, there was an Expert Committee consisting of twelve experts from academia, industry, and civil society, representing various disciplines. These teams also collaborated with the public sector through the MSCSTKI. Although not explicitly stated, these working groups aimed for inclusive representation.

Furthermore, the development process of the NAIP involved participatory methodologies for citizen engagement in two stages during 2020. The first stage brought together sixty-nine digital working groups organised by the Ministry across the country, as well as seventy additional working groups initiated by academia, industry, civil society, and the public sector. Additionally, fifteen webinars were conducted to communicate the process and provide information about AI, involving a total of 6,000 participants in the first stage (MSTKI, 2021a, p. 6). The second stage consisted of a public consultation that engaged 209 individuals and entities (MSTKI, 2021a, p.7).

The NAIP includes an Action Plan comprising 70 priority actions and 185 initiatives, with a budget of CLP 26 billion allocated for public investment (approximately US$32 million) (MSTKI, 2021b). Examples of these initiatives encompass the adaptation and enhancement of tools for certifying AI-related skills in the labour force, support for technology-based startups, promotion of upskilling and reskilling courses for the labour market, prioritisation of scholarships for doctoral programs for studying AI abroad, and encouragement of the employment of highly qualified AI professionals in technological companies, among others (MSTKI, 2021b).

There currently exist binding norms and guidelines for the ethical deployment of AI systems in the public sector. In August 2022, the Digital Government Division (DGD) published a guide for ethical formulation in data science projects (UAI & DGD, 2022). This guideline is intended for public officials who are planning to develop projects with intensive use of data analysis to enhance their management or service delivery to the public. The guide equips them with fundamental knowledge for ethically formulating projects and creating awareness of potential risks, such as biases, personal data breaches and undesirable discriminations. Moreover, there is also a binding norm concerning the procurement of data science and AI projects in the public sector, which will be detailed in the "Procurement Laws and Policies" section.

Furthermore, a legal draft regarding the regulation of AI is under discussion in Congress. In April 2023, a group of parliamentarians presented a draft to regulate AI systems, robotics and related technologies in bulletin No. 15869-19. The goal of this project is to establish a legal framework for the development, commercialization, distribution, and use of AI systems while safeguarding the fundamental rights recognized by the State of Chile. This draft defines concepts such as "AI systems," "developers," "providers," "users,"

"biometric data" and "serious incidents," among others. Additionally, the Government announced its intention to present a draft on "economic intelligence against crime" in the near future.

Lastly, no existing initiatives for assessing current norms related to AI have been reported, nor is such an assessment considered in the short run. Moreover, there is no existing obligation to inform citizens or consumers whether an AI system is being deployed or not.

DATA PROTECTION AND PRIVACY LAWS

Chile is ranked 74th in the Global Cybersecurity Index 2020 by the International Telecommunication Union, placing 7th among the countries in the Americas region, with an overall score of 68.83 (ITU, 2021).

Data protection and privacy are addressed in article 19, No. 4 of the current Political Constitution of the Republic of Chile (PCR), as well as in the Private Life Protection Act, Law No. 19,628. The PCR acknowledges private life, honour, and personal data protection as fundamental rights that must be addressed through common law. The Private Life Protection Act, issued in 1999, regulates matters related to data protection and privacy, and only four out of sixty proposed amendments have been approved since then.

The existing legislation has been evaluated in various documents, leading to the conclusion that the current regulations need to be updated to align with relevant international standards (Law Assessment Department of Deputy Chamber, 2016; Leonardo, 2019; bills bulletin 11144-07 and 11092-07). The current legislation has the following shortcomings:

- The scope of application lacks clarity, with ambiguous definitions for areas such as domestic data and foreign service providers operating in Chile from other countries.

- The definition of personal data is both insufficient and broad, encompassing any information related to an identified or identifiable natural person, making it challenging to distinguish from statistical data.

- Various actors involved in the data treatment process are not adequately addressed in the law, resulting in deficient assignment of responsibility.

- The rules of consent are outdated and require integration with the contemporary context of new digital technologies.

- Ambiguity exists regarding publicly accessible sources of data, leading to unclear boundaries.

- An excessive number of exceptions for the use of sensitive data.

- Inadequate limitations on the use and treatment of personal data by public entities.

- A weak enforcement system due to ineffective procedures, insufficient penalties, and an inadequate responsible authority.

The current Act explicitly encompasses user control over their own data, including the right to request data erasure; the definition of sensitive data and conditions for its use and treatment; mechanisms for compensation in case of moral or pecuniary damage; and additional considerations related to data collected and used by the public sector. However, the current Act does not include mechanisms for notifying data owners, requirements for data fidelity and transparency, data minimization requirements and impact assessments of the law's application.

Currently, a legal initiative to update Law No. 19,628 is in Congress. The legislative proposal, Bulletin No. 11092-07, is in its final stages of approval in Parliament. This initiative aims not only to update the existing data protection and privacy regulations but also to fulfil Chile's commitment to adhere to international standards in this field. The proposed legislation addresses the gaps not covered by the current Act, as mentioned in the previous paragraph, and seeks to rectify the deficiencies listed above.

Furthermore, there is no single authority responsible for enforcing personal data protection. Currently, the Council for Transparency (CFT) is the entity responsible for overseeing regulatory compliance within the public sector, while other areas fall under the jurisdiction of different organisations. The lack of a unified authority has been a major critique of the current regulation. Addressing this issue, the ongoing legislative proposal establishes the creation of a Personal Data Protection Agency, which will be responsible for ensuring data protection compliance across all cases.

Data Sharing and Accessibility

Chile legally enshrined the principle of interoperability in 2019 through Law No. 21.180, known as the Digital Transformation of the State. This law amended a previous norm that outlines the procedures of State administrative bodies. Based on this principle, electronic media used by State administrative bodies are required to interact and interoperate within the State administration using open standards, enabling secure and efficient connections among them. Furthermore, public sector bodies must collaborate by providing the information requested by each other through electronic media, and explicit user consent is only needed for sensitive personal data.

The Digital Transformation of the State law is supplemented by two decrees that establish regulations and technical standards to actualize the principles of interoperability and cooperation within the public sector (Decree No. 4, 2021; Decree No. 12, 2023). These regulations define the standards and protocols for data, document, and file interoperability among State administrative bodies. They also include models and services for interoperability, secure connections, and other mechanisms to facilitate integration within the Government.

The technical standards for interoperability establish an Interoperability State Network, also known as "PISEE 2" using the Spanish spelling of State Electronic Services Integrated Platform v.2. PISEE 2 is a platform enabling secure and direct internet-connected information sharing through interoperability nodes hosted within the IT infrastructure of each public body. Although PISEE 2 is a recently implemented platform, it serves as an upgraded version of PISEE 1 from 2006, addressing the weaknesses identified in the assessment of the previous iteration. PISEE 2 was developed by the DGD in collaboration with the Technical Interoperability Board, composed of representatives from eighteen governmental institutions. This collaboration incorporated improvements considering the emergence of new technologies and the public bodies' needs to meet citizen expectations.

Data sharing between the public and private sectors is influenced by two interconnected regulations: private data protection and privacy laws[1], and transparency and information access regulations[2]. As a general practice, public information is typically accessible to all citizens unless it involves personal data. State administrative bodies can share information among themselves without explicit consent if the data pertains to their areas of jurisdiction and does not involve sensitive personal data. Conversely, private institutions require explicit consent to access personal data, unless such data can be sourced from public records.

Regarding Open Data, Chile scored 52.9 in the Global Data Barometer 2022 and is ranked 75st among 195 countries in the Open Data Inventory (ODIN) by Open Data Watch. Additionally, Chile signed the International Open Data Charter (IODC) during its inception, marking the first decade of this signing in March of this year (2023).

Figure 2. Chile's Score in Global Data Barometer
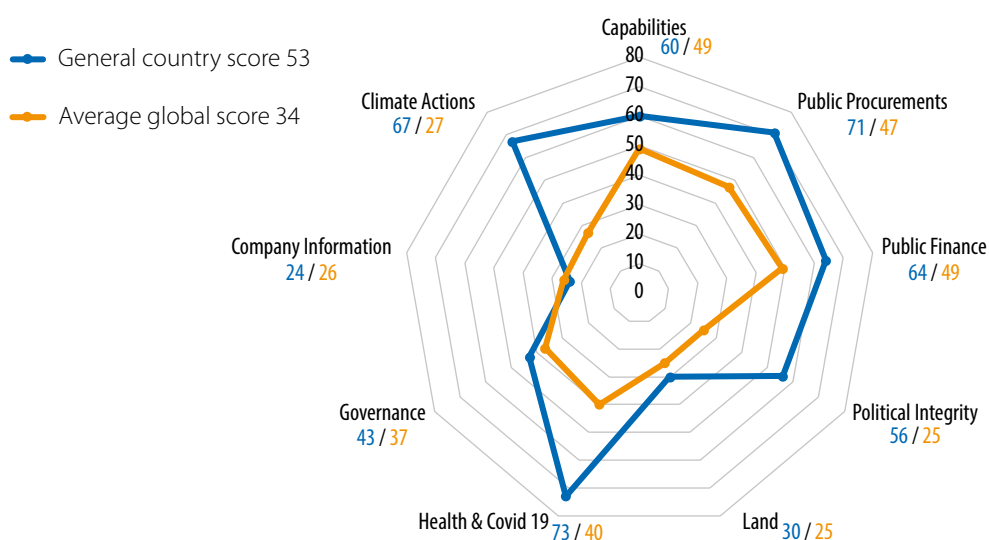
Source: Global Data Barometer

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1   For further information, see previous section "Data protection and privacy laws."
2   This topic will be addressed below, in section "Freedom of information acts/ access to knowledge acts."

Currently, the country lacks an official Open Data policy; however, several initiatives are in progress. Firstly, the DGD is formulating a Technical Standard for Open Data, which will offer guidelines to different governmental bodies for publishing datasets on the Open Data Portal. Secondly, the same department is crafting a Public Data Management Strategy, aiming to establish data governance within State entities and promote the use of public data for industry, academia and civil society. Thirdly, an updated version of the National Open Data Portal (datos.gob.cl) will be relaunched this year, enhancing the existing platform and facilitating access to governmental open data.

Since Chile joined the Open Government Partnership (OGP) in 2011, the country has created five Action Plans, each lasting two years. These plans serve as platforms to evaluate the outcomes of Open Data policies, setting new objectives for each period. These objectives have led to the implementation of measures such as developing tools to align data availability with personal data protection regulations and establishing a portal for public procurement data, among others.

Moreover, governmental open data sets are accessible for various purposes, including research. In this context, the National Agency for Research and Development (ANID, by its name in Spanish) has formulated an Open Access to Scientific Information and Research Data Policy to ensure unrestricted access to knowledge generated using public funds. Additionally, the Ministry of Social Development and Family (MSDF) has introduced mechanisms for accredited educational institutions to access administrative social data, aiming to encourage research with social impact.

PROCUREMENT LAWS AND POLICIES

Currently, no law regulates the government procurement of AI systems or products and services incorporating AI systems.

At the administrative level, the "Type Basis to Bid Algorithms and AI Projects" was published by ChileCompra in Resolution No. 60 on December 28th, 2022. This guideline offers the public sector the minimum necessary knowledge to ethically formulate data science projects and be aware of risks while collecting and training data.

Intended for public officials and institutions, the guideline focuses on technological projects involving extensive data use and analysis to enhance management and public service delivery. It specifically addresses stages vulnerable to various legal and ethical risks within the decision-making process, including biases, arbitrary discrimination, and personal data protection.

The guide was developed through the "Ethical, Responsible, and Transparent Algorithms" initiative, led by Adolfo Ibáñez University and the Inter-American Development Bank (IADB) via IADB Lab and the Innovation Laboratory of the IADB Group, as part of the fAIr LAC initiative. This initiative promotes the ethical and responsible deployment of AI systems in Latin America and the Caribbean (LAC).

As this guide has been recently published, its effectiveness has not yet been evaluated. No special approval process is required for acquiring an AI system in Chile. Furthermore, no certification or official providers list has been reported.

FREEDOM OF INFORMATION ACTS AND ACCESS TO KNOWLEDGE ACTS

The freedom of information and access to knowledge are encompassed by several laws. Firstly, the current PCR establishes that any act or resolution of governmental bodies, along with their reasons and procedures, is public. The PCR further stipulates that only a law with higher quorum can classify them as secret or confidential under special conditions, such as the risk of impeding proper government duties, compromising individual rights, or endangering national security and interests.

This subject is extensively addressed by the Law of Public Function Transparency and Information Access in State Administration, Law No. 20,285. This law declares that acts and resolutions of state administration bodies, their reasons, documents that support or supplement them, and the procedures used are all public unless exceptions are specified by law. Similarly, the law asserts that all information generated using public funds or under the control of public administration is public, unless certain exceptions apply.

Enforcement of this law falls under the jurisdiction of the CFT, which is tasked with promoting transparency in public functions, ensuring compliance with information transparency and disclosure, and safeguarding the right to access information. Additionally, the CFT is presently entrusted with overseeing personal data protection in the public sector. It formulates guidelines and recommendations to harmonise privacy protection and transparency principles. Moreover, the CFT enforces criteria for active and

passive transparency, mandating that state administrative bodies proactively publish public information and respond to information requests from any individual.

Act No. 20,285 has been evaluated twice since its enactment in 2008. In 2016, a survey was conducted among public officials and a sample of individuals who requested information during the second half of 2014. The survey aimed to assess their perception of the law's effectiveness. Results indicated a generally positive perception among respondents, highlighting increased citizen participation and protection of individual rights.

A second evaluation occurred in 2018, marking the law's first decade. During this period, a bill was introduced to amend the existing act (Bill No. 12100-07). Drawing from the lessons of the preceding ten years and expert recommendations, the bill reflects a consolidated culture of transparency and public access to information. Proposed modifications include extending the scope to encompass a broader range of the public sector, including other branches of government, introducing new obligations for active transparency, strengthening sanctions, and making procedural enhancements, among other measures.

