

THE GLOBAL AI RACE IS ON

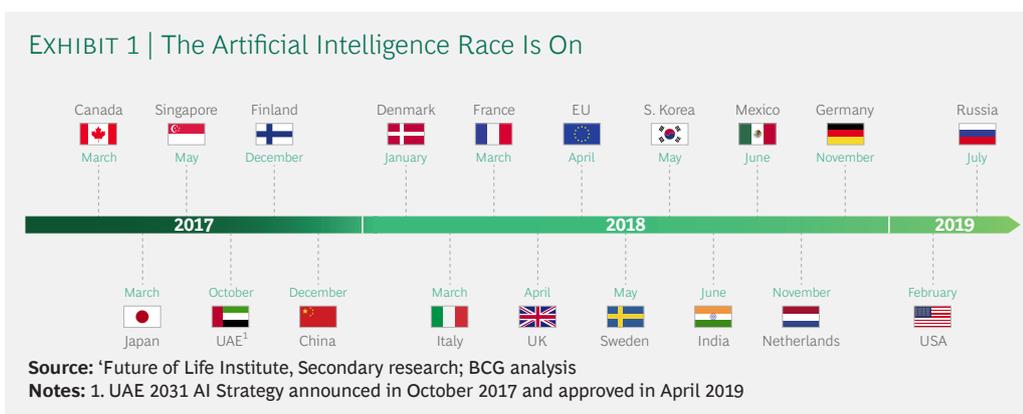
OBSERVATIONS FROM LEADING NATIONAL AI STRATEGIES

By David Panhans, Faisal Hamady, Thibault Werle, and Raphael Gomez

A global race, led from the top

GLOBAL TECH GIANTS have been competing for artificial intelligence (AI) leadership for more than a decade. Google, Apple, Facebook, Amazon, Microsoft, and IBM in the US, along with Baidu, Alibaba, and Tencent in China, have been the front-runners, while a wide variety of niche players, mostly startups, have increasingly pushed the boundaries of core and applied AI.

It is, however, only in the past two years that governments have begun to formalize and communicate their AI strategies, detailing measures for promoting and supporting local AI development that will position their countries on the global AI stage. Several governments have signaled the importance and seriousness of their plans by having their nations' top leaders establish dedicated, highly visible AI bodies, announce the country's AI strategy, or even appoint AI ministers of state.



French President Emmanuel Macron personally launched a task force dedicated to creating France’s AI strategy. Then, in March 2018, at the AI for Humanity summit, Macron announced his plan to help make the country a leader in AI by building national champions and attracting global companies at the forefront of AI research and development. Germany also elevated the AI debate, with Chancellor Angela Merkel announcing the country’s AI strategy at the Digital Summit in Nuremberg in November 2018. Its aim is to make Germany a “leading global AI hub.” The United Arab Emirates (UAE) highlighted the importance of AI by having the Vice President and Prime Minister, His Highness Sheikh Mohammed bin Rashid Al Maktoum, appointing the world’s first Minister of State for Artificial Intelligence, Omar Sultan Al Olama in October 2017.

