

AI Policy - A Comparative Analysis

Carolina Rieder Ka Man Ng Simeon Kechagias
Yusuf Furkan Fidan

Contents

Introduction	2
The value of a comparative look into national AI strategies	2
Contributions	3
Overview	4
Why we need AI Strategies	4
China	4
European Union	5
The United Kingdom	6
Japan	6
Mexico	7
Overall Approach	8
China	9
European Union	9
United Kingdom	10
Japan	11
Mexico	11
Strategic Goals and Targets	12
Global leaders and welfare of citizens	13
China	13
European Union	14
The United Kingdom	15
Japan	15
Mexico	16
Roles of the Public and Private Sector	17
China	18
European Union	19
United Kingdom	19
Japan	20
Mexico	20

AI Use Cases and Examples	22
China	22
European Union	23
The United Kingdom	24
Japan	24
Mexico	25
AI regulation, ethics, principles and data protection.	26
China	27
The European Union	28
United Kingdom	28
Japan	29
Mexico	30

Introduction

The value of a comparative look into national AI strategies

Artificial intelligence will dramatically affect every aspect of human life, changing how we process, understand and analyze information. Along the way it will make industries and jobs obsolete, change others and form new ones all together. As a consequence leadership in AI, more than any other emerging technology, will hold economic, political, and military power in the 21st century.

Between 2017 and 2020, more than 50 countries which together represent 90% of the world's GDP have raced to release their national AI strategies.¹ While the effects of frontier technologies often spill over national borders, innovation policy is still largely organized on a national level given the unique role of governments in implementing policy instruments, as highlighted by Edler and Fagerberg in their 2017 paper on innovation policy.²

AI as a general purpose technology has the potential to form new technological paths across various industries e.g. healthcare, defense, agriculture, transport and of course information technology. However, at the same time AI adoption has the potential to bring about unintended consequences or threats, as emphasized by Djefal in his 2020 paper on the role of AI governance.³ As a consequence of the wide reaching effects AI will have, researching how different governments approach and assess AI as a strategic technology, will also reflect on how they approach their national, socio-political and economic objectives in general.

¹“50 National AI Strategies,” 2019, HolonIQ, <https://www.holoniq.com/wp-content/uploads/2020/02/HolonIQ-2020-AI-Strategies.pdf>

²Edler, J & Fagerberg, J. “Innovation Policy: What, Why, and How.” 2017, *Oxford Review of Economic Policy* 33(1): 2–23. <https://doi.org/10.1093/oxrep/grx001>

³Djefal, C. “Artificial Intelligence and Public Governance: Normative Guidelines for Artificial Intelligence in Government and Public Administration,” 2020, In T. Wischmeyer & T. Rademacher (Eds.), *Regulating Artificial Intelligence*, pp. 277-293. Springer International Publishing. https://doi.org/10.1007/978-3-030-32361-5_12

A comparative examination of AI strategies enacted by nation states or supra-national blocs can therefore offer insights reflecting the national-innovative systems framework analyzed by scholars such as Freeman⁴, which explores the role of governments in diffusing innovation, supporting firm-level innovation, and rectifying systematic barriers in their respective socio-economic conditions.

This project aims to present a qualitative comparison of AI strategies launched by China, the European Union, Japan, Mexico and the United Kingdom. The comparison framework features six sections. In each section, an introductory comparative text offers a high-level overview, followed by research summaries of the respective section in the case of each country / region upon selection.

As a whole, the high-level analysis in this project explores which AI objectives the governments prioritize, what strategic milestones or policy instruments they set, what types of governance and participatory frameworks they lean towards, and through what types of AI use cases they are already reshaping public lives. As AI policies sit at the core intersection of technology and politics, the analysis presented in this project may help us better forecast their future socio-technological realities prospectively.

Contributions

The research summaries for all six sections of each country / region, built upon information sourced from respective AI strategies, policy documents, data protection laws, use cases and relevant reports, were written by:

- Carolina Rieder (Mexico)
- Yusuf Furkan Fidan (United Kingdom)
- Ka Man Ng (China, Japan)
- Simeon Kechagias (European Union)

In addition, the comparative overviews introducing each section were written by:

- National AI Strategy (all)
- Overall Approach (Ka Man Ng)
- Strategic Goals and Targets (Carolina Rieder)
- Role of the Public and Private Sector (Simeon Kechagias)
- Use Cases / Examples (Carolina Rieder)
- AI regulation (Yusuf Furkan Fidan)

Web design and implementation by: - Yusuf Furkan Fidan

⁴Freeman, C. “The ‘National System of Innovation’ in historical perspective,” 1995, *Cambridge Journal of Economics*: 5–24. <https://doi.org/10.1093%2Foxfordjournals.cje.a035309>

Overview

Everything points to the existence of more than one (AI Strategy) model: in parts of Asia, States how these technologies are designed and deployed, to facilitating as an ecosystem coordinator. In North America a laissez-faire approach focuses on how the private sector develops and uses AI, with minimum involvement from the State. In Europe it is taking the shape of a mixed approach, focused mainly on a strong regulatory framework enforced by the State, and implemented through big techs and SMEs. In Latin America, same as in Africa and Southeast Asia, this is still an open question.⁵ Countries in these regions have to decide whether they will lead or fall into an umbrella of others, and in that case if they are forced to follow with no or minimum voice on how AI will transform their governments and societies.

Why we need AI Strategies

AI is used in many of our daily lives activities like mobility, retail, hospitality and will increasingly be used in areas such as social programs, security and finance. Along with concrete uses of these technologies there are relevant questions that remain to be answered, for example regarding data protection, regulation and bias, ethical issues around algorithmic accountability, openness, and transparency and so on. These are only some of the questions that make the need for national and local AI strategies relevant, since the path governments decide to follow today will define their place in an increasingly AI driven global space.

China

In July 2017, China announced its official “**New Generation of Artificial Intelligence Development Plan**”⁶ (AIDP). The 20,000-word plan directly premised its need for such a strategy by calling AI a “strategic technology” that presents China with both opportunities and uncertainties on three fronts: international competition, economic growth and social construction.

The plan, serving as the first state-level unified AI strategy, was promulgated by China’s State Council, the country’s highest-level administrative authority which formulates top policy measures, prepares state budget and economic plans, and monitors implementation at all levels and across ministries. China’s AI strategy is structured in six sections:

- 1) “**The strategic situation**”, which maps the technological landscape of AI, its implications and potential for China;

⁵“Policy Brief #15 - Mexico: The story and lessons behind Latin America’s first AI Strategy,” 2020, Development Bank of Latin America, https://7da2ca8d-b80d-4593-a0ab-5272e2b9c6c5.filesusr.com/ugd/7be025_5b56471311f74346a6ad5faa1e7a8ec9.pdf

⁶“New Generation Artificial Intelligence Development Plan,” July 20, 2017, State Council, People’s Republic of China. http://www.gov.cn/zhengce/content/2017-07/20/content_5211996.htm

- 2) **“Overall Requirements”**, which lays out China’s guiding philosophy, principles and strategic goals, such as building a domestic industry worth almost 1 trillion yuan by 2030;
- 3) **“Key Tasks”**, which lays out implementation targets such as the types of AI systems to be improved, the types of emerging industries to be developed in AI, the embedding of AI in social and safety infrastructure, and military-civilian integration;
- 4) **“Allocation of Resources”**, which elaborates the financial means and coordination of resources;
- 5) **“Assurance Measures”**, which touches upon the laws, ethical norms and evaluation systems that need to be considered;
- 6) **“Organization and Implementation”**, which specifies the role of the Ministry of Science and Technology, the establishment of the AI strategy advisory committee and the importance of guiding public opinion.

Later in 2017, China’s Ministry of Industry and Information Technology (MIIT) published a follow-up **“Three-Year Action Plan to Promote the Development of New Generation Artificial Intelligence Industry”**⁷, which built upon the broader strategy. The action plan concretized key advancement targets to support industrial development for both China’s **AI strategy** and **“Made in China 2025”** strategy, emphasizing the development of intelligent and networked products, AI’s support system such as smart sensors, intelligent manufacturing, and improvement of the AI ecosystem including training, testing and cybersecurity.

European Union

In Europe AI strategies are split between national efforts such as in Germany⁸ or France⁹ and the push for a common, supranational, AI strategy on a European level that has been published in 2018. As part of its AI Strategy, the European Commission has joined forces with all Member States, Norway and Switzerland to foster the development and application of AI in Europe.¹⁰

Through streamlining research and collaboration between Member States and increasing investment into AI development and deployment as well as building out policy options for a future EU regulatory framework, with a particular focus on high-risk applications the European Union hopes to leverage it’s common market and regulatory frameworks to guide developments against a background of global competition. . In its *Strategy on Artificial Intelligence*¹¹, the European Commission lays out a three part vision for AI in Europe.

⁷“Three-Year Action Plan to Promote the Development of New Generation Artificial Intelligence Industry,” December 15, 2017, Ministry of Industry and Information Technology, People’s Republic of China, https://www.miit.gov.cn/jgsj/kjs/gzdt/art/2020/art_a322b0d7c20645e19b3d4e09bf787f06.html

⁸(Federal Ministry for Economics Affairs and Energy, 2018)

⁹(Politico, 2018)

¹⁰(European Commission, 2020b)

¹¹(European Commission, 2018)

1. Place Europe ahead of technological developments and encourage the uptake of AI by the public and private sectors.
2. Prepare Europe for the socio-economic changes that wide AI adoption will bring.
3. Establish appropriate ethical and legal frameworks for the development and operations of AI.