Regarding access to information about how AI systems are used in the public sector, the principle of passive transparency allows any individual to request that information from the State administration bodies. In particular, the CFT along with the Adolfo Ibáñez University are developing a General Instruction on Algorithmic Transparency that will provide guidelines to State agencies for disclosing the automated systems, algorithms, or AI they are using, which directly impact services provided to the public. This initiative has already generated four case studies through the participation of four public institutions that published the corresponding information.

Finally, the parties are obligated to inform the owners of the data being used or shared, especially when it concerns data that could affect the rights of third parties. When personal data is involved, the Personal Data Protection Act applies.

DUE PROCESS AND ACCOUNTABILITY

In Chile, due process has constitutional status. It is regulated in the PCR, which stipulates that every individual has the right to legal defence in the manner indicated by law, and no authority or individual can prevent, restrict, or disturb the proper intervention of a lawyer if requested. The law will provide the means to grant legal advice and defence to those who cannot secure it for themselves. Additionally, it will specify the cases and establish the way in which natural persons who are victims of crimes will have access to free legal advice and defence.

Some of the guarantees of due process include, among others:

- Every person accused of a crime has an irrevocable right to be assisted by a defence lawyer provided by the State in case they have not hired one themselves.

- Every judgement from a jurisdiction-exercising body must be based on a legally processed prior procedure.

- No crime shall be punished with a penalty other than that established by a law promulgated prior to its perpetration, unless a new law benefits the affected person.

- No law can establish penalties unless the behaviour being sanctioned is expressly described in it.

Likewise, due process is specified in different Codes depending on the subject matter. For civil cases, the Code of Civil Procedure applies. For criminal cases, the Code of Criminal Procedure applies. In the case of public administration, due process is outlined in Law No. 19,880, which establishes the basis of administrative procedures governing the acts of State administration bodies.

The procedural laws of the country are under constant evaluation and modification, following regular institutional mechanisms. Currently, a draft of a new constitution is being prepared, proposing new regulations in procedural and regulatory matters. The constitutional draft will be subject to a plebiscite in December 2023 and, if not approved, the current norm will remain.

Regarding the application in AI systems, there is no legal obligation to actively inform individuals interacting with AI systems. However, this information can always be requested by any individual under the principle of passive transparency described in the previous section3.

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3   See "Freedom of information acts/ access to knowledge acts" section for further information

Likewise, there is currently no law or policy establishing mechanisms for oversight, compensation, and recourse against damages caused by AI systems. A bill is currently being processed in Congress proposing some mechanisms in this regard; however, this does not currently represent any obligatory provision4.

ONLINE SAFETY AND INTEGRITY OF SPEECH

Currently, there is no policy or law defining concepts such as "hate speech" or "false information," nor establishing procedures for the detection and removal of infringing content of this kind.

Recently, the creation of an Advisory Commission against Disinformation was approved through a decree (Decree No. 12, MSTKI). The Advisory Commission against Disinformation was established with the aim of advising the MSTKI, and the Ministry Secretary-General of the Government, on aspects that allow for the analysis of the phenomenon at a global and local level, specifically concerning the study and analysis of disinformation on digital platforms, excluding press media from the analysis.

Within one year, this entity must issue two reports, the first associated with understanding the current state of the phenomenon and the second to provide guidance and recommendations regarding the formulation of public policies.

Regarding the responsibility of online intermediaries, the Intellectual Property Law No. 17,336 states that providers of data transmission, routing, or connection services will not be held responsible for transmitted data when certain conditions on the intermediary's part are met. These conditions relate to content integrity and require the intermediary not to modify or select the content, nor to select the recipients of the information, among other conditions.

The effectiveness of these laws or bills has not been evaluated. Additionally, there is no law or project concerning the impact of AI on social networks, including transparency, disinformation, false information, or hate speech.

PUBLIC SECTOR CAPACITY

The State Modernization Agenda 2022-2026 is the main governmental strategy currently in place to enhance digital competences in the public sector. The Agenda comprises thirty initiatives that strengthen six cross-cutting pillars for the construction of a modern State, with public value and oriented towards improving citizens' trust in governmental institutions. One of these pillars is the digital transformation of the State, which consists of seven initiatives:

1. Implementation of Law No. 21,180 for the Digital Transformation of Public Administration.

2. National Data Strategy and State Data Interoperability Network.

3. National Cybersecurity Policy.

4. Institutional Strengthening of Digital Services Governance and Digital Transformation.

5. Development of Policies in Technological Procurement, particularly cloud infrastructure.

6. Improvements to the Public Administration's Technological Investment Evaluation System.

7. Integrated Platform for Digital Public Services.

The current Agenda is built on State modernization initiatives and the enhancement of digital competences within the public sector from previous years. An important precedent is the State Digital Transformation Strategy 2018-2022, with one of its goals being the promotion and attraction of talent for digital transformation with high-performance teams. In 2019, Law No. 21,180 for the Digital Transformation of the State was published, establishing a comprehensive modernization regime for the public sector. The Digital Transformation Coordinator was created in each public entity, and instructions were given to appoint these coordinators and define digitization plans for processes, among other measures.

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4   See "AI policy and regulation" section for further information.

The coordination of the modernization agenda is primarily carried out by the DGD, of the Ministry General Secretariat of the Presidency (SEGPRES by its name in Spanish), which is mandated to coordinate and advise State Administration bodies in the strategic use of digital technologies, supporting their use, data, and public information to enhance management and the delivery of close and quality services to people.

Other specific initiatives to enhance digital competences in the public sector include:

a. Virtual Campus, by the Civil Service, offers a diverse range of free courses for public officials seeking to enhance their digital skills, such as the Digital Transformation in the Public Sector course.

b. Platforms and constant training by DGD, consisting of the implementation of cross-cutting technological platforms for use in the public sector, along with the development of competences for their proper use.

c. Government Laboratory, whose main objective is to build capabilities for innovation in public institutions to improve public services and their relationship with citizens.

While there currently is not a unified digital qualification programme for all State entities, there are some sector-specific initiatives in this regard. For example, the Ministry of Health, in collaboration with the University of Santiago, conducts cybersecurity courses and seminars targeting clinical users, administrative staff and technicians involved in handling individuals' health data.

SOCIAL AND CULTURAL

In this section, social and cultural dimensions will be discussed. Social and cultural dimensions are crucial to assessing ethical components in AI systems deployment, such as mechanisms to avoid the eruption of biases in the whole AI system lifecycle and the creation of a fair and inclusive AI ecosystem. In this regard, this section addresses topics such as the inclusion of women in the science, technology, engineering, mathematics (STEM) and AI development environment, as well as the incorporation of social and cultural diversity to ensure the ethical application of AI. Additionally, it includes the level of acceptance and attitudes of the general public towards AI, the consideration of environmental and sustainable criteria, health, social well-being and culture in the creation of AI solutions.

DIVERSITY, INCLUSION AND EQUALITY

The gender gap in Internet usage in Chile is nearly non-existent, with an Internet Gender Gap Index of 1, indicating fully equitable access between genders (Digital Gender Gaps). The percentage of households residing in urban areas with internet access was 89.23% in 2017, whereas only 76.69% had access in rural areas according to Organisation for Economic Co-operation and Development (OECD) data (OECD, 2023a).

Figure 3. Internet Gender Gap Index
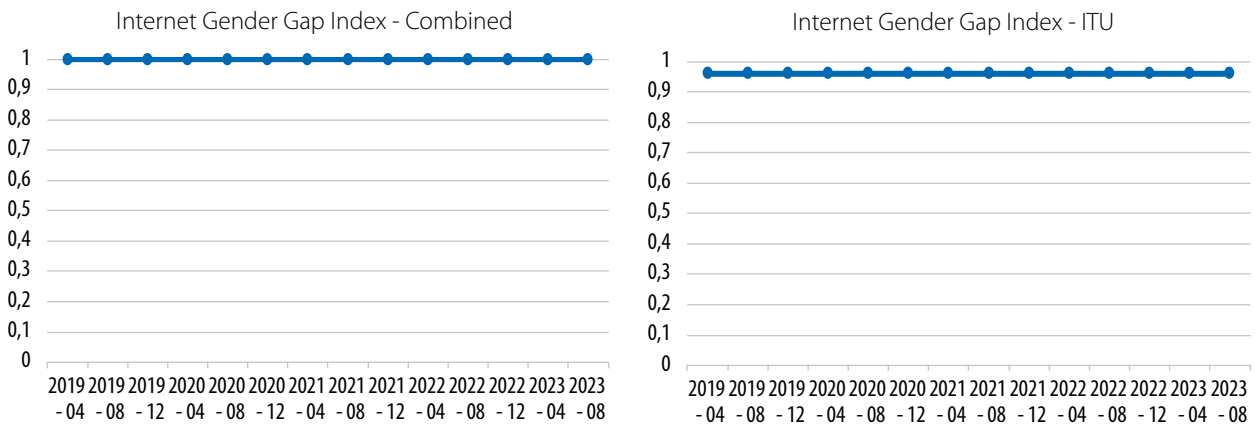
Source: Digital Gender Gaps. Internet GG ITU and Combined. https://www.digitalgendergaps.org/

By 2022, access to high-speed fixed networks was 69.5% in urban areas and 10.1% in rural areas. Chile ranks among the highest global standards for speed on these networks (Speedtest, 2023). When adding the usage rate of mobile networks to fixed networks, the total reaches nearly 100% in urban areas and 78% in rural areas, where at least one household member has access (CASEN, 2022). In terms of mobile data consumption rates, according to the OECD, Chile is among the top 10 countries in terms of usage (OECD, 2023b).

Regarding the gender gap among graduates of higher education STEM programs, the sub-indicator of STEM attainment percentage from the Global Gender Gap Report (WEF, 2021) reveals a significant gap in Chile, with 6.76% for women and 38.61% for men. Additionally, the proportion of males studying science or mathematics and aspiring to work as STEM professionals at age 30 is greater than that of females, at 38.1% and 22.7%, respectively (OECD, 2019a). These perception gaps don't correlate with science

performance according to PISA, where boys score 445 points compared to girls' 442 points, showing very similar performance (OECD, 2019a).

To reduce the gender digital divide, Chile introduced a National Policy for Gender Equality in Science, Technology, Knowledge, and Innovation in 2021, published under Decree No. 12 of 2021 by the MSTKI, with a 50/50 Action Plan for 2030 (MSTKI, 2021c). The effectiveness of this Policy has not been evaluated to date.

To reduce the socioeconomic or urban-rural digital divide, Chile recently launched the Zero Digital Divide Plan 2022-2025 (Subtel, 2022). The plan encompasses a Connectivity Regulation axis, which includes pending legislation on this matter; Digital Infrastructure, encompassing last-mile projects, connectivity for education, fibre-optic projects, WiFi Chilegob, and 5G deployment; Our Projects, grouping a Demand Subsidy; and Connectivity for All, seeking alternatives to create solutions for underserved urban areas. The effectiveness of this plan has not been evaluated to date.

Regarding diversity within AI-related groups, there is currently no law in Chile that promotes it, although it is considered within the objectives of the NAIP. Technology companies are not obligated to publish diversity statistics in Chile, and there are no affirmative action regulations to foster diversity throughout the AI lifecycle. Universities and professional faculties are not required to publish diversity statistics, but they are required to conduct internal assessments on the perception of gender-based violence and discrimination as per Law 21,369.

However, government contract holders are required to comply with diversity-related regulations under Public Procurement Directive No. 20, "Gender Perspective in Public Procurement," which allows the incorporation of a gender perspective into procurement processes (Directive No. 20, 2022). Although these are non-binding recommendations or guidelines for buyers, once incorporated into the purchasing processes, they become obligatory for the procuring agency.

Currently, there are several programs promoting diversity in STEM, such as:

- Gender Perspective in Educational Robotics, Innovation Network for Educational Transformation and Digital Citizenship (Ministry of Education).

- Young Programmers with a focus on diversity (Ministry of Culture).

- Virtual Ideathon for Girls in STEM Chile (Ministry of Transport and Telecommunications, Ministry of Education, MSDF, and IDB).

- More Women in Sciences (Ministry of Women).

- UNESCO SAGA Program (Ministry of Women, Ministry of Education, and MSTKI).

- RED STEM Project for Women in Science, Technology, Engineering, and Mathematics in Local Development (Chile Agenda 2030).

- IBM SkillsBuild Training Program for Women (MSTKI and IBM).

Lastly, there is no online data available for training AI systems in all official languages of the country by the State. However, universities do provide such resources. Likewise, there is no online data available for training AI systems in indigenous languages of the country, although there is currently a project under development led by the Internet Society (ISOC).

PUBLIC ENGAGEMENT AND TRUST

Chile is ranked 36th among 193 countries in the Online Services Index (OSI), scoring 0.8280 (UN E-GK, 2022a). Chile is ranked 43rd among 193 countries in the Electronic Participation Index (EPI), scoring 0.6932 (UN E-GK, 2022b). Chile is ranked 40th among 100 countries in Trust in Government websites and apps according to the Inclusive Internet Index (III), scoring 52% (Economist Impact, 2022).