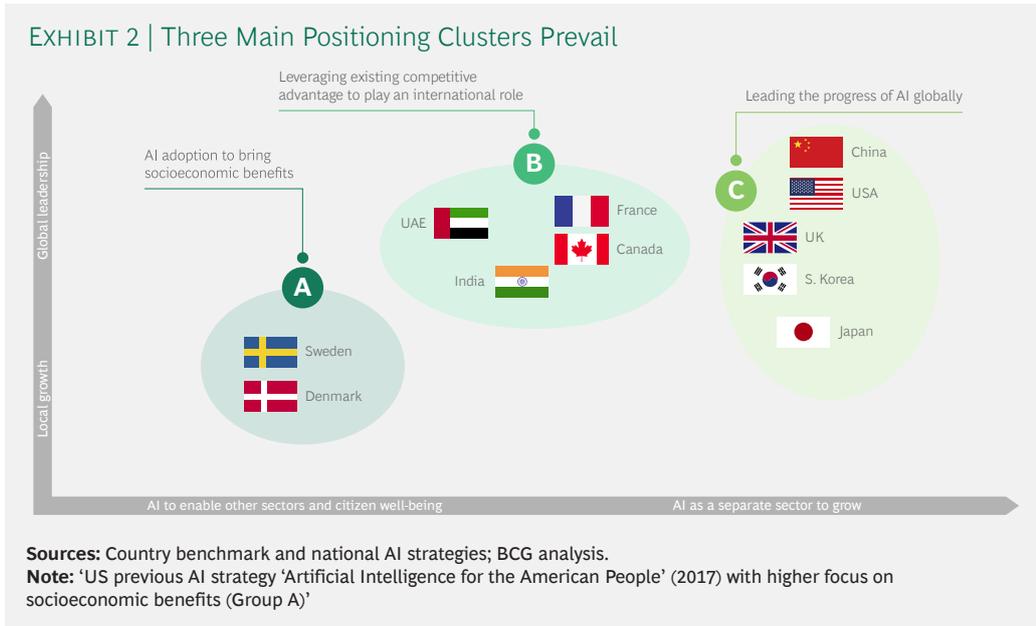
As is evident from these examples, other countries are joining the US and China in the race and pushing the AI agenda on the government side. In fact, over the past two years, a national AI strategy has been announced every month, on average. (See Exhibit 1.)

Nations rushing to claim niches

Despite variations in the AI positioning across nations, three main archetypes prevail. (See Exhibit 2.)

Some countries see AI as key to **improving citizen welfare** and national well-being overall. In Sweden’s “National Approach to Artificial Intelligence” released in May 2018, the country mentions that AI is crucial for broad societal benefits and can particularly contribute to, among other things, “better disease identification, less energy consumption, [and] traffic accident reduction....”. Similarly, in the US’ strategy “Artificial Intelligence for the American People” released in May 2018, the Trump administration stresses that AI will “virtually improve every aspect of our [American] lives,” with an emphasis on new job creation in innovative industries, increased development of AI talents, and targeted initiatives such as the sharing of government open data for AI social research.

Other nations see AI as a way to assert their current standing on the global stage or **reinforce a niche advantage** in the field. India, for instance, has declared its intention to become “the AI garage for the developing world,” where the relevant ecosystem (such as talent, infrastructure, test beds, and data) can connect, flourish, and scale up further for the rest of the developing world. The UAE aspires to be a global hub for AI, with a focus on defining appropriate AI legislation and responsible governance, seeking, for instance, mechanisms to reduce or prevent moral bias in algorithms.



Still other countries see AI as a way to **gain a global competitive advantage**. China has the ambition to “lead the world in AI theories, technologies, and applications,” while in the US, President Trump announced his plan to “maintain American leadership in artificial intelligence,” and the UK made AI one of its “Grand Challenges” alongside others such as the future of mobility and an aging society, with the goal of becoming an international leader in the field.

Across those archetypes, efforts and funding are inclined to focus on areas where the government typically drives the agenda. These areas include the following:

- **Research and Development.** Countries are building centers of excellence, strengthening AI research schemes, and creating interdisciplinary research communities.
- **Local AI Startups.** Governments are improving startups’ access to funding, connecting emerging companies with opportunities, and providing tailored advisory to support their scale-up.