In order to manage the safety and liability of AI development and operations, the strategy builds upon the foundations of the *Report on the Safety¹² and Liability Aspects of AI* and the *European Data Strategy¹³*. (European Commission, 2020a; European Commission, 2020b; European Commission, 2020c).

The United Kingdom

The Sector Deal for AI¹⁴ is usually referenced as the UK’s national AI strategy. It’s a joint publication by the Department for Business, Energy & Industrial Strategy and the Department for Digital, Culture, Media & Sport. High level goal is “to put the UK at the forefront of the artificial intelligence and data revolution” with main focus being “business and productivity”¹⁵.

Japan

Japan is the world’s second country to announce a national AI strategy (after Canada), and the first nation to do so in the Asia-Pacific region.

In 2016, Japanese Prime Minister Shinzō Abe ordered the setup of a special council¹⁶, which later released the “**Artificial Intelligence Technology Strategy**”¹⁷ in March 2017. This first strategy plan put its focus on promoting AI development in an industrial framework. Taking note of the trend of “Industry 4.0” and Japan’s relatively lower investment in R&D, the plan set an “Industrialization Roadmap” in priority areas including productivity, healthcare, and mobility.

In 2019, Japan released its more comprehensive “**AI Strategy 2019: AI for Everyone: People, Industries, Regions and Governments**”¹⁸. This sec-

¹²(European Commission, 2020c)

¹³(European Commission, 2020a)

¹⁴“AI Sector Deal,” GOV.UK, April 25, 2018, <https://www.gov.uk/government/publications/artificial-intelligence-sector-deal/ai>

¹⁵“The Grand Challenges,” GOV.UK, accessed February 1, 2021, <https://www.gov.uk/government/publications/industrial-strategy-the-grand-challenges/industrial-strategy-the-grand-challenges#artificial-intelligence-and-data>.

¹⁶“The Prime Minister in Action,” September 15, 2016, Council for Science, Technology and Innovation, Government of Japan, https://japan.kantei.go.jp/97_abe/actions/201609/15article2.html

¹⁷“Artificial Intelligence Technology Strategy,” March 31, 2017, Strategic Council for AI Technology, Government of Japan https://ai-japan.s3-ap-northeast-1.amazonaws.com/7116/0377/5269/Artificial_Intelligence_Technology_StrategyMarch2017.pdf

¹⁸“AI Strategy 2019: AI for Everyone: People, Industries, Regions and Governments,” June 11, 2019, Integrated Innovation Strategy Promotion Council , Government of Japan,

ond strategy, at three times the length of the previous plan, represents a more in-depth plan that holistically embeds itself within Japan’s “Society 5.0” plan, a grand strategy that envisions a “human-centric society that can balance economic development and social issues,” while also linking to the United Nations Sustainable Development Goals.

The plan was announced by the Integrated Innovation Strategy Promotion Council under the Cabinet, a **cross-disciplinary team** connecting councils in charge of topics including science and technology, communication network, intellectual property, health and medical strategy, space development, ocean policy to geospatial information¹⁹.

Expanding beyond the previous industry-oriented focus, this second strategy aims to “specify the environment and measures conducive to effective future utilization of AI for the purposes of contributing to the solution of global issues through realization of Society 5.0 and overcoming the issues facing Japanese society.” At 74 pages long, the plan outlines targets ranging from education reform to R&D ecosystem, identifies development areas such as social use cases and data infrastructure, and highlights ethical issues.

Mexico

Considering the advancements other countries were making in regard to developing AI strategies, the Government of Mexico took a proactive approach to the matter and in 2017 decided to catalyze the conversation on the future of AI and the place that the country should take in the international scenario.

The advancements on digitalization, technical infrastructure and open data availability, among others, allowed Mexico to decide to set the foundations of AI through three concrete actions: first, analyzing the country’s readiness for AI; second, launching its first AI Strategy in 2018; and third, consolidating the AI multi-sector ecosystem.²⁰

As such, in 2017 the government of Mexico, together with strategic actors from civil society, the private sector, academia, and international cooperation, decided to develop the first AI strategy for the country and Latin America. This report was commissioned by the British Embassy in Mexico and funded by the UK Prosperity Fund. It was developed by Oxford Insights and C Minds with the collaboration of the Mexican Government and input from experts across Mexico.²¹

https://www.kantei.go.jp/jp/singi/ai_senryaku/pdf/aistrategy2019en.pdf

¹⁹“Integrated Innovation Strategy 2020,” Cabinet Office, Government of Japan, <https://www8.cao.go.jp/cstp/tougosenryaku/index.html>

²⁰ibid.

²¹British Embassy Mexico City, Oxford Insights and C Minds (2018). TOWARDS AN AI STRATEGY IN MEXICO: Harnessing the AI Revolution. [online] . Available at: https://docs.wixstatic.com/ugd/7be025_e726c582191c49d2b8b6517a590151f6.pdf [Accessed 25 Feb. 2021].

Taking this into account, Mexico’s AI Strategy is rather the result of a bottom-up effort pushed forward by external players and the civil society rather than solely by the government.

Overall Approach

The broad visions of the selected AI strategies can facilitate an understanding on how different governments assess the vast potential of AI in supporting their respective ambitions. A high-level comparison helps indicate whether governments perceive AI as mainly a tool of economic competitiveness or also for social development, whether they envision AI as a key enabler of sustainable development as well as their long-term national goals, and if they have considered the holistic range of governance issues surrounding AI utilization.

In general, all five strategies feature an ambition to be a world leader in AI, though only China has framed its strategy within more specific timeframes. China, the European Union, Japan and Mexico envision the use of AI in both economic and social contexts, while the UK focuses on an economic view. Ecosystem-wise, China, Japan and the EU all elaborate on the role of AI regulations in mitigating related risks.

From all encompassing to sectoral focused Putting the five strategies on a spectrum, China’s AI strategy appears to be the most comprehensive, encompassing a broad range of economic and socio-political elements from domestic industries and international competition to social governance, with clearly-defined and quantified milestones such as becoming the world leader in AI by 2030 which also shapes its global norms.

In comparison, the AI strategies of Japan and Mexico, while also centering on industry competitiveness and aspiring to be global AI leaders, convey a more social perspective more closely rooted in their domestic cross-sectoral needs.

Both Japan and Mexico envision AI as a digitalization pathway that helps resolve their socio-economic challenges, e.g. advancing healthcare and agriculture in Japan to tackle aging population and rural deterioration, transforming Mexican SMEs which account for over half of Mexico’s GDP. Their shared emphasis on developing more tailored, cross-sectoral services for the public also reflects a more human-centric policy approach, when compared to China’s, which put more focus on AI as national strength.

The UK’s AI strategy, on the other hand, represents the most industry-focused approach of all, focusing predominantly on AI utilization in business and is closely linked to its Industrial Strategy. While it envisions developing London to be the European capital of AI, references to AI utilization in public services such as healthcare or education are lacking when compared to others.

Finally, the EU strategy does not target specific national objectives due to its supranational scope, but rather appears to balance the various broad strokes

mentioned above, e.g. upskilling labor forces, public-private collaboration, increasing resources to grow AI development while being cautious about its risks.

China

China envisions becoming a world leader in AI theory, technology and application by 2030, with a domestic industry worth more than 1 trillion yuan and the scale of its related industries worth more than 10 trillion yuan²².

While China’s ambition to pursue technological prowess in AI is prevalent in its multiple-decade policy, the “New Generation of Artificial Intelligence Development Plan” (AIDP) does not only see AI as an industrial innovation, but a “major historical opportunity”²³ that can help the country leapfrog its development and shape its future on mainly three fronts: international competition, economic growth and social governance.

China identifies AI as a “new focus of international competition” core to advancing its “national competitiveness” and “national security”; a “new engine of economic development” key to its next phase of economic reform by triggering new models of industries and shifts in human production; and finally, a strategic technology for “social construction,” one that can improve the precision level of public service as well as “the ability and level of social governance”²⁴.

In general, China’s macro AI vision encompasses its multifaceted aims to “develop intelligent economy, construct intelligent society, safeguard national security.” The AIDP comprehensively covers key initiatives in R&D, industrialization targets, education and personnel training, the potential to become a driving force for the ethics and regulation system of AI, the need for military-civilian integration in accordance with related laws, and the promotion of AI applications, such as biometric identification technology, intelligent security and police products, for “public safety intelligent monitoring.”²⁵

European Union

The European vision for developing an AI strategy is to utilize a split approach of regulation and investment to promote the development of AI and address the risks associated with certain use cases of AI.

In order to increase the development and uptake of AI in the public and private sector the Commission sets out to strengthen the collaboration of different research centres on Artificial Intelligence across Europe. Through linking individual efforts from public and private institutions they hope to increase the

²²“New Generation Artificial Intelligence Development Plan,” July 20, 2017, State Council, People’s Republic of China. http://www.gov.cn/zhengce/content/2017-07/20/content_5211996.htm

²³Ibid.

²⁴Ibid.

²⁵Ibid.

impact of the individual parts. In order to further accelerate this process the commission has been supporting the development of the “AI-on-demand platform” that provides access to a vast amount of AI resources in the EU.