Figure 4. Chile's OSI 2022 Score

Category	Score
SUB-REGION AVERAGE	0,6531
REGION AVERAGE	0,5585
WORLD AVERAGE	0,5554
SUB-REGION LEADER BRAZIL	0,8964
REGION LEADER USA	0,9304
WORLD LEADER ESTONIA	1,0000
CHILE	0,8280
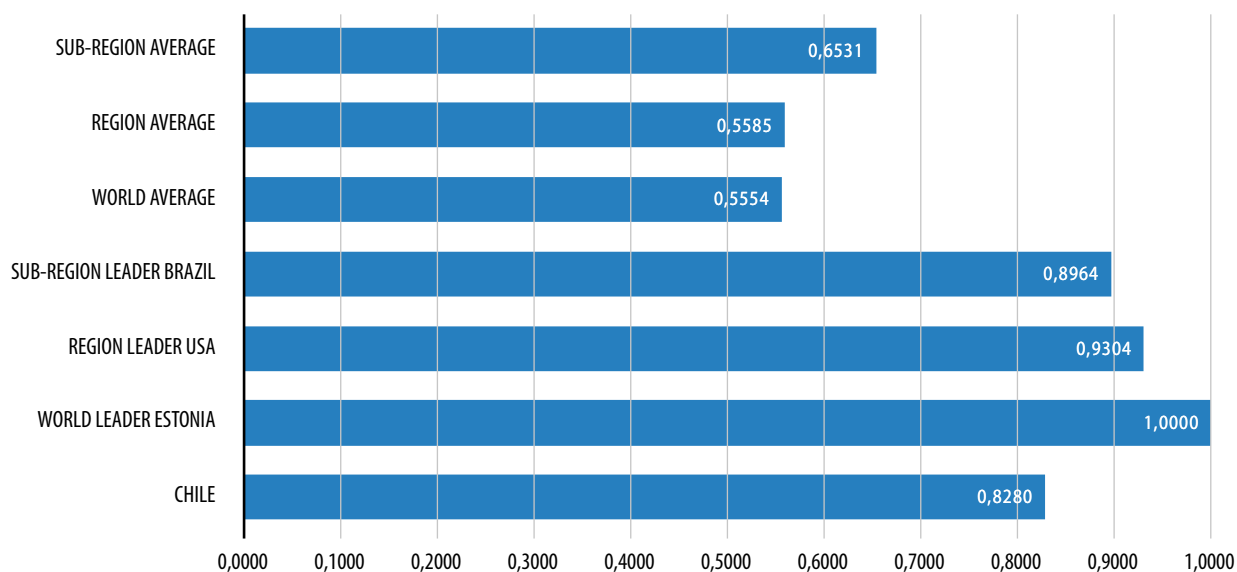
Source: UN E-Government Knowledgebase. Online Service Index (OSI).

Finally, according to the 2022 Ipsos survey, 63% of Chileans believe that "Products and services that use AI have more benefits than drawbacks." Furthermore, 76% claim to have a good understanding of what AI is, 70% believe that AI products and services make life easier, and only 36% feel nervous about AI products (IPSOS, 2022).

ENVIRONMENTAL AND SUSTAINABILITY POLICIES

Currently, Chile does not have a specific policy to address the impact of AI on the environment and sustainability, although the NAIP covers it and is considered within the current updating process. Neither the Sustainable Development Goals (SDGs) nor the environmental, social, and governance (ESG) criteria are explicitly mentioned.

Currently, the specific impact of AI on land and water use is not considered, and it is not obligatory to conduct an environmental impact assessment before using AI. Regarding the environmental impact of AI's energy demand, related carbon footprint, and environmental impacts of uses facilitated by AI technology, these are not taken into account when using AI. However, the NAIP specifically suggests amending Law 19,300, the General Bases for the Environment, to address energy efficiency in systems incorporating AI.

HEALTH AND SOCIAL WELLBEING

The Ministry of Health of Chile has established the Department of Digital Health as part of its Digital Health Strategy, aiming to enhance medical care and health management through the implementation of digital technologies in the country's healthcare systems. The Department of Digital Health is responsible for promoting innovation and developing digital solutions in the healthcare field, as well as establishing regulations to ensure the quality and safety of digital services in the Chilean healthcare sector.

The country's digital health policy has been shaped by a series of initiatives over nearly twenty years:

- In 2006, Chile published the Blue Book outlining a digital health agenda and implemented various policies like the 5D Roadmap, the Network Assistance Information System (SIDRA), Health Responds, among others.

- In 2013, the E-Health 2011-2020 roadmap was established, incorporating new projects addressing specialised architectures, telemedicine, and other innovative projects.

- In 2017, the National Telehealth Plan was released, aiming to create the technical, technological, administrative, organisational, and financial conditions to develop the three components of telehealth in Health Services, thereby contributing to improving access and equity to comprehensive health.

- In 2019, the Department of Digital Health was created and installed, and with the pandemic, regulations for remote care were established.

- In 2021, Technical Guidelines for the development and implementation of remote care and a Remote Care Regulation were introduced. A Telemedicine Standard is currently being developed based on the regulation.

The 2022 National Health Strategy (Ministry of Health, 2022) includes a specific section on Digital Health with the goal of developing a sustainable Digital Healthcare model that contributes to access, timely care and patient information in their territorial and cultural contexts, in an articulated, coordinated manner that complements the existing in-person health care model.

Digital health initiatives have been evaluated on multiple occasions and have been considered successful in terms of coverage and the provision of services through digital tools. Additionally, they have supported health services in maintaining patient care during periods of high demand, such as the COVID-19 pandemic.

Digital health policies encompass various types of automated systems, including AI, to the extent that the nature of the services permits and ensures quality care, patient autonomy, data security, and confidentiality. Both physical and mental health are covered, facilitating remote access to care through platforms and remote assistance channels, implementing telepsychiatry nationwide and protocols for telemedicine application.

Finally, the digital health policy does not explicitly address the impact of AI on children.

CULTURE

Currently, Chile does not have any specific policy regarding the use of AI for the preservation of cultural heritage, although it is included within the objectives of the NAIP. Consequently, there is no assessment of the effectiveness of such a policy, nor are there explicit instances of community participation in this regard.

Likewise, there is currently no policy concerning the use of AI for the preservation of indigenous and minority languages in Chile. Therefore, there is no assessment of the effectiveness of such a policy, nor are there explicit instances of community participation in this matter.

SCIENTIFIC AND EDUCATIONAL

In this section, scientific and educational dimensions will be discussed. Given that the scientific and educational components significantly contribute to the advancement of AI, evaluating them becomes a pertinent method to assess a country's readiness for AI development. The scientific aspect is gauged by the country's performance in research and innovation (R&I), comprising research and development (R&D) expenditure, research output, ethical AI research and AI talent innovation output. Conversely, the educational aspect is assessed through the country's performance in educational aspects such as educational strategy, educational infrastructure, curriculum content, educational attainment and public access to AI education.

RESEARCH AND INNOVATION

Chile had a gross expenditure in research and development (GERD) of 0.34% of its gross domestic product (GDP) in 2020 according to OECD. Further, its GERD in natural science and engineering was approximately 0.35% of GDP in 2015, the most recent data available according to the OECD. Therefore, Chile is among the late OECD countries in this indicator, as shown in figure 5.

Figure 5. Gross domestic expenditure on R&D as a percentage of GDP in OECD countries
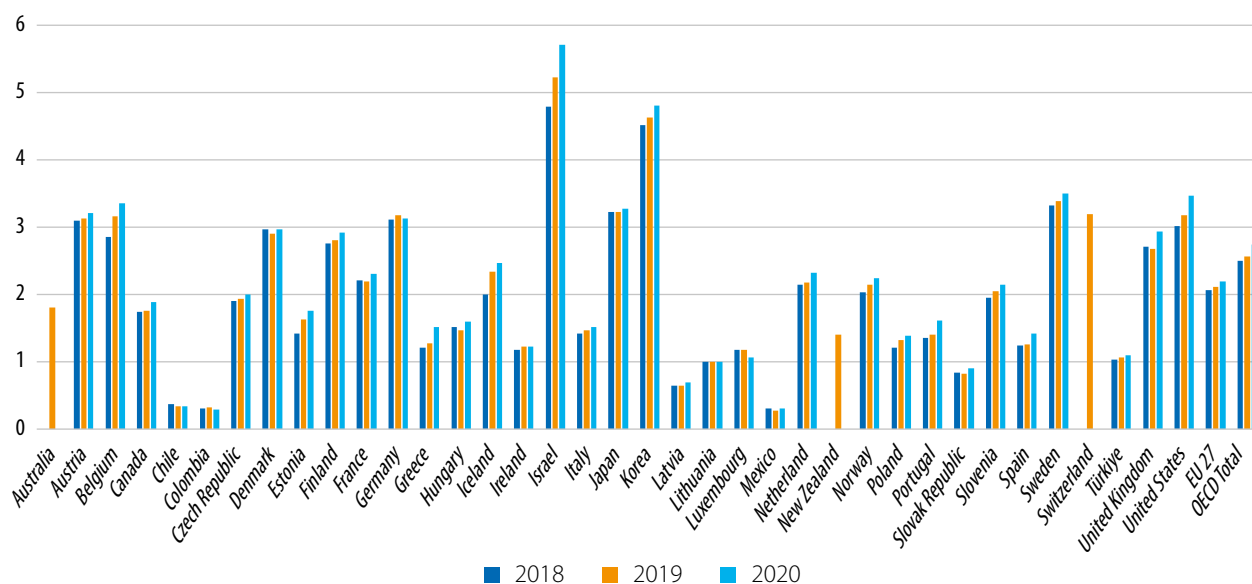
Source: OECD Main Science and Technology Indicators Database, March 2022. http://oe.cd/msti

The Government budget allocations for R&D (GBARD) of Chile totalized USD 1.0185 billion in 2019. Furthermore, although there is no estimate of government funding for research and development in AI in Chile, the State has funded a total of CLP 11.64 billion in AI projects since 1991, of which CLP 3.2 billion correspond to AI research projects since 1995 (MSTKI, 2022). Additionally, the estimated budget for the implementation of the National AI Policy is USD 32 million over a period of 10 years.

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5   In current dollars by purchasing power parity (PPP).

Regarding the number of per capita publications on AI and related topics, the number depends on the source and methodology used, following the OECD or National Centre of Artificial Intelligence of Chile (CENIA by its spelling in Spanish). Although both sources are based on OpenAlex data, the criteria of labelling and type of publications considered can vary. According to OECD data since the year 2000, the total number of publications in AI and related topics would be 18,491, which corresponds to 0.095 per 100 inhabitants for that period (OECD.AI, 2022). The following table shows the annual numbers of AI-related publications based on the data of CENIA (2023) and the OECD:

Table 1. Annual number of publications on AI (Sources: CENIA and OECD)

YEAR	CENIA	OECD
2012	201	757
2013	239	910
2014	265	957
2015	316	1,107
2016	330	1,144
2017	381	1,254
2018	394	1,298
2019	426	1,351
2020	465	1,603
2021	541	1,863
2022	458	1,383
2023	87	-
TOTAL	4.103	13,627
Total per 100 inhabitants, population 2021	0.021	0.07

A third source corresponds to the Emerging Technology Observatory (ETO), where authors are inferred based on the institutions where they publish. Using ETO's methodology and database, the figure would amount to 5,972 publications for Chile, or 0.03 publications per 100 inhabitants (ETO, 2023).

On the other hand, ETO counts 92,730 citations for publications related to AI, resulting in a total of 0.46 per 100 inhabitants in Chile. According to CENIA calculations, the figure would rise to 111,838, equivalent to 0.57 citations of publications related to AI per 100 inhabitants. The citations are distributed by year as shown in the following table:

Table 2. Number of citations for publications related to AI per year

YEAR	CITATIONS
2012	4,017
2013	4,743
2014	5,776
2015	6,493
2016	7,176
2017	8,503
2018	9,382
2019	12,844

YEAR	CITATIONS
2020	14,758
2021	19,393
2022	18,753
2023	3,651

Although there isn't a defined number of AI ethics conferences organised in the country annually, various instances have been organised at an academic level. In August 2023, the University of Chile held the seminar "Artificial Intelligence with Ethics at the Centre: In Search of Solutions through Multidisciplinarity". Topics related to these issues are discussed in events like the Congress Futuro or workshops in partnerships with universities such as the MIT-Chile Human-Centred AI & Visualization Research Workshop.

As for the number of research centres dedicated to AI ethics, Chile has three artificial intelligence centres: CENIA, Milenio Futures of AI, and the Milenio Institute for Engineering and Artificial Intelligence for Health. While none are exclusively focused on the study of AI ethics, CENIA and Milenio Futures of AI have these themes as a central research axis.

The average number of researchers with publications over the last five years is 837, according to data calculated by CENIA based on Open Alex data. This corresponds to 0.004 active researchers per year per 100 inhabitants. There is only one Kaggle Grandmaster in Chile (Matías Thayer [2015-04-09] - Data Scientist - chechir). This means the number of Grandmasters per capita is 0.00000005.

Only six patents were reported as first-time filings in the Chilean patent office according to ETO data. On the other hand, a total of 3,662 commits were recorded in 2022, resulting in a number of commits per capita to AI repositories on GitHub of 0.00018786 for Chile.

EDUCATION

Currently, there is no specific law or policy for the use of AI in the educational system. However, the Ministry of Education and the Undersecretariat of Telecommunications are implementing a Digital Transformation strategy to bridge gaps in access to technological resources, connectivity, and skills development in educational communities. These initiatives address enabling elements for skills development and access to digital technologies, including AI (CIM, 2023).

The Ministry of Education's strategy consists of four elements:

1. Connectivity. The Connectivity for Education initiative provides subsidies to improve quality internet access in high schools and schools across the country. Currently, coverage has been achieved for 9,349 educational establishments, corresponding to 88% of state-subsidised institutions.

2. Educational Digital Infrastructure. This involves a series of initiatives to close the gap in access to technological resources, connectivity, and digital skills development. Some initiatives include TIC Scholarships, which will provide 143,000 computers to 7th-grade students during 2023 ("I Chose my Laptop Program"); Technological Kits distribution, benefiting 864 establishments this year; Connected Classrooms, which has assisted the administrators of 475 establishments this year to achieve an appropriate standard in data network infrastructure conditions in the classrooms.

3. Capacity Development. This consists of teacher training initiatives in the pedagogical use of technological resources and strengthening coordination within establishments to enhance computational capacities. Additionally, a Digital Citizenship programme is being implemented, covering topics such as critical and reflective digital literacy, care and responsibilities in digital environments, digital participation and creativity and innovation with digital tools.

4. Management and Governance of Educational Data. As part of the digital transformation of the state, a data governance policy is being implemented, with protocols for data standardisation and processes within the educational scope.

Some of these initiatives are ongoing and recently implemented, therefore effectiveness has not been evaluated. The only exception is the "I Chose My Laptop" Program, which was evaluated in February 2022 by Chile's Budget Direction (DIPRES). The evaluation found no evidence that providing a laptop to 7th and 11th grade students improved their academic performance, school attendance, non-cognitive traits (ej., responsibility, motivation, perseverance), nor it improved the use of technology for studying. These results are in line of what has been found in other reports done in Latin America (DIPRES, 2022).