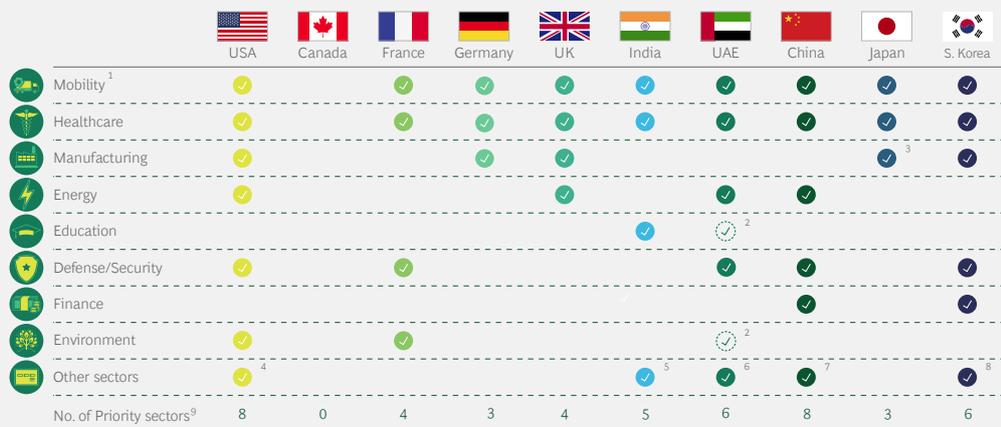
- **Talent.** Countries are developing and deploying targeted AI training programs and embedding AI in schools’ and universities’ curricula.
- **National Infrastructure.** Governments are developing AI test beds, facilitating access to AI regulatory sandboxes, and accelerating efforts to make relevant data digital and accessible.

Strategic focus on a handful of sectors, with health care and mobility common across all

As countries plan their AI futures, common priorities are emerging: an AI strategy should align with the national agenda, boost economic productivity, and elevate citizens’ well-being. These priorities, in turn, are leading countries to focus on a handful of sectors to achieve these goals.

In fact, most countries have announced that their AI strategies will focus only on certain sectors. (See Exhibit 3.) For instance, France announced it would focus on four: mobility, health care, defense and security, and the environment.

EXHIBIT 3 | Benchmark Countries Focus on a Handful of Sectors



Sources: National AI Strategy blueprints; BCG analysis

Note: 1. Including Logistics and Transportation. 2. Sectors included in initial strategy but not in official cabinet approval in April 2019. 3. Productivity. 4. Space exploration. 5. Agriculture, smart cities, infrastructure. 6. Tourism and Hospitality. 7. Agriculture, commerce, household goods. 8. Broadcasting. 9. Number of sectors as defined by BCG.

Canada, by contrast, indicated it would be sector agnostic; it plans to push a general AI research agenda, in line with its goal to become a hub for AI research and talents.

Mobility (including logistics and transportation) and health care are two focuses that most countries have in common. By giving attention to mobility, governments can address long-standing issues such as road safety, efficiency of public transportation, and traffic management, improving overall citizens' safety. By targeting health care, governments can ensure that citizens are the prime beneficiaries of the latest breakthroughs in medical technology, such as devices that improve early diagnoses, outcome predictions, and prognosis evaluations.

Considerable steps forward, but still a long way to go

Driven by global leadership ambitions and fueled by defense spending, the US government plans to allocate an estimated \$35 billion on AI over the next five years. In China, at least two regional governments have committed to investing more than \$14 billion each by 2025; they will focus mainly on AI research and intellectual property development. The US and China are leading other nations when it comes to committing to budgets that will support their AI plans.

For the rest, despite AI's swift path to the top of their leadership agendas, nations' public investments lag behind private-sector spending.

For example, France recently announced that it would double its AI budget of \$1.7 billion for the next five years. The investment will go toward doubling the number of PhDs in AI, creating one of the most powerful supercomputers in Europe, and incentivizing large tech companies to set up their R&D centers in France. Germany also announced an investment of \$3.4 billion to become an AI powerhouse. Other countries are taking a more targeted approach. Canada, for example, has invested about \$400 million solely in research and innovation, mostly through PhD grants.

In comparison, AI-related startups in the US raised about \$9.3 billion in 2018, and Google, Apple, Facebook, and Amazon invested more than \$6 billion over the past two years in acquisition of AI startups. These companies are expected to further increase their spending as the AI race heats up, and early signs support this view.

Varying national approaches to AI governance

The need for national and international AI governance has grown over the past few years. As the number of AI applications has increased, so, too, has the concern for potential pitfalls stemming from lacking the right resources and priorities, biased learning algorithms, or job losses due to increased automation and the prevalence of learning systems.