Through creating large scale testing and experimentation facilities in key strategic sectors and technologies the Commission hopes to increase the deployment and uptake of AI and robotics made in Europe starting with a focus on AI adoption in the public sector to transform public procurement processes themselves.

Beyond investing into public and private research and development efforts the Commission also acknowledges that Education needs to be rethought in the wake of expanding AI and automation efforts. Through expanding the upskilling of the existing workforce as part of the Digital Education Action plan 2021-2027 and the Digital Europe Programme the EU wants to advance digital skills.²⁶

United Kingdom

The UK considers Artificial Intelligence and data as one of the Great Challenges of its Industrial Strategy. High level goal is “to put the UK at the forefront of the artificial intelligence and data revolution.”²⁷

Like the Industrial Strategy, overall approach is built on top of the 5 foundations (of productivity):

1. Ideas: Increase R&D investment (part of the aforementioned industrial strategy, not just for AI) to make the UK the world’s most innovative economy.
2. People: Increase the supply of skills working with universities and industry.
3. Infrastructure: Invest in digital infrastructure (i.e. physical - e.g. 5g mobile network, full-fibre broadband) Solve (cultural and practical) problems around data sharing (both private and public) to improve availability of data.
4. Business Environment: Make the UK “the best place to start and grow a business.” As part of the deal the UK will establish a new AI Council (with members from respected leaders from both academia and industry), a new Centre for Data Ethics and Innovation”. Also take steps to attract AI entrepreneurs to the UK.
5. Places: Overall goal is to help communities prosper. London is considered (by the report itself) to be the European capital of AI. There are clusters across the country (e.g. Edinburgh, Cambridge etc) Government will support these clusters.

²⁶(European Commission, 2020b)

²⁷“The Grand Challenges,” GOV.UK, accessed February 1, 2021, <https://www.gov.uk/government/publications/industrial-strategy-the-grand-challenges/industrial-strategy-the-grand-challenges#artificial-intelligence-and-data>.

Japan

Japan’s key vision of AI development emphasizes an “integrated” view and a human-centric approach.

In its newest AI strategy (2019), while aiming to become a “frontrunner”²⁸ in AI applications in the world, Japan’s overall vision of AI development is firmly embedded in a framework of solving its top socio-economic and environmental issues, such as aging population, shrinking population and deterioration of infrastructure, in a way that helps propel the country toward realising its “Society 5.0” vision while also contributing to the United Nations Sustainable Development Goals.

Its integrated view of AI development emphasizes the linkage of technological development and social infrastructure as its enabling context. Japan recognises that many of its issues cannot be solved with technologies alone, but it is “necessary to coordinate technology and social mechanisms in a transformational way” in order to realize a sustainable society that incorporates diversity. The AI Strategy therefore aims to “specify the environment and measures conducive to effective future utilization of AI”²⁹.

In parallel, Japan’s AI Strategy adopts a set of “Social Principles of Human-Centric AI”³⁰, which includes (i) Dignity (a society in which human dignity is respected); (ii) Diversity and Inclusion (a society in which people with diverse backgrounds can pursue their own well-being), and (iii) Sustainability (a sustainable society). Within this overarching framework, the strategy builds upon its previously more industry-focused version announced in 2017, and presents an integrated AI policy package that encompasses educational reform, R&D and social implementation with the vision to be more industrially competitive, and more effective in solving challenges facing Japan and the world.

Meanwhile, while Japan recognizes that it does not yet possess “adequate competitiveness” amid the battle for AI supremacy notably among companies based in the US and China, the strategy also notes that given the scope of AI applications is so wide and competition in areas such as data collection has just begun, the “decisive contest is yet to come” on a global level, and calls for Japan to open up opportunities for the future by taking immediate, concerted actions on AI development.

Mexico

The key vision that the Mexican Government has in regards to their AI Strategy is aiming to be a global leader in AI and digitalisation, and as such being capable

²⁸“AI Strategy 2019 AI for Everyone: People, Industries, Regions and Governments,” June 11, 2019, Integrated Innovation Strategy Promotion Council , Government of Japan, https://www.kantei.go.jp/jp/singi/ai_senryaku/pdf/aistratagy2019en.pdf

²⁹Ibid.

³⁰“Social Principles of Human-centric AI,” 2019, Government of Japan, <https://www8.cao.go.jp/cstp/english/humancentricai.pdf>

of promoting social and economic development for its citizens.³¹

In Mexico, micro, small and medium enterprises (MSMEs) are the backbone of the economy, generating 72% of employment and contributing to 52% of the country's GDP.³² One of the main goals is to digitize those and allow them to identify through Big Data, data analytics and AI new business opportunities, gain access to global markets and create a better understanding of their overall business environment.

Through the usage of AI systems, the government also aims to automate routine tasks which currently occupy a large amount of many peoples' working days, leaving them free to focus on more complex, high-level tasks which cannot yet be effectively performed by machines. This encourages human creativity and innovation, aspects that can increase productivity and solve partly the economic stagnation Mexico is living through.

Beyond that, future uses of AI may also enable cheaper, and more tailored, public services such as health and education. As such, one of the major goals of the Government is also to provide greater access to high-quality healthcare and schooling for the population..

Concluding, the Mexican Government and experts in all sectors are committed to promoting AI in the country in a sustainable and scalable way, primarily focusing on the social impact it can have and the opportunities it offers in providing better living conditions for the Mexican population.

Strategic Goals and Targets

Artificial intelligence can be seen as a new industry on its own, but at the same time it's also transforming business models across many sectors. From helping doctors diagnose medical conditions more effectively to allowing people to communicate across the globe using instantaneous speech recognition and translation software, vast datasets allow AI to identify better ways of doing complex tasks

In order for governments to make the best out of these opportunities, it is essential for them to set strategic goals within their AI strategy, envisioning where they want to lead their country to. Strategic goals are fundamental as they drive priority setting, resource allocation, capability requirements and budgeting activities, which are essential for countries to advance their key vision.

³¹British Embassy Mexico City, Oxford Insights and C Minds (2018). TOWARDS AN AI STRATEGY IN MEXICO: Harnessing the AI Revolution. [online] . Available at: https://docs.wixstatic.com/ugd/7be025_e726c582191c49d2b8b6517a590151f6.pdf

³²Secretaría de Hacienda y de Crédito Público (2017). Informe de autoevaluación enero-diciembre 2017. [online] Available at: https://www.condusef.gob.mx/transparencia/IA_enero_dic_2017.pdf

Global leaders and welfare of citizens

When examining the strategic goals of the five strategies, it becomes clear that China has the potential of becoming the global AI leader it envisions itself to be. Not only do they have an extensive three-phase plan on the development of AI within their country for the next decade, but they also managed to set clear strategic goals in a defined timeframe.. Their key target is to become the “major artificial intelligence innovation center of the world,” having an AI industry worth 1 trillion yuan and its related industries worth 10 trillion yuan by 2030.

On the other hand we also have Japan and the UK envisioning themselves to become global AI leaders. Japan in comparison to China, does not have a timed plan, but rather outlines four strategic goals that reflect their integrated view of connecting AI development with their social mechanisms. Similarly, the UK is focusing on five priority areas, which they call the “five foundations of productivity,” each having separate goals but matching their vision of being at the forefront of the artificial intelligence and data revolution. The European Union similarly wants to develop an AI ecosystem that brings the benefits of the technology to the whole of European society and economy. However, they do not seek to become explicitly a global leader in AI but rather place themselves ahead of technological developments, while ensuring to embed it’s values throughout the development and implementation of AI made in Europe.

Mexico, has a three-phase plan on how they want to set the foundations for their AI vision. Their strategic goals are much more focused on providing the right environment such as the development of an inclusive governance framework, the identification of uses and needs of AI in industry, supporting their AI leadership ambition in international forums.. In comparison to the strategic goals of the other regions and countries, it lacks concrete goals regarding the private sector and the benefits that will be assured to the citizens.

China

China’s “New Generation of Artificial Intelligence Development Plan”³³ (AIDP) outlined a three-phase plan in AI development, each step with its strategic goals and timeframe. The first step: make sure China’s overall AI technology is in line with its advanced competitors by 2020. This goal is further elaborated in concrete targets, such as making key progress in areas including large-scale data intelligence, autonomous intelligence systems and core devices, and being an early standard-setter on the global AI stage by building AI ethics norms, policies and regulations of some areas. The scale of China’s AI core industry should be worth more than 150 billion yuan.

³³“New Generation Artificial Intelligence Development Plan,” July 20, 2017, State Council, People’s Republic of China. http://www.gov.cn/zhengce/content/2017-07/20/content_5211996.htm

The second step: achieve a major breakthrough in AI basic theory, and becoming a world-leader in certain AI applications by 2025. By this point, AI should be the “main driving force” of China’s industrial upgrading and economic transformation, its construction of an AI society and developed into the global high-end value chain ranging from manufacturing, medical care, agriculture, to national defense construction. The scale of China’s AI core industry should reach more than 400 billion yuan.

The third step: become the “major artificial intelligence innovation center of the world” by 2030, with an AI industry worth 1 trillion yuan and its related industries worth 10 trillion yuan. By this stage, China expects to “occupy the commanding heights of AI technology” on a global level, to “expand widely and deeply” the use of AI in production, social governance, national defense construction and all aspects, including forming the complete industrial chain. Remarkable results are expected to be achieved in the development of an intelligent economy and intelligent society, which will help bring China into “the forefront of the innovative countries and economic powers.”