Regarding curriculum content, tertiary educational offerings dedicated to AI, machine learning, and data science have experienced significant growth in Chile. Currently, fifteen courses, thirty-nine diploma programmes, ten master's programmes and one doctoral programme in these areas are available, offered by fifteen universities and three technical institutions. Among them, there are four diploma programmes and one course specifically focused on topics of law, ethics and related areas.

In Chile, there are educational programmes that cover both technical and ethical aspects of AI, such as coding, machine learning, statistics, data science, along with information ethics, philosophy of science and technology, privacy, social implications of technology, among others. Relevant courses can be found within Data Science Engineering programmes, notwithstanding potential applications in other areas.

In the case of primary and secondary education, the curriculum content is currently being reviewed to include digital technology content, such as programming and artificial intelligence. Additionally, ethical topics are currently being addressed within the aforementioned Digital Citizenship programme.

Regarding educational attainment, the percentage of STEM programme graduates in higher education was 21.41% in 2020, and 3.41% for Information and Communication Technologies programme graduates in the same period (UNESCO, 2020). There is no data available for the number of graduates in data science, machine learning, or robotics, nor for AI-related doctorates or postdoctoral programmes. On the other hand, Chile is ranked 72nd out of 102 countries in data science in the Coursera Global Skills Report.

Figure 6. Coursera Global Skills. Latin America and the Caribbean Ranking

GLOBAL RANK	RANK CHANGE	COUNTRY NAME	BUSINESS	TECHNOLOGY	DATA SCIENCE
34	↑ 37	Peru	24%	83%	64%
41	↑ 17	Venezuela	28%	64%	76%
54	↑ 27	El Salvador	29%	61%	51%
55	↓ 8	Trinidad and Tobago	88%	21%	28%
57	↑ 8	Costa Rica	54%	34%	48%
63	17	Brazil	16%	73%	34%
69	↑ 18	Ecuador	10%	58%	61%
72	↑ 12	Chile	4%	70%	56%
73	↑ 2	Uruguay	8%	71%	39%
78	↑ 7	Colombia	9%	50%	50%
82	↑ 8	Bolivia	23%	24%	44%
83	↑ 8	Honduras	13%	59%	22%
86	↑ 11	Guyana	59%	27%	7%
87	↓ 8	Argentina	7%	36%	45%
89	↑ 5	Mexico	1%	53%	41%
90	↓ 4	Dominican Republic	15%	11%	40%
91	N/A	Jamaica	56%	14%	2%
95	↓ 3	Guatemala	6%	10%	32%
96	↓ 8	Puerto Rico	27%	4%	14%
97	↓ 4	Panama	2%	9%	18%

Source: Coursera Global Skills Report 2022.

Lastly, Chile offers technical AI courses aimed at the general population. The Youth Programmers programme provides free online courses that offer direct teaching on AI. There are also training and courses on AI offered by the National Training and Employment Service (SENCE, by its name in Spanish) and the Production Promotion Corporation (CORFO, by its name in Spanish). There are also courses on AI ethics for the general population, although these are often offered within university programmes that require payment.

ECONOMIC

In this section, the economic dimension will be discussed. The economic dimension considers relevant aspects within the ecosystem in which AI systems are developed and deployed, such as those related to the labour market, intermediate consumption and investment and production for AI. The dynamism and qualification level of the labour market, along with the level of spending on intermediate consumption and investment and production, are crucial aspects for evaluating the performance and readiness of the specific ecosystems in which AI is deployed.

LABOUR MARKETS

Although there is no specific data on the percentage of job postings that require AI-related skills in Chile, the Relative AI Hiring Index is available, which measures the growth of hiring in AI-related areas. In 2022, Chile shows an index of 1.05, indicating that in December 2022, there was a 5% increase in hiring compared to the reference year (2016). The graph 1 below shows the evolution of this indicator over the last few years for Chile:

Figure 7. **Relative AI Hiring Index Chile**
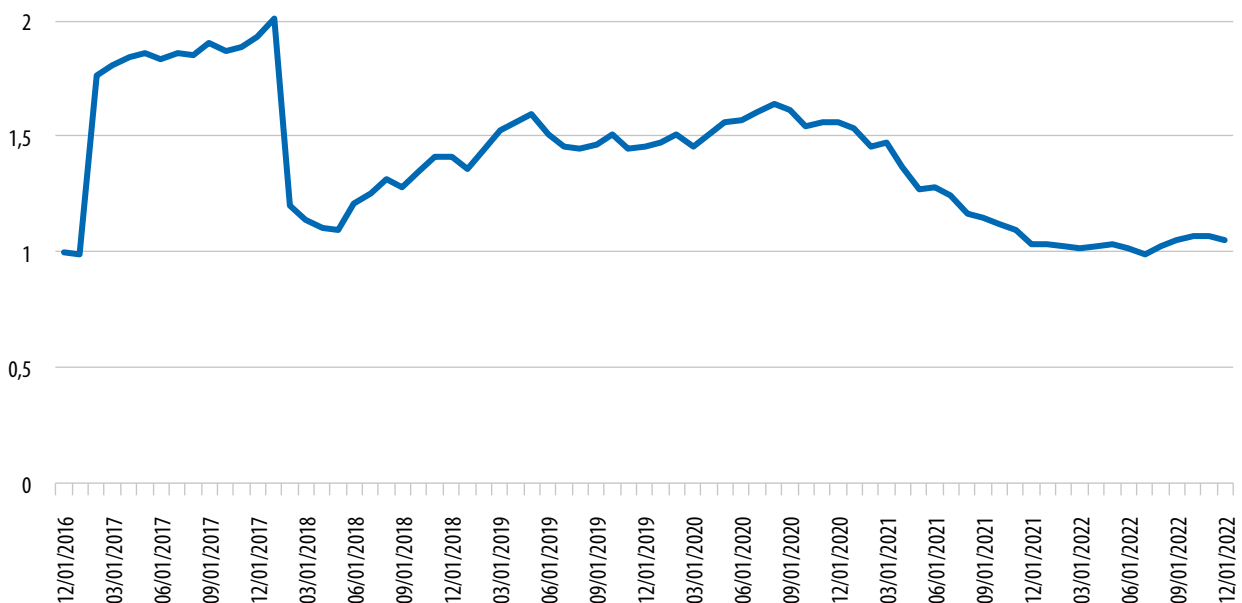
Currently, the percentage of employees working as data science experts is not available. On the other hand, Chile's relative penetration of AI skills is 0.27508 according to LinkedIn data for 2015-2021, while the talent concentration in AI is 0.72% in 2022 according to OECD data (OECD.AI, 2022). Talent concentration varies depending on the industry, being 1.5% in education, 0.22% in manufacturing, 1.67% in professional services, 1.16% in ICT and 0.98% in financial services. In terms of gender, talent concentration in AI is 0.43% for women and 0.93% for men (OECD.AI, 2022).

Figure 8. AI Talent Concentration Chile
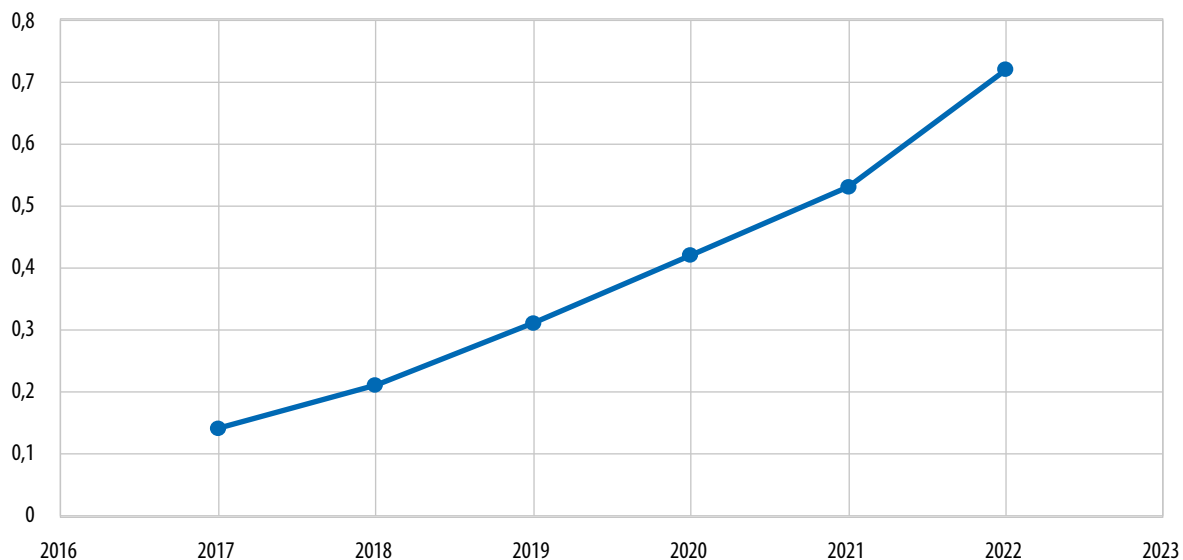
Source: OECD.AI Policy Observatory. Live Data.

Regarding the preparedness of the labour market for the impact of AI on jobs, there is currently a Ministerial Advisory Commission on Labour Prospects to provide guidance in these aspects. The Commission is an advisory body that includes workers, employers, international organisations, academics and various ministries and services. Its mission is to advise the Ministry of Labour and Social Security in the process of designing and implementing a National Labour Prospects Strategy.

The Strategy aims to anticipate the impact of socio-ecological, technological, and demographic factors that will have significant consequences on people's employability and well-being, the productivity and competitiveness of companies, and the country.

On the other hand, the SENCE and ChileValora provide support to workers in the face of automation. In the area of reskilling, certification and training in digital skills are promoted to maintain employability, encourage lifelong learning and generate upward career paths. Similarly, SENCE funds Digital Talent positions for Chile, a public-private initiative that brings together companies, educational institutions, and the government to develop new skills in people according to demands in digital skills.

INTERMEDIATE CONSUMPTION

According to information from the Central Bank, business spending in Chile on computer and information services accounts for 0.13% of the total intermediate consumption. Regarding data on the import and export of telecommunications, computer, and information services, imports were USD 2.689 billion and exports were USD 508 million in 2022 (Banco Central, 2022).

INVESTMENTS AND OUTPUT

According to ETO's data on investment attraction, Chile records USD 589 million of incoming investment published, with an estimated total of USD 666 million for 179 investments. On the other hand, the Communications and Information Services sector represented 2.6% of the GDP in 2022, corresponding to CLP 6.8 billion pesos, which would be CLP 340,770 pesos per capita. Lastly, Chile has a 1.9% share of high-tech exports according to the 2022 Global Innovation Index (WIPO, 2022).

TECHNICAL AND INFRASTRUCTURAL

In this section, infrastructural and technical dimensions will be discussed. The technical and infrastructure dimensions refer to the installed capacity within countries for the development and deployment of AI solutions, whether through their computing power, the availability of data centres, connectivity, and internet access, among others. These elements are relevant enablers for the development of AI systems within a country, as they determine development capabilities based on the infrastructure available and necessary to support processed information.

INFRASTRUCTURE AND CONNECTIVITY

There are 133 mobile device subscriptions per 100 people as of December 2022 according to the Undersecretariat of Telecommunications, and 136 according to the World Bank and ITU data (ITU, 2023). Additionally, there are reported 22.46 fixed broadband subscriptions per 100 inhabitants as of December 2022, and 21,223,256 active mobile subscriptions, representing 107% of the country's population (OECD, 2023b). Chile has an average international bandwidth of 4.3 Mbit/s according to ITU (2022) and the average fixed broadband download speed as of June 2023 according to Speedtest is 229.48 Mbps (Speedtest, 2023).

According to ITU (2023), 88.3% of the population used the internet in 2020. Chile has a coverage of 98% of the population with at least 3G (ITU, 2022). With LTE/WiMAX and 5G, the country has 97% coverage according to the Undersecretariat of Telecommunications' data. Furthermore, 100% of the population in Chile has access to electricity (World Bank, 2021).

Regarding gender gaps in access, Chile has a score of 71.8 for gender gaps in internet access and a score of 68 for mobile phone access (Economist Impact, 2022).

APPLIED STANDARDS

Regarding the country's participation in the standardisation of both technical and ethical aspects of AI and digital technologies, the National Institute of Statistics participates in the SC 40 on Governance and Service Management (ISO, 2023).

COMPUTING CAPABILITIES

Regarding computing capacity, there are 15 data centres in the country (Data Center Map, 2023). Therefore, Chile has 0.8 data centres per million inhabitants. The country that has the highest percentage according to the Global Cloud Ecosystem Index is Luxembourg, with 5.5 data centres per million inhabitants (MIT & Infosys, 2022).

Table 3. Chile's Data Centres

MARKET	DATA CENTERS
Santiago	11
Temuco	1
Los Andes	2
Paine	1
Total Data Centers	**3,15**

Source: Data Center Map. https://www.datacentermap.com/chile/

Chile has established various regulations for cloud-based AI computing within the public sector. In 2018, a presidential directive was issued regarding the use of cloud services, instructing agencies to assess the preferred use of cloud services in formulating their upcoming budget exercises. In May 2022, the Directorate of Public Procurement and Contracting issued the Standard Terms for the acquisition of cloud computing services to facilitate the procurement of these services in the public sector. Currently, the DGD is developing a guide to assist agencies in the use of cloud services; the draft of the guide was open for public consultation, and the final version will be published soon.

STATISTICAL PERFORMANCE

Chile has a score of 82.4 in the Statistical Performance Indicators, placing it in the top 20% (World Bank, 2023). Additionally, the country scores 80 points in data products, which are defined as the availability of data for the 17 UN SDGs, distributed as follows: 19 in the dimension of social statistics, 22 in the dimension of economic statistics, 25 in the dimension of environmental statistics, and 14 in the dimension of institutional statistics. Likewise, the country scores 60 points in data sources and 95 points in data infrastructure (World Bank, 2023).