To drive and steer AI strategies locally, countries have adopted various governance mechanisms, depending on the role they envision for government in the AI transition. (See Exhibit 4.)

Some countries have taken the driver's seat in accelerating and controlling local AI development. The UK, for instance, has chosen to actively oversee the implementation of its AI strategies and the growth of the AI sector through three main dedicated bodies:

- **The Office for AI**, an internal government body that is advised by DeepMind's CEO, Dr. Demis Hassabis. It is responsible for overseeing implementation of the national AI strategy.
- **The AI Council**, chaired by Tabitha Goldstaub, cofounder of CognitionX, an AI advice platform. The council brings together renowned members of academia in the field of AI, leaders from the AI industry and the private sector, and government representatives to steer the strategy implementation for the Office for AI and advise the government on AI policies.

- **The Center for Data Ethics and Innovation**, composed of independent board members from various backgrounds. The center’s mission is to advise the government on policies to maximize the benefits of data-enabled technologies, including AI.

A handful of countries have adopted the more hands-off role of orchestrator, facilitating stakeholder interactions and enabling the AI strategy rather than actively pushing it. In the US and UAE, dedicated AI councils bring together main stakeholders from the public, private, and academic sectors to discuss AI and its future, with limited involvement (for now) in the implementation of national plans.

Some other countries have yet to define their governance model and, for now, are facilitating public debate, allowing the private sector and academia to propel the change. One such country is Germany, where AI matters are debated and discussed in dedicated public forums within the Lernende Systeme, an online platform hosting members from the scientific, government, civil, and commercial communities, enabling them to ex-

change ideas in a number of working groups, such as the Future of Work and Human-Machine Interaction. The groups produce recommendations for action and policies and communicate them to the relevant ministerial bodies.

The debate around the societal and ethical implications of AI has also found a forum in numerous setups. Countries such as the UK, South Korea, India, and Canada have established dedicated governance bodies to debate, study, and steer AI progress to ensure that ethical and societal values are embedded in future developments.

Such governance bodies include the newly established Chinese AI Ethics Committee. The committee is set up to debate the personal privacy implications and risks of mass facial-recognition deployment in China’s subways, at street crossings, and other public places.

In Europe, the European Commission formed the High-Level Expert Group on Artificial Intelligence. It is composed of more than 50 experts from various backgrounds, including AI professionals, re-

EXHIBIT 4 | The Varying Role of Government Across Countries

	UK	China	S. Korea	Japan	France	USA	UAE	India	Canada	Germany	New Zealand
AI-related governance and role											
AI council/committee Define national AI strategy and targets, discuss policies	✓	✓	1	✓	✓	✓	✓				
National AI center Monitor and implement national AI strategy	✓	✓									
Stakeholder forum Ensures transparency and open dialog among stakeholders	✓				✓		2			✓	✓
Ethics committee/other Lead public local and global discussion around selected AI topics (e.g., ethics in AI)	✓		✓					✓	✓		

Driver's seat:
Government overseeing implementation of AI strategy and proactively engaging stakeholders to achieve its goals

Sources: National AI strategy blueprints benchmark.

Note: 1. South Korea AI strategy led by Ministry of Science and ICT. 2. UAE organized first International Forum on Global Governance of AI in 2018 World Government Summit

searchers, sociologists, and national government representatives. In February 2019, the group issued the Draft Ethics Guidelines for Trustworthy AI, which lists ten guiding principles for the “development and release of trustworthy AI,” including nondiscrimination and respect for human autonomy.

AI HAS A STRONG POTENTIAL TO disrupt industries and countries’ economies around the world, and is proving to be a

force multiplier for the global economy in favor of high-tech nations. Many countries have started, with varying speed, to embrace AI and steer it toward economic and social benefits.

As more AI applications make their way into citizens’ everyday lives, governments have an imperative to act on the strategies that they have put forward, strengthen their positions in the AI space—and do so rapidly. The (AI) future will belong to those who can learn, and act, fast enough.

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