European Union

As previously stated Europe’s approach is two-folded with a focus on regulation and investment. While there are few concrete goals the overall goals are the following:

A. Promote the development of AI while addressing the risks associated with certain uses of AI

B. Develop an AI ecosystem that brings the benefits of the technology to the whole of European society and economy.

Develop an AI ecosystem that brings the benefits of the technology to the whole of European society and economy.

A. Private sector a. Citizens - reap new benefits for example improved health care, breakdowns of household machinery, safer and cleaner systems, better public services b. Businesses - a new generation of products and services in areas Europe is particularly strong (machinery, transport, , farming, the green and circular economy, and high-value added sectors like fashion and) B. Public sector a. Services - reducing the costs of providing services (transport, , energy and waste management), by improving the of products and by equipping law enforcement authorities with appropriate tools to ensure the security of , with proper safeguards to respect their rights and

Through these goals the EU wants to place Europe ahead of technological developments while ensuring to embed it’s values throughout the development and implementation of AI made in Europe.³⁴

³⁴(European Commission, 2020b)

The United Kingdom

The high level goal of the United Kingdom is “to put the UK at the forefront of the artificial intelligence and data revolution.” Each of 5 foundations of productivity also has separate goals:

1. Ideas: Become the most innovative economy
2. People: Generate good jobs, achieve greater earning power.
3. Infrastructure: Have a major upgrade
4. Business Environment: Be best place to start and grow a business
5. Places: Secure prosperous communities across the UK

Embedding AI across the UK will create thousands of good quality jobs and drive economic growth. A recent study found digital technologies including AI created a net total of 80,000 new jobs annually across a population similar to the UK20. By one estimate, AI could add £232bn to the UK economy by 2030.

Meeting the Grand Challenge means maximising the opportunities created by AI and advanced data technologies, and responding to the potential impacts on society. Britain wants to be among the first countries to ensure that everyone benefits from this revolution, make the UK a global centre for artificial intelligence and data-driven innovation and support sectors to boost their productivity through artificial intelligence and data analytic technologies.

On top the UK wants to lead the world in safe and ethical use of data and artificial intelligence giving confidence and clarity to citizens and business and help people develop the skills needed for jobs of the future.

Japan

Japan outlines four strategic goals that reflect its integrated view of connecting AI development and the social mechanisms that play an enabling role.³⁵

- 1) AI talent pool: to develop a world-leading human resources base aligned with the diverse needs of the AI era and attractive for global talents. As the needs of the AI era are broad, the Japanese government emphasizes that such human resources are not a uniform type of person, but should cover people working in research, who apply AI to industry and in small and medium-sized businesses (SMEs), and who use AI to create new business, including women and people from overseas.
- 2) AI industry competitiveness: to become a frontrunner in applying AI to real-world industry and strengthen industrial competitiveness. Japan defines “real world industry” as the domain involving interactions among people, nature, hardware, etc, and aims to measure its industry competi-

³⁵“AI Strategy 2019 AI for Everyone: People, Industries, Regions and Governments,” June 11, 2019, Integrated Innovation Strategy Promotion Council , Government of Japan, https://www.kantei.go.jp/jp/singi/ai_senryaku/pdf/aistratagy2019en.pdf

tiveness by labor productivity level, a benchmark which it hopes to match those of the US, Germany and France before 2030.

- 3) AI-related diverse technology systems: to implement AI mechanisms to realize a “sustainable society that incorporates diversity.” Japan envisions using AI to create social systems that enable women, foreigners, elderly people and people with diverse backgrounds to fully participate in society while enjoying diverse lifestyles, both within Japan’s borders and on a global scale.
- 4) AI leadership: to take a leadership role in AI international research, education, and social infrastructure networks. Japan sets the target of international partnerships and collaboration in areas of joint R&D, human resource development and the implementation of the United Nations Sustainable Development Goals.

To realize the four strategic goals, Japan’s AI strategy further identified two areas of foundational work: 1) Education and R&D reform, and 2) implementing AI for industry and society through five priority areas: (i) healthcare; (ii) agriculture; (iii) national resilience in relation to natural disasters; (iv) transportation infrastructure and logistics; and (v) regional revitalization (smart cities). These initiatives are to be supported by a policy to improve data infrastructure, digital government and support for SMEs.

Mexico

Mexico decided to set the foundations of AI through three concrete actions: first, analyzing the country’s readiness for AI; second, launching its first AI Strategy in 2018; and third, consolidating the AI multi-sector ecosystem.

Mexico’s AI Strategy 2018, included five key actions³⁶ (goals to be aimed at):

1. Develop an inclusive governance framework, through the creation of an AI Sub-commission led by the Office of the President, the Ministry of Public Administration, and with official participation of industry, civil society, academia, and some local governments as advisors. This Sub-commission had the objective of setting the of the AI initiative and developing coordinated actions within the National Public Administration and States of Mexico.
2. Identify the uses and needs of AI in industry, through a documentation exercise carried out by the Mexican Chamber of Telecommunication Industry, as well as identifying best practices within government of AI.
3. Open the medium and long term recommendations of the Policy Report for public consultation

³⁶CAF – Development Bank of Latin America (2020). *Policy Brief #15 - Mexico: The story and lessons behind Latin America’s first AI Strategy.* [online] Available at: https://7da2ca8d-b80d-4593-a0ab-5272e2b9c6c5.filesusr.com/ugd/7be025_5b56471311f74346a6ad5faa1e7a8ec9.pdf

4. Support Mexico's AI leadership in international forums, including the OECD, D9, the G20, and by creating the Working Group on Technological Change in relation to the Sustainable Development Goals within the United Nations (UN) and the Working Group for Emerging Technologies in the Latin America and Caribbean Network the Development of Digital Governments (GEALC, its acronym in Spanish).
5. Promote continuity through changing administrations, by working with all interested stakeholders towards an official AI National Policy

These actions allows Mexico to establish the bases for the leveraging of AI as a tool for social and economic development, a strategy to be further explored and strengthened by academia, the industry and civil society and by the new Administration (2018-2024), which entered office in December 2018.

Roles of the Public and Private Sector

Across the globe governments are acknowledging that the widespread adoption of AI and automation will depend on the cooperation between the public and private sector. However, which roles the respective sectors are taking differ across various countries. The following chapter will first review the role of the government and the private sector in China, Japan, Mexico and Europe to then discuss similarities and differences.

It doesn't come as a surprise that the Chinese government takes a central role in developing and coordinating the AI efforts in the country. In line with its overall economic approach the Chinese approach reflects a combination of central government and private sector participation in the development of AI technology. However, in contrast to other government's collaboration with the private sector, China's approach to select four companies to lead the development of different areas of AI is a relatively uncommon approach that also underpins the leading roles these companies already take in different AI fields.

Japan's approach to AI governance is defined by the government taking the role of a coordinator that is responsible for establishing and maintaining the right environment for private sector innovation to take place. At the same time, the government is seen as one of the best areas to deploy innovation driven by AI as Japan has increasingly facing problems due to the delay in the digitalization of public services.

The development of Mexico's AI efforts is largely driven by the public sector and inherently a bottom-up movement. Therefore, rather than relying on a government with changing priorities the Mexican strategy sets out to establish an independent body to oversee the implementation of the strategy as central. Consequently, the role of the government is primarily to pave the way for the establishment of the independent body. However, at the same time the strategy acknowledges the importance of the government in promoting Mexico as a leader in the AI space.

In Europe, the European Commission is focused on setting the right playing field for the development of AI. Through a balance between regulation and the free market the EU hopes to harness and attract the best talent and provide the optimal environment for the development of AI in the private sector. In the United Kingdom, the government is mainly seen as a coordination that should drive collaborations within the private sector. Regulation is seen as secondary to providing direct investments but also making the UK AI sector attractive to private investors.

China

The role of the government in steering China’s AI strategy can be said to reflect its contemporary economy model, mixing both central planning features driven by the state and market-based features driven by the private sector.

Before the release of the “New Generation of Artificial Intelligence Development Plan” (AIDP), the importance of AI had already been included in the “Made in China 2025” grand plan and the 13th Five-Year-Plan announced by the Central Committee of the Communist Party of China’s (CCP). Therefore, putting the AIDP into China’s broader policy context, it should be seen as a key strategic area that closely supports many of the structural transitions that the government is involved in from its central role in steering, through spelling out specific reforms, standards and setting numerical targets³⁷.