Figure 9. Chile's Statistical Performance Index (SPI)

DATA USE	Data use by international organizations — 100
DATA SERVICES	Data Releases / Onlin... / Data services — 77
DATA PRODUCTS	Social Statist... / Economic Statist... / Environmental Statist... / Institutio... — 80
DATA SOURCES	Censu... / Surveys... / Administrative Da... / Geo... — 60
DATA INFRASTRUCTURE	Standards and Methods — 95
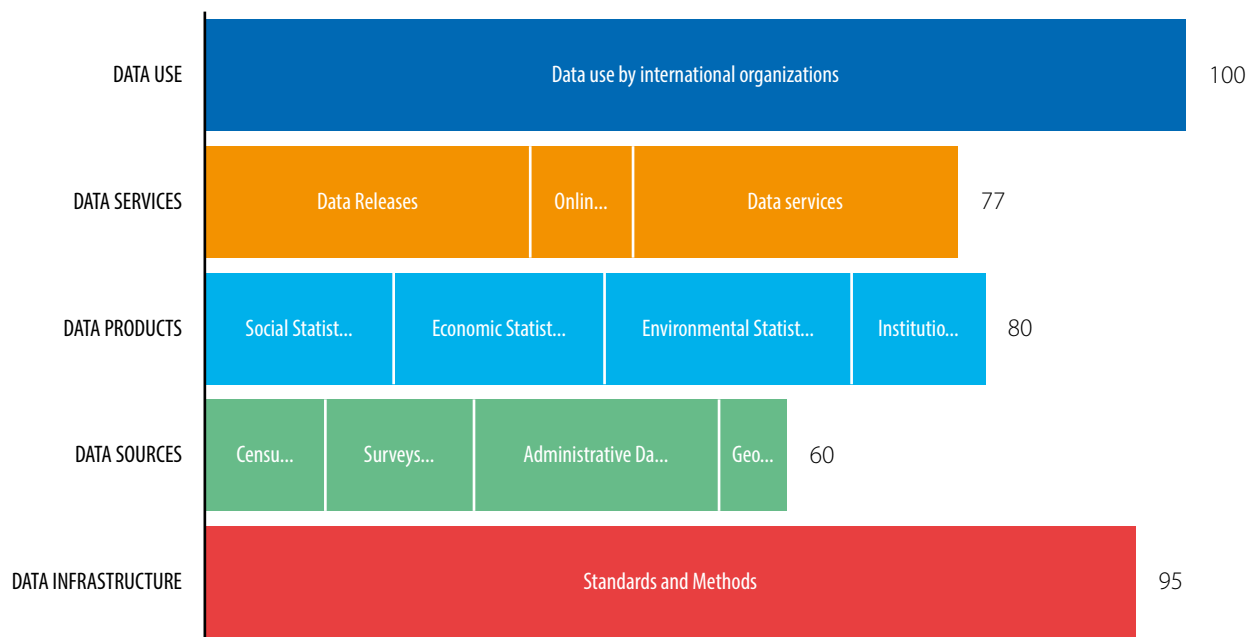
Source: World Bank Group.

For data management in the State Administration, the State Data Management Strategy was published for public consultation in 2023. The consultation closed in June 2023, and the results are being analysed. On June 3rd, the government announced that

they received 35 contributions and 58 votes of support, which they are processing for the next stages. The goal of the Strategy is to establish the foundations for effectively managing government data, generating value for institutions and citizens. To achieve this, the plan is to use DAMA (Data Management) as a reference framework, in an adapted version, to guide public sector entities in implementing data governance.

Regarding data publication, according to the CFT, there is no law that establishes the duties of public agencies and how open data is disclosed. Instead, this is codified through administrative-level policies and norms.

As this is an ongoing initiative, there are no evaluations of its effectiveness at present.

DEVELOPING A NATIONAL AI MULTI-STAKEHOLDER ROADMAP

Chile has an active local AI ecosystem that involves the national government, local governments, academia, private sector companies, civil society, and international organisations.

From the public sector, the MSTKI led the development of the NAIP. The MSTKI articulates its policies in local contexts across the country through the Regional Ministerial Secretariats (SEREMI), whose work is essential for engaging local communities in the formulation and implementation of public policies. Likewise, some Municipalities have initiated their own development of local government AI policies and initiatives for stimulating the development of AI at the local level.

Academia is also a relevant actor within the AI ecosystem, due to the research and development of projects on AI-related topics carried out by universities and research centres. Some examples include CENIA, a research centre aimed at promoting AI development in Chile; the Pontifical Catholic University of Chile, which has developed study programs on AI regulation; the Adolfo Ibáñez University, whose research centre on AI ethics has collaborated with the public sector in the development of ethical algorithms; among other academic actors.

Companies and the private sector also actively contribute to the AI ecosystem, usually through the development of AI solutions and by participating in discussions regarding AI initiatives in the public space. Companies usually gather in associations such as the Chilean Association of Information Technology Enterprises (ACTI), the Association of Chilean Technology Enterprises (ChileTec) and Chambers of Commerce of different countries. The AI ecosystem in Chile also benefits from active participation of international companies (e.g., big tech firms like Microsoft, Google, Amazon, or IBM), major consulting companies (such as EY and Deloitte) and national companies (such as AnastasIA and Zippedi).

Civil society, as well as the general public, show a notable interest in the development of AI in Chile, making them significant participants in the local ecosystem. Some non-government organisations (NGOs) aim to promote the deployment of AI and digital technologies, such as País Digital, while others focus on promoting the protection of rights and the equitable development of AI and digital technologies, such as Datos Protegidos or Derechos Digitales. Regarding the general public, the development of the NAIP involved the participation of 400 people in 69 regional workshops, 1300 people in self-organised workshops, and a total of 6600 people attending online thematic meetings.

Finally, various international organisations have played a significant role in promoting the development of ethical AI systems. A first example is UNESCO's initiative, whose guidelines have allowed for the initiation of the process of updating the ethical dimension within the current NAIP, through the Readiness Assessment Methodology (RAM), to align it with the principles to which Chile adheres. On the other hand, the BID's fAIr LAC initiative has supported projects for the development of ethical algorithms within the public sector. The participation of international organisations has strengthened the local ecosystem through global exchange.

Chile has demonstrated remarkable continuity in its NAIP through two different coalition governments. Some of the commitments made in the policy published in 2021 have been implemented or are in progress during the current administration, despite a change of government in 2022. Some examples of these measures include prioritising scholarships for postgraduate studies in AI abroad, as well as the establishment of a regulatory AI sandbox. The current process of updating the NAIP only involves modifications to the third dimension on ethics and regulation, to align criteria with UNESCO's principles.

This exceptional policy continuity has allowed for the creation of medium and long-term commitments, providing a favourable outlook for the implementation of the NAIP along with any modifications that may arise from the application of UNESCO's principles. Part of this continuity is explained by the active participation of various actors in the local AI ecosystem in the various stages of development, which enables a diagnosis and commitment that transcends political cycles.

DISCUSSIONS ON THE FUTURE OF AI IN CHILE

During the months of June and July 2023, various participatory sessions were held with different actors from the local AI ecosystem, aimed at gathering additional information and generating new actions for the development of AI in Chile.

The MSKTI, in collaboration with UNESCO, established six thematic areas of discussion relevant to the AI agenda for the coming years:

1. The Future of Work and AI.

2. The Future of Democracy and AI.

3. The Future of AI in Government.

4. The Future of Human-AI Interaction in Health, Education, and Security.

5. The Future of Regulation and AI.

6. The Future of the Environment and AI.

The participatory sessions were held in person in six different regions of the country, with more than 200 individuals participating from various sectors such as academia, industry, the public sector, and civil society. Parallel virtual discussion sessions were also conducted, involving more than 100 experts.

The participatory sessions involved backcasting methodology that allowed participants to project various possible scenarios for the development of AI in Chile by the year 2050. The exercise continued with the identification of the necessary actions that must be taken today to achieve positive scenarios and avoid negative ones. Figure X illustrates the exercises conducted in the working groups.

Figure 10. Template for conducting the backcasting methodology
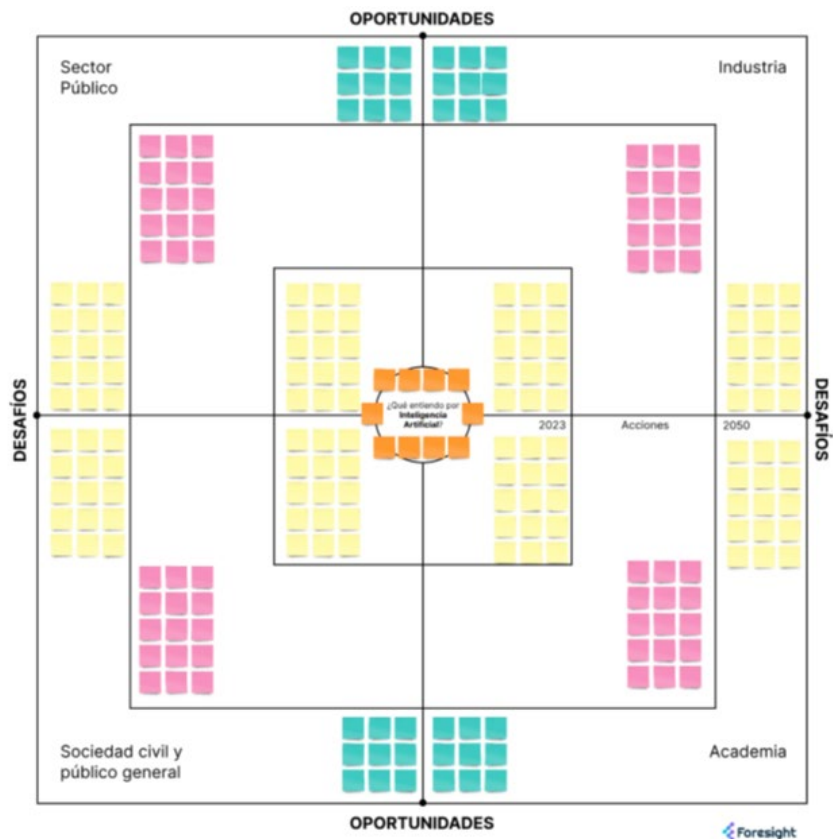
To analyse the gathered information, a mixed method was employed, combining manual qualitative analysis with natural language processing tools. As a result of this analysis, key opportunities and challenges were identified, along with the main conclusions for each of the thematic areas. In the following, we summarise the main results from the regional roundtables in charge of discussing the six thematic areas defined by the MSKTI, in collaboration with UNESCO.

The Future of Work and AI

The thematic discussion on the Future of Work and AI took place in the North Macrozone, in the Antofagasta region, with the physical attendance of thirty-three people and twenty-one people online.

Opportunities

Regarding the future of work, several opportunities were identified:

The potential of AI systems to automate routine tasks, which can lead to increased productivity, free up time for recreational activities, and reshape the nature of human work toward less routine tasks. In high-risk sectors such as mining, AI could replace human labour in hazardous jobs and relocate workers to lower-risk roles for worker health.

An opportunity for business decision-making through AI, optimising resource allocation and reducing environmental impact. Process automation, both in the corporate and governmental realms, could streamline procedures and reduce bureaucracy. However, it was emphasised that excessive reliance on AI algorithms should be avoided to ensure system resilience, as potential failures could result in widespread and high-impact problems.

The opportunity for individuals to acquire new skills and knowledge due to job transformation, enabling them to take on more enriching tasks or start new businesses. In a medium and long-term perspective, the possibility of a universal basic income in the case of high automation that generates increased productivity and government revenues was discussed.

Challenges

The first identified challenge was the possibility that AI may replace people faster than they can transition to new roles, leading to unemployment and impacting the quality of life. This transition poses challenges for companies in terms of transitioning to new tasks and jobs for workers in areas susceptible to automation. Relatedly, issues concerning the relevance of current labour legislation and the role of labour unions was addressed.

Concerns also arose about the transparency and explainability of AI systems in highly sensitive areas such as employment, as well as the protection of workers in the face of possible AI dominance in operations. This is both because of the decisions that AI may make for the selection and recruitment of workers and because errors made by AI in its operation can affect other workers.

Finally, it was emphasised that the automation through AI adoption could exacerbate inequality if appropriate compensation policies are not implemented. The infrastructure required to implement AI systems and tasks could favour larger companies, especially in urban environments compared to rural ones. Without proper policies, this could result in greater economic concentration and reduced competition.

The Future of Democracy and AI

The thematic table on the Future of Democracy and AI was held in the Central Macrozone, in the Valparaíso region, with the participation of thirty-seven people in person.

Opportunities

Firstly, it was acknowledged that the incorporation of AI and the expansion of digital platforms can democratise access to information and education. The existence of multiple options, both free and paid, for training and information, is seen as a positive aspect for strengthening democracy.

Likewise, it was recognized that AI could contribute to the formulation of public policies and regulations, fostering citizen participation and collaboration with experts. The ability of AI systems to process diverse data from various sources could open new channels for public and expert participation in policy definition stages. Examples include tailoring consultations to different audiences and experts interacting with proposal platforms to present them to decision-makers.

Thirdly, AI can support navigating news and information by detecting false or incomplete content. Although AI introduces challenges related to misinformation, it can also become a crucial tool in its combat.

Finally, process automation can streamline bureaucracy and reduce corruption by promoting transparent and less arbitrary processes. Systems could be used to identify patterns and detect potential instances of corruption, enabling more effective intervention.

Challenges

One of the main challenges discussed was the speed at which AI development is advancing, partially rendering current regulations obsolete, as their updates cannot keep pace. This suggests the need to establish flexible and experimental spaces, such as regulatory sandboxes, and to find alternatives to strict regulations. These alternatives must protect both citizens and institutions from misuse of AI tools in areas such as personal data protection, mitigate biases in AI systems, allocate clear responsibilities in AI system development and deploying, and address emerging cybersecurity threats.

Secondly, there was a debate on the harmful effects of AI on misinformation. Algorithms not only impact the dissemination of information in networks and create content bubbles but also generative AI provides new ways of producing false information. This includes the creation of false identities and other methods for committing crimes.

Finally, the possible loss of autonomy in relation to AI systems and surveillance risks were discussed. The importance of regulating the use of AI in sensitive areas, such as security, and widely educating on its functioning to prevent a decrease in individual autonomy was emphasised.