However, while the AIDP will be guided by a new AI Strategy Advisory Committee and coordinated by the Ministry of Science and Technology (MIST), the AIDP has been suggested to serve more as central guidance instead of a centrally managed initiative. Much of the actual innovation and transformation is expected to be driven by the private sector and local governments.³⁸

One example is the Chinese government’s announcement of private-sector partnerships in supporting the AIDP. In 2017, China’s Ministry of Science and Technology announced a partnership model with national tech giants³⁹. Four companies were called upon to leverage their strengths in four AI fields to support “technology, economy, social development and national security”:

- Baidu is tasked with the development for autonomous driving
- Alibaba is tasked with the development of urban brains (smart)
- Tencent is tasked with the development of computer vision for imaging

³⁷Bertoldi, M., Melander, A.E., Weiss, P. “Can Economic Transitions Be Planned? China and the 13th Five-Year Plan,” 2016, European Commission, Economic Brief 17, https://ec.europa.eu/info/sites/info/files/file_import/eb017_en_2.pdf

³⁸Roberts, H., Cows, J., Morley, J. et al. “The Chinese approach to artificial intelligence: an analysis of policy, ethics, and regulation.” 2021. *AI & Society*. *AI & Soc* 36, 59–77. <https://doi.org/10.1007/s00146-020-00992-2>

³⁹“The Ministry of Science and Technology holds AIDP and a major technology project launch meeting” (in Chinese), November 20, 2017. Ministry of Science and Technology, People’s Republic of China. http://www.most.gov.cn/kjbgz/201711/t20171120_136303.htm

- iFLYTEK (partially state-owned) is tasked with the development of intelligence

When compared with public-private partnership in other countries, one can argue that this form of “national champion endorsement” still reflects the more top-down commanding role of the Chinese government. Local governments are incentivised under China’s political structure to fulfill centrally-defined initiatives, but the broad range of the AIDP may also give rise to individual development paths across provinces, as local governments may prioritize different AI projects, with different stakeholders, most suited to their contexts.

European Union

Europe sets out to strike a balance between regulation and the free market, focused on strategic investments and regulation. The European Commission has increased its annual investments in AI by 70% under the research and innovation programme Horizon 2020 in order to:

1. Connect and strengthen AI research centres across Europe.
2. Support the development of an “AI-on-demand platform” that provides access to relevant AI resources in the EU for all users.
3. Support the development of AI applications in key sectors.

However, this is only a small proportion of total investments, many of which come from Member States and the private sector. The Commission’s actions act as the glue linking the individual efforts, with an aim to make a collective solid investment. The expected impact of such an investment is much greater than the sum of its parts. To this end, more actions are foreseen to:

1. Increase the deployment and uptake of AI and robotics made in Europe by creating world reference large scale testing and experimentation facilities in key strategic sectors and technologies (agri-food, healthcare, manufacturing, smart cities and edge AI);
2. Build on Public Private Partnerships;
3. Accelerate public sector AI adoption by supporting public procurement of AI-based systems and helping to transform public procurement processes themselves.

Along the process citizens, experts and stakeholders have been able to provide direct input to the AI policy through ad hoc consultations and online discussions in the European AI Alliance.

United Kingdom

The role of the government is mainly seen as coordination. The government “is expected to take on an entrepreneurial role in innovation policy through cross

sectoral collaborations with businesses and universities.”⁴⁰

Japan

Japan’s AI Strategy identifies the government as the “overall coordinator”⁴¹ and leaves the implementation to private sector companies, which must all comply with the “Social Principles of Human-Centric AI.”

Therefore, the role of the Japanese government lies in establishing and maintaining an enabling environment in the technological, economic and social dimension. This ranges from laying down the foundational support in data infrastructure, human resources and R&D, to promoting social acceptance of AI, by developing cybersecurity and ethical standards and improving AI literacy.

A specific section in Japan’s AI Strategy is dedicated to role-sharing between the government and the private sector. The government positions itself as the maintainer of an environment most supportive to private sector efforts, through specific actions such as:

- Developing the AI strategy and implementation roadmap
- Immediately removing institutional and policy obstacles
- Developing domestic and foreign human resources
- Putting measures in place for social structure transformation related to AI
- Forming governance systems and ethics framework for AI
- Building multi-stakeholder networks and hubs

It’s worth noting that Japan’s AI strategy also includes transforming the government itself into an “AI Era Digital Government.” Considering Japan’s delay in computerization in the public services sector and aging population, which have increased the administrative costs of local governments, Japan’s AI Strategy also aims to utilize AI to make public services more cost-efficient and policy planning more precise.

Mexico

The role of the government in the creation/implementation of the AI Strategy may differ significantly between Mexico and other countries as the willingness to push forward the topic of AI in the country rather comes from the civil society, academics and the private sector⁴².

⁴⁰“AI Sector Deal,” GOV.UK, April 25, 2018, <https://www.gov.uk/government/publications/artificial-intelligence-sector-deal/ai-sector-deal>.

⁴¹“AI Strategy 2019 AI for Everyone: People, Industries, Regions and Governments,” June 11, 2019, Integrated Innovation Strategy Promotion Council , Government of Japan, https://www.kantei.go.jp/jp/singi/ai_senryaku/pdf/aistratagy2019en.pdf

⁴²IA2030MX (2020). Agenda Nacional Mexicana de Inteligencia Artificial. [online] Available at: https://36dc704c-0d61-4da0-87fa-917581cbce16.filesusr.com/ugd/7be025_6f45f669e2fa4910b32671a001074987.pdf

In spring 2018 Mexico had a change of administration, and much of the work from the government around digitalisation took a halt with a shift in policy priorities. As such many stakeholders that took part in the creation of the national AI Strategy stressed the importance of creating an independent body to oversee the implementation and coordination of both digitalisation and AI policies to ensure continuity⁴³.

The Mexican strategy clearly defines the role the government should take in order to ensure the successful implementation of the AI strategy:⁴⁴:

1. First the government should set a clear strategic direction. A cross-cutting, central government department should own the national AI strategy - “Office of AI” and an official to lead AI should be appointed.
2. As AI is a cross-cutting technology and touches on almost every area of governance, either through government support, promotion or in delivery, selected ministries should appoint Emergent Technology Innovation teams to lead individual efforts.
3. Governments have enormous power to change the national conversation and direct attention. The Mexican government should harness this power to champion Mexico as a strategic place to build and deploy AI technology e.g. through supporting the creation of an AI chamber of commerce, actively attracting the best talent to return or come to work in Mexico and ensuring that stories of successful Mexican AI deployments are shared internationally
4. Develop guidelines for smart AI procurement by
 - a. Talking to the emergent Mexican AI sector to foster mutual understanding and stimulate ideas on how AI could help the government provide better services for less.
 - b. Take a portfolio approach to develop and procure AI products and services in government.

Other important AI government actions included the publication of two key documents related to the responsible and ethical development and use of AI (AI General Principles & a Risk Assessment Tool for the use of autonomous systems). Both were opened for public participation in their development.⁴⁵

The development of the Mexican AI Strategy was (and still continues to be) a

⁴³CAF – Development Bank of Latin America (2020). *Policy Brief #15 - Mexico: The story and lessons behind Latin America’s first AI Strategy*. [online] Available at: https://7da2ca8d-b80d-4593-a0ab-5272e2b9c6c5.filesusr.com/ugd/7be025_5b56471311f74346a6ad5faa1e7a8ec9.pdf

⁴⁴British Embassy Mexico City, Oxford Insights and C Minds (2018). *TOWARDS AN AI STRATEGY IN MEXICO: Harnessing the AI Revolution*. [online] . Available at: https://docs.wixstatic.com/ugd/7be025_e726c582191c49d2b8b6517a590151f6.pdf [Accessed 25 Feb. 2021].

⁴⁵CAF – Development Bank of Latin America (2020). *Policy Brief #15 - Mexico: The story and lessons behind Latin America’s first AI Strategy*. [online] Available at: https://7da2ca8d-b80d-4593-a0ab-5272e2b9c6c5.filesusr.com/ugd/7be025_5b56471311f74346a6ad5faa1e7a8ec9.pdf

bottom-up approach. The process of developing the national AI Strategy was chaired by the organization C Minds, and six further working groups that were established around several key topics mentioned in the strategy (e.g. Ethics, Data, R&D etc.). Key Mexican institutions from all sectors helped lead each working group including the Mexican Society of AI, the Ministry of Foreign Affairs, the Ministry of Economy, the Telecommunications Federal Institute, Plenum Group, the National University of Mexico, the National Mathematics Institute, among others, bringing their expertise and different points of view into the efforts.

Another example of the necessity of bringing different perspectives in, and the favoring of a bottom-up approach, is the multi-stakeholder national coalition named IA2030.mx which is formed by institutions from the industry, civil society, academy and government. Its objective is to coordinate efforts, build a single voice around AI and promote continued action and support for the topic. What started as a collaboration of ten institutions grew to more than 110 on a national scale. One of the first actions of the coalition was launching a national consultation on AI, where more than 1,500 people shared their perspectives.

AI Use Cases and Examples

Following we listed some examples on the usage of AI technology by the different countries and regions we are comparing. This list of examples is a good reflection on the priorities the governments have set and the fields where it is the most pressing to take advantage of AI technology. Beyond the purposes, the use cases will also allow to see how the different countries and regions have implemented in a practical manner their AI visions.

China

A prominent government-led AI use case that influences resource allocation for the Chinese public would be certain areas of AI utilization in China’s Social Credit System.

China’s Social Credit System (SCS) can be broadly understood as an ecosystem of digital scoring systems that classify behavior into morally “praise-” and “blameworthy”⁴⁶. Instead of one centralised scoring platform, there are currently multiple social credit systems across national, provincial, municipal, and ministerial levels, covering areas from judicial to financial and commercial credit rating and with varying degrees of public-private sector collaboration. While a clear unified structure is yet to be observed, the systems share core components:

- all legal entities, including companies, are linked to a Unified Credit Code

⁴⁶Engelmann, S., Chen, M., Fischer, F., Kao, C.Y., Grossklags, J.. “Clear Sanctions, Vague Rewards: How China’s Social Credit System Currently Defines”Good” and “Bad” Behavior.” 2019. In FAT. *Conference on Fairness, Accountability, and Transparency (FAT ’19)*, <https://doi.org/10.1145/3287560.3287585>

- all social credit systems involve a master database, a blacklisting and a punishment and rewards mechanism that may intersect policy areas

It is critical to point out that many of the social credit systems may or may not be currently using AI. China's AI Strategy, while emphasizing applying AI in social governance and public order, also did not explicitly mention the Social Credit System. However, while there are not sufficient public materials to precisely map out how many social credit systems across China are integrating which fields of AI technologies, an example relevant to our scope would be the use of facial recognition as one field of AI technology in maintaining public order within the framework of SCS.

Using facial recognition to targeting jaywalkers within a social credit system framework

- In 2019, the eastern Chinese city of Nanjing introduced a to punish pedestrians who are captured on video more than five times in one year.⁴⁷
- Facial recognition system was put in place at multiple busy in the city to identify jaywalkers. After being on camera, the image of the pedestrian will be matched with of drivers and demographic information to identify the . The facial recognition technology is advanced enough to identify Individuals wearing helmets, sunglasses, and masks.
- Identified information about the offenders will be publicly on a screen beside the road. The punishment includes a to their social credit score, which could affect other of their daily lives, such as "assessments of their job , access to personal loans, and vehicle insurance"⁴⁸.

European Union

In Europe there are different areas in which AI will have a significant impact. The European Commission sees the application cases in three general areas:

1. Private sector Citizens - reap new benefits for example improved care, fewer breakdowns of household machinery, safer and cleaner transport systems, better public services
2. Businesses - a new generation of products and services in areas where Europe is particularly strong (machinery, transport, cybersecurity, farming, the green and circular economy, healthcare and high-value added sectors like fashion and tourism)
3. Public sector services - reducing the costs of providing services (transport, education, energy and waste management), by improving the sustainability of products and by equipping law enforcement authorities with appro-

⁴⁷"City targets jaywalking with detailed social credit system," July 5, 2019. Global Times, <https://www.globaltimes.cn/content/1156908.shtml>

⁴⁸"Jaywalkers in Nanjing face social credit downgrade," July 5, 2019. China Plus. <http://chinaplus.cri.cn/news/china/9/20190705/312844.html>

appropriate tools to ensure the security of citizens, with proper safeguards to respect their rights and freedoms⁴⁹

The United Kingdom

List of case studies mentioned as part of the examples section of the guideline:

- How DFID (department of international development) used satellite images to estimate populations
- How the Department for Transport used AI to improve MOT testing
- How GDS used machine learning to make GOV.UK more accessible
- How a signalling company used AI to help trains run on time
- Using data from electricity meters to predict energy consumption
- Using natural language processing to structure market research
- How the Ministry of Justice used AI to compare prison reports
- How a UK-based bank used AI to increase operational efficiency

There is a brief case study report for all projects above.

Case studies mentioned in the Sector deal:

- STFC-IBM ideas for an intelligent future
- ASI – Creating capability in tomorrow’s leading scientists
- Ocado – Machine learning to build a smart broadband of grocery
- DigitalGenius – A cutting-edge AI company on an export journey
- QuantumBlack – from startup to scale-up
- BT – Supporting national growth through regional R&D partnerships

Japan

In Japan’s 2019 AI Strategy, hopeful use cases were identified from priority areas such as healthcare, agriculture, disaster resilience and transportation. While some remain as work in progress and are closely linked to development in robotics (e.g. developing fire-fighting robots in special disasters), the following are two AI use cases for public welfare that have already been announced or implemented (since Japan released its first AI strategy in 2017):

- Setting up 10 “AI hospitals” by 2022: In 2018, the Japanese government announced it would invest more than 10 billion yen (\$100 million) to set up 10 hospitals enhanced by AI.⁵⁰ The overall purpose is to ease shortage of medical staff amid a rapidly aging population, lower medical expenses and free up more time for doctors to focus on patients. Teaming up with business and academia, these model hospitals are expected to use AI in all tasks, from updating patient records to assisting with diagnosis, analyzing

⁴⁹(European Commission, 2020b)

⁵⁰“Japan plans 10 ‘AI hospitals’ to ease doctor shortages,” August 9, 2018, Nikkei Asia, <https://asia.nikkei.com/Politics/Japan-plans-10-AI-hospitals-to-ease-doctor-shortages>

blood tests, vitals, electrocardiography, DNA parsing and imaging.⁵¹

- AI match-making: In 2020, Japan's Cabinet Office announced it's investing 2 billion yen (\$19.2 million) to subsidise local governments already running or starting projects that use AI to pair people up⁵². The initiative aims to reverse Japan's fertility rate, which fell to its record low in 2019. These AI matchmaking projects are expected to perform more sophisticated analysis of dating criteria submitted by citizens, such as income, age, hobbies, and produce more exact matches compared to traditional human-run matchmaking service. Around half of Japan's 47 prefectures already offer matchmaking services and some of them have already introduced AI systems, according to the Cabinet Office.

Mexico

There are various examples of where AI is currently being used in Mexico to improve public services and to make citizen's lives better, however, most of the AI Use Cases in Mexico are led and implemented by the private sector rather than by the government.

The following are two examples of AI initiatives that are being directly used at the governmental level⁵³:

- AI for better health public services: misalud, Ministry of Health : Misalud is a new health platform that enables patients to ask questions and receive advice through their cell phone. It was launched in June 2017 as a result of the government's Prospera digital pilot and focuses on maternal health. Beneficiaries of misalud receive SMS messages with advice to help improve their health and that of their babies. To date, more than 5,000 women have exchanged more than one million SMS messages through the platform. The CEDN is supporting the initiative to develop chatbots for government communication as a 'plug and play' innovation.
- AI to detect fraudulent taxpayer operations: Tax Administration Service, Ministry of Finance and Public Credit: The Tax Administration Service has been trialling AI algorithms to detect companies that are conducting fraudulent operations, by identifying pattern disruptions in data analysed using R Studio, Python Language, and DBs in-memory Redis. Within three months of a six month pilot scheme, 1200 fraudulent companies were detected and 3500 fraudulent transactions identified. The identification

⁵¹Kim. J. "Japan to develop assessment system to speed up AI development," August 23, 2019. <https://www.bioworld.com/articles/429318-japan-to-develop-assessment-system-to-speed-up-ai-development>

⁵²"Japan to fund AI matchmaking to boost birth rate," December 8, 2020. BBC News, <https://www.bbc.com/news/world-asia-55226098>

⁵³British Embassy Mexico City, Oxford Insights and C Minds (2018). TOWARDS AN AI STRATEGY IN MEXICO: Harnessing the AI Revolution. [online] . Available at: https://docs.wixstatic.com/ugd/7be025_e726c582191c49d2b8b6517a590151f6.pdf [Accessed 25 Feb. 2021].

and analysis of these irregular activities would have taken an estimated 18 months of work without the use of AI.

AI regulation, ethics, principles and data protection.

Regulations over the use of Artificial Intelligence (AI) vary greatly across countries we've investigated. All countries seem to acknowledge the ethical concerns that arise from the use of AI; however, this has not necessarily reflected in regulations. On the other hand, the use of data, personal or otherwise, seems to have more regulatory scrutiny. Since data is crucial for development of AI systems, data regulations impact the possible uses of AI.

Mexico is the weakest among all of them with no specific regulation over the use of AI and with no reason to expect this to change any time soon. The AI strategy document prepared by NGOs, with the support from the Office of the Mexican President, does mention ethical concerns. However, there is no commitment from the current government to follow up on this document and the ethical regulations it proposes. In terms of data regulation, Mexico has The Federal Law on the Protection of Personal Data Held by Private Parties that was enacted in 2010 and is seen as outdated by many. (who?)

Regulatory scene in China, in general, is hard to dissect and it is no different for regulations over the use of AI. Ethical impacts of AI is clearly acknowledged as apparent by the white paper published in 2018 by China's Standards Administration. The country recently announced the "Personal Information Protection Law" which is expected to become effective in 2021 and regulate the processing of personal data and its misuse. On the other hand, the 2017 Cyber Security Law gives the Chinese government unprecedented power in accessing citizens' data. In other words, personal data may have some protection against the 3rd parties but not the government.

Japan is arguably the country with the most emphasis on ethical concerns on AI. In fact it is the only one with very clear legislation addressing ethical concerns. "Social Principles of Human-Centric AI" is a clear commitment and desire to put humans at the front and center of the discussion with core principles of Dignity, Diversity and Inclusion, and Sustainability. While "AI Utilization Guidelines" (2019) lists the principles to follow for AI development and use, "Basic Act on the Advancement of Public" (2016), Private Sector Data Utilization and Cyber Physical Security Framework" and "Act on the Protection of Personal Information (APPI)" focus on use of data across private and public sector. Japan also follows "OECD Principles on AI" enacted in 2019.

The United Kingdom considers AI as a business opportunity and their driving force behind their strategy is fundamentally pragmatist. There is no regulation directly addressing the use of AI. That being said, there are institutions who

are tasked with following the state of affairs, namely “AI Council,” “Office for AI” and “Centre for Data Ethics and Innovation.” The last one is tasked with identifying measures needed to make sure the development of AI is safe, ethical and innovative. Also, despite leaving the EU, the UK still, effectively, has GDPR as DPA 2018.