The Future of AI in Government

The thematic table on the Future of AI in the State was held in the Metropolitan Region, in Santiago, with the participation of thirty-eight people in person.

Opportunities

Regarding the role of AI in government affairs, opportunities were identified at various stages of the public process, from data collection to implementation and monitoring.

Firstly, the potential of AI to improve the identification of public challenges and problems with greater precision was highlighted. Participants emphasised how real-time monitoring and access to large volumes of data allow for the establishment of preventive and more responsive systems. AI algorithms, by collecting information from multiple unstructured sources, enrich the evidence base for policy formulation and decision-making.

Secondly, the streamlining of procedures and automation to increase efficiency, transparency, and citizen safety was discussed. In-depth discussions revolved around the use of predictive algorithms for government intervention or preventive monitoring systems, i.e. alerting the risk of regulatory non-compliance or violations of rights, and reducing discretion in the allocation of social benefits to improve resource distribution and reduce corruption.

Thirdly, the possibilities of AI to enrich the information that public officials work with, promoting creativity and in-depth analysis for policy formulation, were explored.

Fourthly, discussions centred on AI's potential to enhance representativeness in citizen consultations. This involves data analysis techniques to generate statistically more representative samples, include minority groups, and enable diverse channels for participation.

Finally, the potential contribution of AI to designing effective public policies in response to challenges such as climate change, an ageing population, or citizen safety was highlighted. A better understanding of reality and connection with citizens could enhance resource prioritisation and the generation of innovative ideas.

Challenges

Discussions on the future of AI in the State identified challenges that could hinder the safe and effective adoption of AI systems, posing risks to citizens and democracy.

Firstly, there was extensive debate about access to and dissemination of information in the context of AI. Concerns were raised about information control and validation, considering that the proliferation of false data has highly damaging effects on democracy. AI can contribute both to detecting false information and generating it, posing ethical and surveillance challenges.

Secondly, ethical questions were raised about the state's use of AI algorithms. The need for transparency and explainability in algorithms was emphasised so that citizens could understand and appeal decisions made. Additionally, the protection of sensitive data and the management of biases in algorithms were addressed.

Thirdly, the complexity of governing AI was discussed, addressing tensions between values such as privacy and transparency. The speed of technological advancement and gradual regulatory updates require flexible regulatory frameworks that address challenges such as assigning responsibilities, making it possible to take timely mitigation actions.

Fourthly, it was observed that state capabilities to implement AI are still insufficient. The lack of infrastructure and competencies in ministries affects the adoption and control of technology. There was a discussion about the need to train officials at different levels, from AI literacy to the management of technological projects.

Additionally, the control of multinational companies over AI systems and their potential impact on the Global South, including Chile, was discussed.

The Future of Human-AI Interaction in Health, Education, and Security

The thematic session on the Future of Human-AI Interaction in Health, Education, and Security was held in the Central South Macrozone, in the Bío Bío region, with the participation of thirty-two individuals in person.

Opportunities

Firstly, there is a valuable opportunity to integrate AI systems into the fields of education and health, complementing the work of teaching and medical professionals. This involves using diverse information to personalise care and teaching. Specifically in the field of health, there is an expectation of advancing towards more predictive medicine and relieving congestion in the public healthcare system. Although concerns persist about the replacement of human roles by algorithms, the potential benefit of AI as a complement is recognized.

Secondly, it was suggested that proper education in AI could lead to the generation of new jobs and entrepreneurial opportunities. The ability to process large and heterogeneous amounts of data is emphasised, which could drive creativity in various areas.

Lastly, the incorporation of AI systems in public management, particularly in the health sector, is highlighted. This could reduce waiting lists and improve operational efficiency. The automation of administrative processes is also considered a way to reduce corruption and increase transparency in government management.

Specific opportunities for security were not addressed during the thematic session.

Challenges

Firstly, the debate on the substitution of humans by algorithms and the redefinition of roles was further deepened. Additionally, there was the fear of not being able to discern whether one is interacting with a human agent or an AI, especially in the field of health, where empathy could be critical in some cases. The need for clear regulations in this regard was raised by attendants. Additionally, the effectiveness of AI in addressing mental health cases was questioned.

Secondly, the lack of available data in sensitive areas such as health, education, and security was emphasised. This lack of data reinforces the importance of regulatory frameworks and financial support that allow for safe experimentation. Although "regulatory sandboxes" are not explicitly mentioned, the creation of controlled spaces with similar characteristics was proposed.

Thirdly, the lack of access to basic infrastructure, especially in rural areas, was addressed. Connectivity and equipment gaps can exacerbate inequality, limiting access to the personalised education and care promised by AI for disadvantaged areas. There was also a discussion about the need to maintain system resilience mechanisms in case of AI system failures.

Fourthly, regarding specific challenges in education, potential risks posed by generative AI and its effects on misinformation were addressed. The importance of promoting critical thinking in the face of the proliferation of fake news and addressing plagiarism and the use of automated systems for student tasks was emphasised. Advocacy was made for widespread AI literacy, covering technical aspects and its potential negative impacts.

Lastly, the concentration of technological developments in the Global North and in a few companies was highlighted, increasing the likelihood of unintended biases emerging. In health and education, the adaptation to local contexts and the consideration of biases in AI systems trained on different populations and cultures were emphasised.

The Future of Regulation and Artificial Intelligence

The thematic session on the Future of Regulation and AI was held in the South Macrozone, in the Araucanía region, with the participation of twenty-eight individuals in person and seven online.

Opportunities

Firstly, there was a discussion about the opportunities that come with involving a greater number of individuals in legislative processes. AI systems can expand channels of participation while enhancing the analysis of these instances. The creation of new platforms that promote active citizen participation, along with new mechanisms to manage this data, was also mentioned.

Additionally, the pressing need to explore regulatory experimentation methods, such as sandboxes or regulatory prototypes, was emphasised. This premise becomes relevant due to the speed at which digital technologies are advancing and the inherent ambiguity of AI. The establishment of these spaces would allow for testing regulations and assessing their impact in the regulated environment, providing greater empirical support to the legislative process.

Thirdly, there was a debate about the use of AI systems for monitoring and compliance assurance purposes. In this sphere, the automation of early assessment processes and the identification of patterns indicative of non-compliance can be achieved through AI systems, thereby streamlining oversight.

Finally, the use of AI systems to streamline regulatory simplification, improve the quality of information used to formulate bills and to ease the assessment of projects complying with current regulations. The implementation of these auxiliary systems has the potential to rationalise bureaucracy, reduce processing times and mitigate errors and discrepancies that may arise in the legislative process.

Challenges

Firstly, the risks arising from the disconnect between the rapid evolution of technology and the gradual pace of regulations were highlighted. This gap not only raises concerns about the potential inability to enact specific laws in a timely manner but also the threat of quickly rendering related regulations obsolete. The difficulties that emerge in defining responsibilities in the event of system failures were emphasised, along with the need to strike a balance between transparency, cybersecurity, and safeguarding privacy.

Secondly, there was a debate about the possibility of misuse of AI systems in the realm of citizen participation in law creation. There is a genuine concern here that these systems could be used to manipulate public opinion or create a fictitious illusion of objectivity and representativeness in legislative processes, distorting instances of democratic participation and deliberation.

Thirdly, the crucial challenge of promoting and strengthening the capacities, education, and understanding of citizens regarding the implications of artificial intelligence was addressed. The urgent need to empower the population with knowledge that allows for informed discernment and evaluation of the ethical, social, and political implications of AI was highlighted.

Lastly, the need to establish robust regulations concerning the security and privacy of information, especially in the context of technologies such as image recognition and other AI applications, was emphasised. The development of regulatory frameworks that effectively address data protection and the prevention of potential abuses, ensuring the confidentiality and integrity of individuals' information in a technological environment, was suggested.

The Future of the Environment and Artificial Intelligence

The thematic panel on the Future of the Environment and AI was held in the Austral Macrozone, in the Magallanes region, with the participation of thirty-five individuals in person and five online.

Opportunities

Firstly, the feasibility of using AI systems to anticipate violations of environmental regulations and prevent serious or irreversible impacts was explored. The predictive capability of these systems could enable proactive monitoring, facilitating the search for mitigation or remediation solutions before the damage materialises, even in cases of forest fires and individual actions harmful to ecosystems.

Secondly, it was proposed to use AI to strengthen state resilience in the face of natural disasters. Early detection would enable better preparation and collaboration with the population, minimising human and material losses associated with these events.

Thirdly, the use of AI to enhance productivity without harming the environment was addressed, optimising processes and reducing the environmental footprint. Advanced data analysis techniques could be used to plan and execute more sustainable projects in sectors such as energy, water, and agriculture.

Challenges

The first identified challenge is the energy consumption of current large AI models. If their environmental impact is not considered, technological advancements could exacerbate the climate emergency rather than resolve it. Although addressing this issue is complex due to the influence of large companies in the Global North, its importance was recognized.

Secondly, concern was raised about the increase in electronic waste due to the rapid advancement of AI, which can accelerate the obsolescence of devices. Additionally, the environmental impact of rare elements used in the manufacturing of essential components for AI system development was discussed.

Conclusions

Based on the discussions held within the thematic panels, several recurring themes and converging opinions regarding the opportunities and challenges identified by actors in Chile's local AI ecosystem can be established. The main conclusions are as follows:

1. There is noticeable optimism regarding the potential of AI to boost productivity in the private sector, catalyse innovation, and streamline government processes. Areas such as healthcare, agriculture, mining, and state management are emerging as key beneficiaries of intelligent AI system implementation, with the potential to improve the overall well-being of the population.

2. The importance of a strong ethical foundation in AI implementation becomes an indispensable condition for the development of these systems. Alongside ensuring privacy and transparency in data collection, it is considered fundamental to incorporate human and social values into the design of algorithms and systems to prevent biases and discrimination.

3. The opportunity for broader citizen participation in the formulation of public policies and the optimization of government services is highlighted. AI not only promises deeper analysis but also the creation of innovative channels for detecting regulatory violations and combating corruption.

4. Education about AI emerges as a priority, ranging from basic literacy to advanced training in human capital. The need to revise curricula to address AI as a sociotechnical system is universal, considering both its technical aspects and ethical and social implications.

5. Regulation becomes a critical challenge due to the rapid pace of technological advancement. Beyond promoting strict regulations, there is a debate on the implementation of experimental schemes such as sandboxes or policy prototypes to enable innovation in controlled and flexible environments while safeguarding the interests of individuals.

6. Concerns about technological sovereignty and control of AI systems are evident. Alongside global cooperation, there is a push for investment in local research and development to avoid excessive dependence on foreign actors and ensure the ability to adapt and personalise technological solutions to national needs.

7. Inequality resulting from a lack of access and connectivity is a concern for many stakeholders, especially in rural areas. Equipment and connectivity shortages could exacerbate existing disparities, leaving individuals and businesses at a disadvantage.

8. The concentration of algorithmic development in a few global companies poses challenges of power and local suitability. The importance of adapting systems to the Chilean reality to avoid biases and failures that harm the population is emphasised.

9. Automation generates both expectations and apprehensions simultaneously. While there is potential for improving efficiency, there is fear of labour and mental health consequences if not carefully planned with supportive policies.

NATIONAL AI STRATEGY: MAIN POLICY RECOMMENDATIONS

Chile has demonstrated remarkable characteristics for the deployment, development, and use of AI. Since the launch of the NAIP in 2021, the country has been building the capacity to create an environment that can support its national strategy. The NAIP defined a governance structure and established an Action Plan with priorities in public policy initiatives. Furthermore, the continuity of the national strategy through different coalition governments allows for the establishment of medium and long-term commitments, providing a favourable outlook for the implementation of the NAIP in the future.

However, there are opportunities for improving Chile's national strategy and to align it with UNESCO's recommendations. Based on the RAM methodology, the participatory sessions held with various stakeholders from the local AI ecosystem (namely governmental authorities, industry, academia, civil society and international organisations) and international experiences, this report formulated twenty recommendations to improve Chile's regulation, institutional framework and capacity building. Ten of those recommendations have been highlighted with high priority based on their impact on several indicators of the RAM (See Table 3).

Table 4. List of ten prioritised recommendations

1. REGULATION

    1.1. Assign urgency to the updating of the current Personal Data Protection Law and the Cybersecurity and Information Critical Infrastructure Bill

    1.2. Create a multi-stakeholder and adaptive governance for AI regulation

    1.3. Explore Regulatory Experimentation Mechanisms (e.g., Sandboxes) for the Application of AI in Critical Areas

    1.4. Promote ethical principles of AI through purchasing regulations and standards

2. INSTITUTIONAL FRAMEWORK

    2.1. Improve data collection and statistics on the use of AI

    2.2. Development of AI Strategies for Local Governments

    2.3. Update Chile's National AI Policy (NAIP)

3. CAPACITY BUILDING

    3.1. Development of Human Capital in AI

    3.2. Attract investments in AI technological infrastructure and promote discussion on its environmental impacts.

    3.3. Assess the impact of AI and automation on the workforce and define job retraining plans

REGULATION

This section includes recommendations based on the gaps identified in the legal section of the RAM, the discussions held with different stakeholders during the participatory sessions, and the legal initiatives currently being discussed in Chile. The recommendations include both legal and regulatory actions for the short and medium term, including the responsible institutions for their implementation.

Assign urgency to the updating of the Personal Data Protection Law and the Cybersecurity and Information Critical Infrastructure Bill

The safeguarding of personal data is regarded as a fundamental element in ensuring the effective adherence to the principles and values outlined in UNESCO's Recommendations. The diagnostic process conducted during the implementation of the RAM raised concerns about the outdated nature of Chile's current legislation concerning the protection of personal data. Furthermore, ensuring a secure digital ecosystem for the development and ethical use of AI requires addressing cybersecurity threats and treating information as a critical infrastructure.