The European Union has arguably the most balanced approach to AI regulation. On one hand they try to leverage it as a tool for socio-economic development and on the other hand they aim to have an appropriate ethical and legal framework around it. The European Union is the only state that takes direct input from its citizens, as well as experts and stakeholders.

China

China’s “New Generation of Artificial Intelligence Development Plan”⁵⁴ (AIDP) outlined specific targets for China to become a world leader in setting ethical norms and standards for AI.

The document, however, included mostly high-level direction for further research and development in a broad range of ethical and regulatory topics, such as “civil and criminal responsibility confirmation, privacy and property protection, information security utilization.” It also called for setting up a traceability and accountability system, and clarification of the legalities of AI such as rights and obligations.

In 2018, China’s Standardization Administration, the state body developing technical standards, released a white paper on AI standards which identified three key principles: i) human interests as the ultimate purpose; ii) the principle of liability requires accountability and transparency, iii) the “consistency of rights and responsibilities” principle, which aims to balance data oversight and intellectual property protection in the commercial domain.⁵⁵

In 2019, China’s Ministry of Science and Technology established the National New Generation Artificial Intelligence Governance Expert Committee, which released eight principles for AI governance: harmony and friendliness, fairness and justice, inclusiveness and sharing, respect for privacy, security and controllability, shared responsibility, open cooperation, and agile governance⁵⁶.

China’s AIDP named “massive data resources” as one of its unique advantages in AI development. While most of its policy literature on AI regulations emphasize the importance of privacy, scholars have debated exactly what types of

⁵⁴“New Generation Artificial Intelligence Development Plan,” July 20, 2017, State Council, People’s Republic of China. http://www.gov.cn/zhengce/content/2017-07/20/content_5211996.htm

⁵⁵Ding, J., Triolo, P.”Translation: Excerpts from China’s ‘White Paper on Artificial Intelligence Standardization,’ June 20, 2018, New America. <https://www.newamerica.org/cybersecurity-initiative/digichina/blog/translation-excerpts-chinas-white-paper-artificial-intelligence>

⁵⁶“China issues principles of next generation AI governance,” June 18, 2019, Xinhua. http://www.xinhuanet.com/english/2019-06/18/c_138152819.htm

personal data are protected, considering China’s historically looser data protection regulations when compared to some of the western countries. In 2018, a privacy standard called Personal Information Security Specification was released to elaborate on broad privacy rules, which were established in the 2017 Cyber Security Law⁵⁷. However, the Specification has been described to function more as a voluntary standard instead of a binding data protection law such as the GDPR in the EU.

In late 2020, a draft of a new personal data protection law was put into consultation process⁵⁸. Whether it may present any impact on China’s AI governance remains to be observed.

The European Union

The European Union’s efforts to regulate Artificial Intelligence are set around a collaboration between streamlining research efforts, fostering collaboration between Member states and increasing investment into AI development and deployment. At the same time the EU is developing a regulatory framework to determine which requirements relevant actors will have to fulfill, especially looking at high-risk applications.

Furthermore, the EU has been leading the field of data protection with the recent General Data Protection Regulation (GDPR) rising to particular prominence. Therefore, it is unsurprising that the EU’s approach to ethics and data protection has been at the forefront of the debate on AI in Europe. Through the European data strategy as well as the Report on the safety and liability aspects of AI the EU is advancing its vision that freely available non-personal data should empower everyone to make better decisions.⁵⁹⁶⁰

United Kingdom

The UK government has published “a guide to using artificial intelligence in the public sector” is meant to be a guideline for AI based projects. It covers everything from evaluating AI as a potential tool for some project to management/maintenance and ethics. The Ethics section is a summary of the Alan Turing Institute’s guidance.

There are three new bodies founded:

- AI Council: Expert committee from academia and business.
- Office for AI: Follows up on the implementation of UK’s AI strategy.

⁵⁷Creemers, R., Triolo, R., Webster, G, “Translation: Cybersecurity Law of the People’s Republic of China (Effective June 1, 2017),” June 29, 2018, New America. <https://www.newamerica.org/cybersecurity-initiative/digichina/blog/translation-cybersecurity-law-peoples-republic-china/>

⁵⁸“The full text of the”Personal Information Protection Law of the People’s Republic of China (Draft)” announced”, October 21, 2020, SECRSS, <https://www.secrss.com/articles/26427>

⁵⁹(European Commission, 2020c)

⁶⁰(European Commission, 2020a)

- Centre for Data Ethics and Innovation: identifies measures needed to make sure the development of AI is safe, ethical and innovative.

The UK also has a Data Ethics Framework. The goal is stated as: “The Data Ethics Framework guides appropriate and responsible data use in government and the wider public sector. It helps public servants understand ethical considerations, address these within their projects, and encourages responsible innovation.”

(<https://www.globallegalinsights.com/practice-areas/ai-machine-learning-and-big-data-laws-and-regulations/u>)
-> See

The report “Artificial Intelligence and Public Standards” argues that the area of “transparency and data bias” requires urgent guidance and regulation. Otherwise it is suggested that existing institutions are “commendable” and the UK does not need a new AI regulator.

The UK also has set up a fund named “Regulator’s Pioneer Fund” to help regulators promote latest regulator practices when developing emerging tech.

Japan

The current efforts by Japan’s government in building a regulatory and governance system for AI can be described in three aspects: ethics principles, specific AI and data guidelines, and data protection regulations.

On a high-level, Japan founded its “Social Principles of Human-Centric AI”⁶¹. Its three overarching principles are Dignity, Diversity and Inclusion, and Sustainability. Private companies involved in AI development must comply with these principles. Japan is also one of the countries that have adopted the “OECD Principles on AI”⁶² announced in 2019.

On a practical level, Japan recognises that the fundamental ingredient of AI development is large amounts of data, and have formulated several guidelines that address different stakeholders and aspects of AI utilization.

- Japan’s “AI Utilization Guidelines” (2019)⁶³ advises stakeholders including developers, users, service producers, end users (business and consumer) on what to consider in AI utilization. Ten principles were suggested with regards to data quality, collaboration, safety, security, fairness, privacy, etc.

⁶¹“Social Principles of Human-centric AI,” 2019, Government of Japan, <https://www8.cao.go.jp/cstp/english/humancentricai.pdf>

⁶²“The Recommendation on Artificial Intelligence (AI),” 2019, OECD, <https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449#backgroundInformation>

⁶³“AI Utilization Guidelines,” August 9, 2019, Government of Japan, https://www.soumu.go.jp/main_content/000658284.pdf

- Japan’s AI Strategy references the Basic Act on the Advancement of Public and Private Sector Data Utilization, enacted as legislation in 2016⁶⁴, which regulates under which purposes and mechanisms the government and private sector shall coordinate in data utilization.
- Japan’s AI Strategy also references the “Cyber Physical Security Framework” (2018), which addressed rules and methodologies that ensure trustworthiness of data in cross-sectoral data cooperation⁶⁵. Japan’s AI Strategy plans to build on the framework and develop trust data linkage infrastructure that enable international mutual authentication with the U.S. and Europe.

On a data protection level, Japan’s Act on the Protection of Personal Information (APPI) was enacted in 2003 and was subsequently amended several times to raise data protection standards. In mid-2020, the APPI was amended to include the rights of data subject to request data deletion, the obligation for data operators to report data breach, stricter oversight on the use of cookies, and including pseudonymised information as a category of personal data (similar to GDPR in the EU). As the new APPI is expected to come into effect in 2022⁶⁶, its potential impacts on AI products and services using personal data are yet to be observed.

Mexico

What is mentioned in regards to Data & Ethics in the Mexican AI Strategy are mere recommendations on what the Government/The “Office of AI” should do in regard to these topics rather than real commitments.

So in order to create a data infrastructure that allows Mexico the best possible advantage of the benefits of AI, it is recommended that the government should⁶⁷:

1. Update the legal framework with respect to personal data in order to > promote greater access considering privacy protection and ethical criteria
2. Accelerate access to the greatest quantity of data in a way that > respects ethics and privacy.
3. Drive standardization of data in public databases, e.g., based on > the international Open Data Charter

⁶⁴“Outline of the Basic Act on the Advancement of Public and Private Sector Data Utilization,” 2016, Government of Japan, <https://japan.kantei.go.jp/policy/it/outline.pdf>

⁶⁵“The Cyber/Physical Security Framework,” April 18, 2019, Ministry of Economy, Trade and Industry, Government of Japan. https://www.meti.go.jp/english/press/2019/pdf/0418_001a.pdf

⁶⁶“Japan makes amendments to their Act on the Protection of Personal Information,” July 2, 2020. Clifford Chance, *Talking Tech*. <https://talkingtech.cliffordchance.com/en/data-cyber/data/amendments-to-the-protection-of-personal-information-act-of-japa.htm>

⁶⁷British Embassy Mexico City, Oxford Insights and C Minds (2018). TOWARDS AN AI STRATEGY IN MEXICO: Harnessing the AI Revolution. [online] . Available at: https://docs.wixstatic.com/ugd/7be025_e726c582191c49d2b8b6517a590151f6.pdf [Accessed 25 Feb. 2021].