In this regard, two pieces of legislation currently being discussed in parliament should be given urgent priority. The first is the bill that regulates the protection and processing of personal data and creates the Personal Data Protection Agency (bulletins 11144-07 and 11092-07, currently in its third constitutional process). Chile has signed international commitments to update this law, which is vital for ensuring an adequate protection of people's rights against potential risks in digital environments. The second legislation is the Framework Law on Cybersecurity and Critical Information Infrastructure (bulletin 14847-06, in the second constitutional process), which creates the National Cybersecurity Agency with regulatory, supervisory and sanctioning powers for state agencies and private institutions. This piece of legislation is necessary for the deployment of tools and AI systems digital environments.

This report recommends that both projects be given maximum urgency since they constitute the necessary legal foundation to build adequate governance for AI.

Responsible Institutions: MSTKI, SEGPRES.

Timeframe: 2023 – 2024.

Create a multi-stakeholder and adaptive governance for AI regulation

The report recommends the creation of a specialised body, which has the explicit mandate to monitor and implement public AI policies; monitor the use of AI systems in accordance with current legislation; propose regulatory improvements, in addition to proposing and executing evaluation mechanisms.

In line with UNESCO's Recommendations, this specialised body should strive to include participatory initiatives involving citizens in the formulation of AI policies. The objective is to craft a regulation that garners broad consensus among various stakeholders, including different branches of government, industry, academia, and civil society.

Several pertinent aspects to consider when drafting AI regulations include the multiple definitions of AI systems and the various risk levels associated with its development. It is also essential to evaluate the adoption of fundamental principles that ensure the safe and ethical use of AI. These principles should cover issues such as proportionality and harm, safety and security, fairness and non-discrimination, human oversight and decision-making, transparency and explainability, as well as accountability and responsibility.

Guiding elements for the formulation of such legal framework for AI development should encompass:

1. Transparency and Explainability: The stipulation that AI systems must be transparent and capable of providing explanations for their decisions and operations, especially when they impact the rights and freedoms of individuals.

2. Ethical and Legal Impact Assessment: The potential for conducting ethical and legal impact assessments before implementing AI systems, particularly in critical domains like healthcare and justice.

3. Oversight and Accountability: The establishment of clear oversight and accountability mechanisms for AI systems, along with legal responsibilities in cases of harm or bias.

4. Prohibition of Unacceptable Uses: The prohibition of AI use in certain contexts considered unacceptable, such as mass surveillance without proper consent.

5. Equity and Non-Discrimination: Measures to promote and ensure equity and non-discrimination.

6. Technical and Ethical Standards: Standards that companies and organisations must adhere to when developing and using AI systems.

7. Creation of an independent body responsible for issuing guidelines and best practices, monitoring and auditing assessments and ensuring overall compliance with the law.

In the context of establishing this organisation, it is advisable to initiate discussions with both the legislative branch and the public regarding the importance and specifics of a particular AI bill. To inform these discussions, a comprehensive study should be conducted to examine how AI regulation is evolving in the European Union, the United States, China and other countries that have made significant progress in this area. This analysis should pay particular attention to how these countries are implementing the principles outlined in the UNESCO Recommendation. It is worth noting that global practices vary, with some countries employing specialised agencies, ministries, public-private partnerships, and other approaches. Therefore, we must carefully consider the most suitable approach for Chile's specific circumstances.

Responsible Institutions: MSTKI

Timeframe: 2023 – 2024

Explore Regulatory Experimentation Mechanisms (e.g., Sandboxes) for the Application of AI in Critical Areas

Regulation can arrive late in rapidly developing technological fields, such as AI, and can increase the costs of innovation if it is overregulated. Therefore, It is recommended to promote regulatory experimentation initiatives which allow for the creation of controlled and secure environments in which companies and organisations can test and refine AI solutions with a certain degree of regulatory certainty. Among the different possibilities for regulatory experimentation, the sandbox has garnered more experience in the Latin American context, as years of experience have been accumulated in Colombia (see Table 1), and a process is currently underway in Chile.

Sandboxes are controlled and safe spaces where companies and organisations can test and refine AI-based solutions under flexible and collaborative regulatory oversight. Sandboxes offer regulator-regulated interactions in which potential regulations can be tested and their effect studied in order to assess their effectiveness.

In 2021, the Ministry of Economy, Development and Tourism carried out a process of discussion and prioritisation of sectors for the establishment of AI Sandboxes. Based on this experience, it is recommended to advance in the creation of prospective regulatory sandboxes aimed at encouraging the development of AI technologies in critical areas such as logistics, health, environmental care, and creative industries. For such application areas, it is recommended to review comparative experience in the region such as that of Colombia and collaborate with international organisations as is currently being done with CAF.

Responsible Institution: MSTKI

Timeframe: 2024

Table 5. Example cases of Sandboxes

The OECD (2023c) defines regulatory sandboxes as a specific regulatory experimentation tool in which flexibility or waivers are set in place for firms to test new systems with reduced requirements. Sandboxes include mechanisms to protect users and, since they closely connect firms and officials from governing bodies, can also inform policy development. Some characteristics of sandboxes are their temporary nature, trial-and-error approach and collaboration between multiple stakeholders. However, there is no one specific definition nor shape that sandboxes take since they are very context-dependent. Some examples of sandboxes that can inform and inspire the Chilean case are:

- Brazil: Recently, the Brazilian National Data Protection Authority opened a call for proposals to create a regulatory sandbox to increase algorithmic transparency, foster AI responsible innovation and inform AI regulation (ANPD, 2023).

- Colombia: The government created a supervised space where firms can develop AI tools that are privacy preserving. The sandbox provides a collaborative environment which facilitates testing tools to achieve privacy standards (SIC, 2021).

- Korea: A group of four ministries related to economy, science and technology created a sandbox that can provide regulatory waivers to test products, services and business models. While tests are conducted, the data informs government regulation. Since 2019, the sandboxes expanded into special regulation-free zones for some specific sectors and applications (Fintech Center Korea, 2023).

Promote ethical principles of AI through purchasing regulations and standards

The RAM, in its assessment, highlighted the importance of creating administrative guidelines for procuring data science and AI projects within the public sector as a best practice. Leveraging procurement regulations can be a highly efficient way to integrate key elements of the UNESCO Recommendation in a dynamic manner.

With the imminent publication of the bill that enhances the authority of the Public Procurement and Contracting Directorate through the modernization of Law No. 19,886, it is advisable to include ethical principles within the procurement guidelines for AI systems issued by this Directorate. These guidelines should explicitly incorporate the principles and values articulated in UNESCO's Recommendations.

Furthermore, it's recommended to conduct an analysis to consider the integration of cybersecurity standards into public procurements. This integration should align with indicators from sources like the Global Cybersecurity Index of the International Telecommunication Union, the report on cybersecurity for Latin America and the Caribbean, or other standards determined by the Inter Ministerial Committee on Cybersecurity.

A critical component for implementing this recommendation is the establishment of suitable standards and certifications that can be referenced in purchase contracts. In this regard, it is suggested that the National Institute for Standardization should formally request full membership in the ISO JTC1 group across all AI-related areas, as it currently holds observer status. This step is essential to ensure that the standards adopted take into account the specific needs of Latin American countries rather than being influenced solely by practices from the Global North.

To ensure the effectiveness of this initiative, it is advisable to set up explicit mechanisms for early evaluation during the application process. Additionally, it's recommended to document the lessons learned throughout the development of this initiative and to ensure proper oversight of its implementation by the relevant agencies responsible for deploying AI systems.

Responsible Institutions: MSTKI, ChileCompras.

Timeframe: 2024.

Utilise soft regulations and guidelines for the adoption of ethical principles in AI systems

Since changing existing laws often require lengthy discussions, it is recommended to explore the use of soft-regulations such as the use of rules and directives that can guide the public and private sector in the use of ethical principles in AI systems. Such principles include: proportionality, safety and protection, equity and non-discrimination, human oversight and decision-making, transparency and explainability, as well as accountability and responsibility.

Drawing from successful national precedents, it is suggested to contemplate the use of instruments such as presidential guidelines to steer the adoption of ethical principles in the deployment of AI systems within government agencies. The establishment of these guidelines within the public sector could serve as a valuable model for applying these principles across various domains. To promote the sharing of knowledge and the dissemination of lessons learned during its implementation, it is recommended to systematically document and publicise both the process and the outcomes of this experience.

Responsible Institutions: MSTKI, SEGPRES, Presidency.

Timeframe: First semester of 2024.

INSTITUTIONAL FRAMEWORK

In this section, we present institutional recommendations that are derived from the insights gained during the RAM application, discussions with various stakeholders in the Chilean AI ecosystem, and the existing AI policy and action plan in Chile. Furthermore, this section outlines approaches for keeping these recommendations up to date, monitoring progress, evaluating their impact, and fostering international collaboration in AI system development.

For each of these recommendations, we have specified the responsible party who will lead the respective policy initiative, and we've proposed a timeframe for its implementation.

Improve data collection and statistics on the use of AI

Significant progress has been made in collecting and making data available on various aspects relevant to AI through initiatives like the Latin American AI Index developed by CENIA and the Observa program from the Ministry of Science, Technology, Knowledge, and Innovation. However, the implementation of RAM has underscored the need for enhancements in Chile's statistical capabilities, data accessibility, and the utilisation of government data. In light of these challenges, the following recommendations are proposed to improve Chile's data collection capacity and statistics generation related to AI:

a. Enhance AI-related Data Collection: Consider gathering statistics that focus on the usage of AI within the private sector and the employment of individuals possessing AI-related skills. To achieve this, it is suggested to review Chile's national ICT Survey to ensure its suitability for measuring AI adoption within businesses. Collaborate with the Labor Observatory to collect data on labour market demand associated with AI.

b. Establish Clear Data Dissemination Regulations: Advance clear regulations that establish specific obligations for state agencies concerning the dissemination of open data, including via mechanisms such as open repositories and data trusts, to support the safe, fair, legal and ethical sharing of data. Additionally, it is recommended to create early assessment mechanisms to monitor the effectiveness of implemented measures and the degree of compliance with the proposed objectives.

c. Promote Gender Diversity Data Publication: Particularly in the context of diversity, there is a recommendation to make progress in publishing detailed data on gender diversity within STEM organisations, aiming to obtain information from both companies and universities. Although the Ministry of Science, Technology, Knowledge, and Innovation has made significant advancements in the scientific and academic spheres, challenges persist in incorporating businesses into these measurements. Encouraging the publication of such statistics can facilitate data-driven diversity policies.

d. Develop an Official Government AI Platform: To strengthen data access and awareness within the national AI ecosystem, it is proposed to establish an official government public platform for AI. This platform should provide a broad range of content, including visual representations of the Policy and the progress of its Action Plan, information about international agreements to which Chile is a signatory, such as UNESCO's Recommendations, best practice manuals, relevant regulations, and educational resources, among others. Additionally, it should feature pertinent statistics related to the AI landscape,

success stories, and examples of responsible AI applications. This platform should incorporate mechanisms for contact, participation, and citizen engagement, facilitating an ongoing relationship between institutional bodies and the broader local AI community.

Responsible Institutions: MSTKI, DGD and the Government Laboratory.

Timeframe: 2024 - 2025

Development of AI Strategies for Local Governments

AI strategies primarily focus on national-level developments, presenting significant challenges at the local government level. Conversely, developing AI systems with an emphasis on local communities provides an opportunity to extend AI beyond major cities.

It is recommended to formulate AI strategies at the municipal level, following the lead of cities such as Barcelona or Helsinki. To achieve this, given the heterogeneous nature of municipalities, they should commence by evaluating their preparedness to establish a baseline for reference.

Considering that this measure remains relatively novel due to limited comparative experience, it is advisable to collaborate with international organisations to facilitate research and pilot development funding in rural local governments.

Responsible Institutions: MSTKI and Undersecretariat of Administrative and Regional Development (SUBDERE, by its name in Spanish).

Timeframe: 2024-2026.

Update Chile's National AI Policy (NAIP) and Action Plan

Although AI governance and institutional structures are robust, NAIP does not explicitly incorporate UNESCO's Recommendation principles. Therefore, it is recommended to revise the current NAIP to include these principles and any new initiatives arising from this integration. These updating initiatives and recommendations should be formulated based on the findings during the implementation of the RAM and the respective participation sessions conducted within the same context.

In particular, the Axis 3 of the NAIP, which deals with Ethics, Regulatory Aspects and Socioeconomic Impacts of AI, should be revised. Furthermore, it's suggested to introduce a new section dedicated to institutional arrangements, monitoring, and evaluation to oversee the various initiatives within the NAIP and its Action Plan.

The ideal occasion to present this proposal is during the Summit of Representatives scheduled for October 2023 in Chile. Updating the NAIP to address new challenges, drawing from the diagnostic work carried out by the RAM, discussion sessions, and UNESCO's Recommendations for AI Ethics, signifies a commitment to evolving the NAIP into a comprehensive national policy.

Updating the NAIP by taking into account new challenges, the diagnostic conducted by the RAM, discussion sessions and UNESCO's Recommendations for AI Ethics provides a signal of continuity in transforming the NAIP into a state policy.

Responsible Institution: MSTKI.

Timeframe: 2023-2024

Modification of the NAIP's Action Plan

Based on the information generated during the implementation of the RAM and the updating of the NAIP, it is recommended to conduct a review of the current status of the Action Plan of Chile's NAIP. Following this review, an assessment of the implementation status is suggested and new priorities should be established in accordance with the agendas of the responsible organisations for each of these actions.

To ensure greater coherence, it is advisable for the modifications made to the Action Plan to align with the updates to the NAIP and UNESCO's Recommendations. This new Action Plan for 2024-2026 could encompass initiatives to be executed during the current government administration, and provide guidelines for the subsequent one.

Additionally, it is recommended to consider institutional mechanisms that ensure the execution and continuity of the initiatives outlined in the new Action Plan, such as issuing decrees or allocating budgetary resources within the national budget.

Responsible Institution: MSTKI.

Timeframe: Last quarter of 2023 and first semester of 2024.

Update the institutional framework and governance of the NAIP

It is recommended to propose a new institutional formula within the national policy with the explicit mandate to implement the NAIP, oversee its degree of implementation and define evaluation mechanisms.

The international experience showcases various models, including specialised agencies, ministries and public-private consortia, among others. Considering the current Chilean institutional framework, strengthening the existing governance led by MSTKI and formalising the Inter Ministerial Committee with greater faculties than sporadic consultations is suggested.