Regarding ethics following recommendations are foreseen⁶⁸: 1. Create a specialized independent body that protects and monitors > human rights related to developing and implementing AI in Mexico, with support from academia and different interest groups (known in the future as the “Mexican AI Ethics Council”) 2. Establish minimum standards (technical and non-technical) and auditing mechanisms for these standards. Technical standards should include clear, robust and valid metrics for AI systems in order to reduce and identify errors and biases. The non-technical standards should include but not be limited to transparency and easily explainable AI systems, e.g., requiring risk disclosure and potential negative impacts of AI systems on research 3. Incentivize the creation of independent organizations that can monitor and audit AI systems 4. Promote the development and ethical use of AI 5. Create practical tools to support the adoption of international guidelines on the ethical use of AI 6. Promote the inclusion of minorities and vulnerable groups in projects and institutions dedicated to topics related to AI

Bertoldi, Moreno, Annika Eriksgård Melander, and Peter Weiss. “Can Economic Transitions Be Planned? China and the 13th Five-Year Plan.” European Commission, September 2016. https://ec.europa.eu/info/sites/info/files/file_import/eb017_en_2.pdf.

British Embassy Mexico City, Oxford Insights, and C Minds. “TOWARDS AN AI STRATEGY IN MEXICO: Harnessing the AI Revolution,” 2018. https://docs.wixstatic.com/ugd/7be025_e726c582191c49d2b8b6517a590151f6.pdf.

CAF – Development Bank of Latin America, 2020. https://7da2ca8d-b80d-4593-a0ab-5272e2b9c6c5.filesusr.com/ugd/7be025_5b56471311f74346a6ad5faa1e7a8ec9.pdf.

China Plus. “Jaywalkers in Nanjing Face Social Credit Downgrade,” July 2019. <http://chinaplus.cri.cn/news/china/9/20190705/312844.html>.

Clifford Chance. “Amendments to the Protection of Personal Information Act of Japan,” July 2020. <https://talkingtech.cliffordchance.com/en/data-cyber/data/amendments-to-the-protection-of-personal-information-act-of-japa.html>.

Creemers, Rogier, Paul Triolo, and Graham Webster. “Translation: Cybersecurity Law of the People’s Republic of China (Effective June 1, 2017).” New America, 2017. <https://www.newamerica.org/cybersecurity-initiative/digichina/blog/translation-cybersecurity-law-peoples-republic-china/>.

Ding, Jeffrey, and Paul Triolo. “Translation: Excerpts from China’s ‘White Paper on Artificial Intelligence Standardization’” New America, June 2018. <https://www.newamerica.org/cybersecurity-initiative/digichina/blog/translation-excerpts-chinas-white-paper-artificial-intelligence-standardization/>.

⁶⁸ibid.

- Djeffal, Christian. “Artificial Intelligence and Public Governance: Normative Guidelines for Artificial Intelligence in Government and Public Administration.” *Regulating Artificial Intelligence* 99 (2020): 277–93. doi:10.1007/978-3-030-32361-5_12.
- Economics Affairs, Federal Ministry for, and Energy. “Federal Government Adopts Artificial Intelligence Strategy.” Federal Ministry for Economics Affairs; Energy, 2018. <https://www.bmwi.de/Redaktion/EN/Pressemitteilungen/2018/20181116-federal-government-adopts-artificial-intelligence-strategy.html>.
- Edler, Jakob, and Jan Fagerberg. “Innovation Policy: What, Why, and How.” *Oxford Review of Economic Policy* 33 (January 2017): 2–23. doi:10.1093/oxrep/grx001.
- Engelmann, Severin, Mo Chen, Felix Fischer, Ching-Yu Kao, and Jens Grossklags. “Clear Sanctions, Vague Rewards: How China’s Social Credit System Currently Defines ”Good” and ”Bad” Behavior.” *FAT* ’19: Proceedings of the Conference on Fairness, Accountability, and Transparency*, January 2019. doi:10.1145/3287560.3287585.
- European Commission. “A European Strategy for Data,” Autumn 2020. <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1593073685620&uri=CELEX%3A52020DC0066>.
- . “Artificial Intelligence for Europe.” <https://ec.europa.eu/digital-single-market/en/news/communication-artificial-intelligence-europe>, 2018.
- . “On Artificial Intelligence -a European Approach to Excellence and Trust White Paper on Artificial Intelligence a European Approach to Excellence and Trust,” February 2020. https://ec.europa.eu/info/sites/info/files/commission-white-paper-artificial-intelligence-feb2020_en.pdf.
- . “Report on the Safety and Liability Implications of Artificial Intelligence, the Internet of Things and Robotics,” February 2020. <https://eur-lex.europa.eu/legal-content/en/TXT/?qid=1593079180383&uri=CELEX%3A52020DC0064>.
- Freeman, Chris. “The ‘National System of Innovation’ in Historical Perspective.” *Cambridge Journal of Economics* 19 (February 1995). doi:10.1093/oxfordjournals.cje.a035309.
- Global Times. “City Targets Jaywalking with Detailed Social Credit System - Global Times,” July 2019. <https://www.globaltimes.cn/content/1156908.shtml>.
- Government of Japan. “‘Artificial Intelligence Technology Strategy’,” March 2017. https://ai-japan.s3-ap-northeast-1.amazonaws.com/7116/0377/5269/Artificial_Intelligence_Technology_StrategyMarch2017.pdf.

- Government of Japan. “Outline of the Basic Act on the Advancement of Public and Private Sector Data Utilization,” 2016. <https://japan.kantei.go.jp/policy/it/outline.pdf>.
- . “Social Principles of Human-Centric AI,” 2019. <https://www8.cao.go.jp/cstp/english/humancentricai.pdf>.
- Government of Japan. “2020 - - (in Japanese).” Accessed January 10, 2021. <https://www8.cao.go.jp/cstp/tougosenryaku/index.html>.
- HolonIQ. “HOLONIQ. GLOBAL INTELLIGENCE Global AI Strategy Landscape,” February 2020. <https://www.holoniq.com/wp-content/uploads/2020/02/HolonIQ-2020-AI-Strategy-Landscape.pdf>.
- IA2030MX. “Agenda Nacional Mexicana de Inteligencia Artificial,” 2020. https://36dc704c-0d61-4da0-87fa-917581cbce16.filesusr.com/ugd/7be025_6f45f669e2fa4910b32671a001074987.pdf.
- “Japan to Fund AI Matchmaking to Boost Birth Rate.” *BBC News*, December 2020. <https://www.bbc.com/news/world-asia-55226098>.
- Kim, Jihyun. “Japan to Develop Assessment System to Speed up AI Development.” *BioWorld*, August 2019. <https://www.bioworld.com/articles/429318-japan-to-develop-assessment-system-to-speed-up-ai-development>.
- Ministry of Industry, and People’s Republic of China Information Technology. “‘Three-Year Action Plan to Promote the Development of New Generation Artificial Intelligence Industry.’” www.miit.gov.cn, December 2017. https://www.miit.gov.cn/jgsj/kjs/gzdt/art/2020/art_a322b0d7c20645e19b3d4e09bf787f06.html.
- Ministry of Internal Affairs, and Government of Japan Communications. “AI Utilization Guidelines,” 2019. https://www.soumu.go.jp/main_content/000658284.pdf.
- Ministry of Science, and People’s Republic of China Technology. “The Ministry of Science and Technology Holds AIDP and a Major Technology Project Launch Meeting,” November 2017. http://www.most.gov.cn/kjbgz/201711/t20171120_136303.htm#.
- Nikkei Asia. “Japan Plans 10 ‘AI Hospitals’ to Ease Doctor Shortages.” *Nikkei Asia*, August 2018. <https://asia.nikkei.com/Politics/Japan-plans-10-AI-hospitals-to-ease-doctor-shortages>.
- OECD. “OECD Legal Instruments.” legalinstruments.oecd.org, 2019. <https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449#backgroundInformation>.
- People’s Republic of China, 2017. http://www.gov.cn/zhengce/content/2017-07/20/content_5211996.htm.

- Politico. “Macron’s €1.5 Billion Plan to Drag France into the Age of Artificial Intelligence.” POLITICO, March 2018. <https://www.politico.eu/article/macron-aims-to-drag-france-into-the-age-of-artificial-intelligence/>.
- Roberts, Huw, Josh Cows, Jessica Morley, Mariarosaria Taddeo, Vincent Wang, and Luciano Floridi. “The Chinese Approach to Artificial Intelligence: An Analysis of Policy, Ethics, and Regulation.” *AI & SOCIETY* 36 (June 2020). doi:10.1007/s00146-020-00992-2.
- Secretaría de Hacienda y de Crédito Público. “Informe de Autoevaluación Enero-Diciembre 2017,” 2017. https://www.condusef.gob.mx/transparencia/IA_enero_dic_2017.pdf.
- SECRSS. “The Full Text of the ”Personal Information Protection Law of the People’s Republic of China (Draft)” Announced.” www.secrss.com, October 2020. <https://www.secrss.com/articles/26427>.
- Technology, and Government of Japan Innovation. “‘The Prime Minister in Action’,” September 2016. https://japan.kantei.go.jp/97_abe/actions/201609/15article2.html.
- Trade, and Government of Japan Industry. “The Cyber/Physical Security Framework(CPSF) Version 1.0 Cybersecurity Division Commerce and Information Policy Bureau,” 2019. https://www.meti.go.jp/english/press/2019/pdf/0418_001a.pdf.
- Xinhua. “China Issues Principles of Next Generation AI Governance,” June 2019. http://www.xinhuanet.com/english/2019-06/18/c_138152819.htm.