Additionally, studying the formation of a permanent multi-stakeholder body for the development of recommendations on the ethical use of AI is recommended. This body could consist of actors from the public sector, industry, academia and civil society with an advisory role and the dissemination of best practices. Furthermore, this body can support the promotion and dissemination of public processes that require greater citizen participation.

Responsible Institution: MSTKI.

Timeframe: Last quarter of 2023 and 2024.

Create early assessment mechanisms for the implementation of the NAIP

Despite Chile having a wide range of ongoing programs for AI development, it still lacks tracking mechanisms to assess the effectiveness of these measures. Based on the findings from the application of the RAM, it is recommended to establish indicators and mechanisms for monitoring and evaluating the Action Plan and the NAIP.

Considering the existing instruments in the country, the use of instances such as the Management Improvement Programme (PMG, by its name in Spanish) is recommended to report the fulfilment of committed actions within the public sector. Additionally, collaboration with multilateral organisations to fund the piloting of evaluation and measurement tools for compliance with these initiatives is recommended.

It is suggested to include a compliance report for the new Action Plan in 2025 within these early assessment mechanisms, evaluating the level of implementation and updating measures in case they become obsolete.

Responsible Institutions: MSTKI and Ministry of Finance.

Timeframe: 2024 and 2025.

CAPACITY BUILDING

This section includes recommendations regarding capacity building and training, strongly based on aiming to bridge the gaps found in the RAM application and discussions held by different stakeholders in the Chilean AI ecosystem. Additionally, this section is aligned with the advance of the current Action Plan and the initiatives informed by different national institutions. For each recommendation, the responsible party for leading the specific policy has been identified, along with a proposed timeframe.

Development of Human Capital in AI

Based on the findings from RAM, Chile has ongoing initiatives aimed at enhancing digital skills and incorporating digital technology, including programming and AI, into secondary and higher education. To improve the development of human capital in this field, the following recommendations are proposed:

a. Revise School Curriculum to Incorporate AI and Ethics: Identify the lack of updates to the school curriculum to include elements of computational thinking, critical thinking, programming, artificial intelligence, and ethics from an early age as a significant challenge. We recommend initiating a comprehensive review process that not only identifies the curriculum components requiring modification and incorporation but also develops a plan for updating and providing teacher training to accommodate these changes.

b. Support Teacher Training in AI Use: In alignment with the above, maintain the work initiated by the Ministry of Education in the development of support guides for teachers in the use of AI and related tools. This ongoing support will be crucial in enhancing educators' capabilities to integrate AI and related subjects into the school curriculum.

c. Review and Enhance Funding Mechanisms: It is recommended to continually monitor and evaluate the current mechanisms for funding and incentivizing human capital development. Consider reassessing compensation structures for funding instruments that support advanced human capital development. This revision should aim to facilitate international collaboration networks and prevent experts from returning without suitable academic or industry positions.

d. Promote Integration of Ph.D. Holders into the Industry: Design, pilot, and implement measures to encourage the integration of Ph.D. holders into the industry, with a particular focus on information technologies, including AI. This may involve initiatives such as tax incentives for companies hiring Ph.D. holders, establishing collaborative Ph.D. programs with industry partners, and offering funding for research internships in the industry, among other strategies.

e. Allocate Resources for Industry-University Collaboration: Allocate industry-university collaboration funds to support the digital transformation of industries through the application of AI. Prioritise industries with the most significant gaps in digitalization or those where AI implementation promises the highest productivity gains.

f. Attract international conferences on AI: One of the gaps identified during the application of RAM is the absence of relevant international conferences on AI or AI ethics in the national territory. Therefore, it is recommended to provide funding to attract and organise high-level conferences on AI and its ethics in the country.

g. Evaluate the Digital Transformation Strategy in Education: Monitor and assess the outcomes of the current Digital Transformation strategy in education to gauge its effectiveness and relevance in building human capital for AI. Based on these evaluations and lessons learned, consider the establishment of specific laws or policies related to the use of AI in the education system.

h. Collect and Maintain Data for Human Capital Development: Collaborate with higher education institutions to collect and maintain up-to-date data on human capital development in AI. This data should encompass metrics like enrollment and graduation rates, with a particular focus on identifying and addressing gender disparities. These statistics can be gathered and shared for research purposes through existing educational institutions, such as the Undersecretariat of Higher Education.

Responsible Institution: MSTKI, Ministry of Education and MEDT.

Timeframe: 2024-2026.

Attract investments in AI technological infrastructure and promote discussion on its environmental impacts.

Chile has made significant strides in developing its technological infrastructure, establishing itself as a regional leader in terms of connectivity and broadband access. However, disparities persist between urban and rural areas. To address this, it is recommended that Chile continues to prioritise the implementation of the Zero Digital Gap Plan 2022-2025. This plan aims to narrow the divide between rural and urban areas by enhancing the last mile connectivity, deploying advanced mobile network technologies like 5G, while phasing out older and slower technologies like 2G. The plan also emphasises regulations to ensure speed and accessibility for all citizens. This report suggests the creation of evaluation mechanisms to assess the plan's progress in 2024 and 2025.

In light of UNESCO's Recommendations, there is growing awareness of the potential environmental impact of training and monitoring AI systems, particularly in terms of energy and water consumption. This environmental impact presents an opportunity for Chile to attract investment in AI technological infrastructure, capitalising on its robust institutional framework and its clean energy matrix. This, in turn, can contribute to reducing the carbon footprint of the global AI industry. To leverage this opportunity, it is recommended that Chile develops a specific plan to streamline regulations and simplify the procedures for obtaining the necessary permits to establish critical AI infrastructure, such as data centres.

Further, Chile has opportunities to enhance the use of AI for environmental protection and climate change mitigation. This report recommends establishing a working group to investigate the environmental impact of AI in Chile. This group should generate a report with recommendations for the public and private sectors regarding the efficient and environmentally responsible use of AI systems, as well as how AI can help in Chile's environmental protection activities. Some options to explore in the report include:

Designing and implementing a Regulatory Sandbox to pilot measures for protecting, mitigating, and remediating the implementation of high-energy-consuming AI models.

Establishing research funds focused on the environmental impact of large AI models, poorly optimised AI models and potential mitigation and remediation methods.

Responsible Institutions: Ministry of Environment, MSTKI, and MEDT.

Timeframe: 2024 and 2025

Assess the impact of AI and automation on the workforce and define job retraining plans

The Ministry of Labour and Social Welfare has initiated a forward-looking process and established a multi-stakeholder working group to address the future of work. To ensure a smooth transition for workers whose roles are impacted by the introduction of AI tools, it is recommended to expedite and enhance these efforts. Specific measures should be devised in the short term to support affected workers, which may include updates to regulations, considering changes in the working relationship between employees and employers, as well as the allocation of funds to assist individuals in their transition and retraining.

Simultaneously, alongside the forward-looking discussions, it is advisable to foster a multi-stakeholder dialogue and establish a national cross-sector agreement on the responsible and ethical use of AI. This agreement should outline principles and commitments from all involved parties, signifying a significant milestone where industry, academia, the public sector, and civil society come together to endorse these principles. Subsequently, guidelines for ethical algorithm use within businesses should be developed, with incentives created to encourage companies to adopt or develop these guidelines as part of their ethical codes.

Furthermore, in the context of training and certification, it is essential to broaden the public offerings of AI training. This expansion should encompass modules addressing the ethical and responsible use of AI. Additionally, qualifications frameworks should be reinforced by integrating AI-related topics into the Information Technologies training and employment route.

Responsible Institutions: Ministry of Labour, MEDT.

Timeframe: 2024-2025

Promotion of Diversity, Inclusion and Gender Equality in STEM

Building upon the National Gender Equality Policy in STEM, it is recommended to develop a specific 2024-2026 action plan aimed at reducing existing disparities in the field of information and communication technologies.

Creating a working group to address the diversity of AI personnel in both public and private organisations, for the development of regulatory recommendations and best practices, is advisable. Additionally, addressing aspects such as the disclosure of diversity data by technology companies and/or entities implementing AI systems, as well as assessing the presence or absence of affirmative action standards and their relevance, is recommended.

Given the limited availability of gender-related data in AI, it is suggested to establish a statistical observatory for gender diversity in STEM. This observatory would allow companies and universities to publish their statistics, thereby advancing diversity policies grounded in data. The observatory should be designed with visualisation tools for the public and adhere to the highest open data standards to ensure its accessibility by all stakeholders.

Responsible Institutions: MSTKI, Ministry of Women and Gender Equity, Ministry of Labour, MEDT.

Timeframe: Second semester of 2024.

Training for Local Government Officials on the Ethical Use of AI and development of Certifications for AI Use in Government

The implementation of RAM reveals substantial knowledge gaps regarding technology and its governance in the public sector. Hence, it is recommended to create an ethical AI training program explicitly designed for local government officials, who exhibit a greater knowledge gap compared to their central government counterparts.

This initiative can incorporate elements from programs like "Elements of AI" but should delve into the specificities of the Chilean municipal context, with a significant emphasis on the challenges and opportunities in rural areas.

Further, building on initiatives like the study on harmful biases commissioned by the MEDT through APEC and the work on Ethical Algorithms supported by the IADB, it is recommended to create best practice guides and certification systems for the use of AI in government. These guides should cover, at a minimum, best practices related to topics such as citizen participation processes, benefit allocation, alert systems and process automation. Additionally, it is advisable to explore the establishment of a certification system for AI solution providers serving the public sector.

Responsible Institutions: SUBDERE, DGD, Government Laboratory.

Timeframe: 2025-2026.

Creation of a Working Group to Assess the Impact of AI on Culture

The application of RAM in Chile has highlighted a noticeable absence of the use and measurement of AI in this field. It is recommended to establish a working group that will produce a report on the potential impact of AI, especially in the context of generative AI, on culture and the creative industries.

Based on the content of this report, proposals for actions are expected to be developed for the training and retraining of stakeholders in the cultural ecosystem, as well as for fostering new developments using technological tools. It is suggested to discuss methods of regulatory experimentation in the field of culture, addressing the challenge of new intellectual property regimes that align with international agreements in this area.

Considering the lack of data in this area during the implementation of RAM, it is recommended to study the opportunities and impacts of AI systems on the preservation of the country's cultural heritage and to develop a roadmap to leverage the potential of AI and establish recommendations to protect it from potential harm.

Additionally, it is recommended to promote the development of open databases for training models in Chilean Spanish and in the dialects of indigenous peoples of the national territory, with the corresponding funding.

Responsible Institutions: Ministry of Culture, MSTKI, MEDT.

Timeframe: 2024 – 2025.

Study the perception and trust in the use of AI in the public and private sectors

Based on the findings during the implementation of the RAM, it is recommended to commission a study on the perception and trust in AI in both the public and private sectors. This study would provide essential statistical data as a foundation for developing suitable awareness policies. This study can be integrated into a more comprehensive examination of public perceptions of digital services, particularly those offered by the government.

Responsible Institutions: SEGEGOB and MSTKI.

Timeframe: 2024

Enhance the Country's AI Patent Ecosystem

Based on the gaps identified during the implementation of RAM, it is suggested to establish a working group to study incentives for patenting within Chile's AI ecosystem. This group should conduct a diagnosis to determine the reasons behind the notably low level of patenting observed in Chile.

Additionally, it is recommended to discuss open development and its role in the Chilean ecosystem within this group. Addressing topics that generate recommendations with measures to incentivise patenting, open-source software development or other relevant intellectual and industrial property mechanisms for boosting the Chilean digital ecosystem is advised.

Responsible Institution: MEDT.

Timeframe: 2024.

Enhancing Participation in International Standardisation Processes

The results of the RAM confirm Chile's limited involvement in international standardisation processes related to AI through ISO.

It is recommended to actively pursue participation in ISO's JTC1 technical and ethical AI committees, moving beyond observer status.

Responsible Institution: National Institute of Standardization.

Timeframe: 2024.

Table 5 summarizes the list of twenty recommendations stemming from this report, including a proposed timeframe to implement in accordance to their priority in advancing UNESCO's recommendations for implement AI ethically and responsibly for all Chilean citizens.

Table 6. List of recommendations based on RAM, participatory sessions and international experience

DIMENSION	NO.	RECOMMENDATION	TIMEFRAME	PRIORITY
Regulation	1	Updating Personal Data Protection Law and Cybersecurity and Information Critical Infrastructure Bill	2023 - 2024	High
	2	Create a multi-stakeholder and adaptive governance for AI regulation	2023 - 2024	High
	3	Explore Regulatory Experimentation Mechanisms (e.g., Sandboxes) in Critical Areas	2024	High
	4	Promote ethical principles of AI through purchasing regulations and standards	2024	Medium
	5	Utilise soft regulations and guidelines for the adoption of ethical principles in AI systems	1st semester 2024	Medium
Institutional Framework	6	Improve data collection and statistics on the use of AI	2024 - 2025	High
	7	Development of AI Strategies for Local Governments	2024 - 2026	High
	8	Update Chile's National AI Policy (NAIP) and Action Plan	2023 - 2024	High
	9	Modification of the NAIP's Action Plan	2023 - 1st semester 2024	Medium
	10	Update the institutional framework and governance of the NAIP	2023 - 2024	Medium
	11	Create early assessment mechanisms for the implementation of the NAIP	2024 - 2025	Low
Capacity Building	12	Development of Human Capital in AI	2024 - 2026	High
	13	Attract investments in AI technological infrastructure and promote discussion on its environmental impacts	2024 - 2025	High
	14	Assess the impact of AI and automation on workforce and define job retraining plans	2024 - 2025	High
	15	Promotion of Diversity, Inclusion and Gender Equality in STEM	2nd semester 2024	Medium
	16	Training for Local Government Officials on the Ethical Use of AI and development of Certifications for AI Use in Government	2025 - 2026	Medium
	17	Creation of a Working Group to Assess the Impact of AI on Culture	2024 - 2025	Medium
	18	Study the perception and trust in the use of AI in the public and private sectors	2024	Low
	19	Enhance the Country's AI Patent Ecosystem	2024	Low
	20	Enhancing Participation in International Standardisation Processes	2024	Low

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