

# Empowering governments to lead in the AI era

A national strategic framework

September 2024

A hand holding a glowing digital cityscape and globe. The scene is set against a dark blue background with floating particles. The hand is positioned at the bottom, holding a glowing white platform. On this platform, there is a stylized cityscape with several buildings of varying heights. Above the cityscape, a glowing globe is visible, surrounded by vertical lines of light and dots, suggesting a digital or data-driven environment. The overall aesthetic is futuristic and technological.

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# 1 Foreword

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**Antonio De Palmas**

*Vice President Global Market Development, Worldwide Public Sector, Microsoft*

**“In the AI era, it’s imperative that governments establish national AI strategies. Aligning with the rapid pace of AI advancement is a necessity for shaping a future where innovation thrives and societies flourish.”**

In the rapidly evolving era of AI, governments face a critical imperative: to develop and modernize their national AI strategies. These strategies are not just blueprints; they’re lifelines, guiding nations through the dynamic landscape of technological advancement. By updating their approaches, governments can align themselves with the accelerating pace of AI innovation. Embracing this challenge isn’t just an option—it’s essential for shaping a future where the benefits of AI are maximized for the betterment of all.



**Didier Ongena**

*Worldwide Government Industry Leader, Microsoft*

**“As AI reshapes industries, governments must harness these advancements to revolutionize key sectors. Embracing AI’s transformative power allows governments to lead innovation, driving progress and prosperity for their people.”**

In the ever-evolving landscape of technology, the transformative force of AI is reshaping industries at an unprecedented pace. Recognizing this tide of innovation, governments have a unique opportunity to leverage AI advancements to revolutionize key sectors in alignment with their strategic priorities. Embracing AI’s potential enables governments to lead the charge in driving progress, fostering resilience, and, ultimately, enhancing the wellbeing of their people.

## 2 Introduction

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Artificial intelligence (AI) has emerged as a central pillar of digital transformation, catching the attention of governments worldwide with its promise of economic advancement, streamlined governance, and improved public services. As we embrace the new era of generative AI, leaders should reframe existing AI strategies or define new goals with these new capabilities in mind, so key sectors can fully capitalize on the technology's potential.

Based on our experience working alongside government teams and implementing transformative AI initiatives, we are proposing that leaders build and refine a national AI strategy, aimed at harnessing the unparalleled capabilities of AI. By swiftly adapting to these advancements, governments can lead their nations to the forefront of innovation, ensuring a prosperous future for generations to come.

This document outlines a set of strategic objectives and identifies key sectors for AI integration, including finance, healthcare, public safety, and sustainability. It also covers guidelines for establishing robust governance and regulatory frameworks imperative for the responsible application of AI, while rigorously upholding data privacy and security protocols.

The implementation roadmap we describe can guide conversations around readiness and early initiatives through to long-term strategy and advanced AI implementation. With methodologies for monitoring progress and adjusting course, governments using this guide will be primed for the transformative potential of integrating AI into their operations.





### Vision for AI

This pillar encapsulates the foundational elements of the leadership and the strategic utilization of AI to catalyze global competitiveness, economic growth and enhance social prosperity.



### Current AI Landscape

This pillar focuses on understanding and evaluating country-specific current AI capabilities and potential through a comprehensive AI Maturity Model and SWOT analysis.



### Strategic Objectives Definition

This pillar emphasizes the importance of aligning strategic objectives for the government's AI initiatives with the overarching governmental vision, ensuring that each goal directly contributes to the broader national agenda.



### Sectoral Transformation through AI

This pillar aims at the strategic integration of AI technologies across various sectors to revolutionize service delivery, operational efficiency, and sectoral outcomes.



### Regulatory Framework and Governance

This pillar is dedicated to establishing a comprehensive regulatory framework and governance model that promotes responsible AI practices, and ensures data privacy and security.



### National AI Strategy Implementation

This pillar combines critical steps for executing the National AI strategy, including enhancing AI infrastructure, workforce upskilling, stakeholder collaboration, and strategic roadmap development. It emphasizes ongoing monitoring and adapting the AI initiatives to ensure they remain effective and aligned with national goals.

Figure 1: Microsoft Proposed National AI Strategic Framework

### 3 AI in government: Fueling economic growth and social prosperity

AI has substantial potential to drive sustainable economic growth, enhance social development, and increase GDP for nations around the world. It's rapidly becoming a crucial focus area for governments seeking ways to enhance their global competitiveness and economic prosperity.

#### Boosting the economy

The global AI market is growing rapidly, reaching \$196 billion in 2023 and projected to grow at a CAGR of 36.6% to 2030.<sup>i</sup> Analysts predict that generative AI specifically could contribute up to \$10 trillion to the global economy, a 10% increase in global GDP.<sup>ii</sup> This will likely stem from increased productivity, new markets, and innovative products and services.

The productivity boost is estimated at up to 40%<sup>iii</sup> and could generate \$480 billion. Alongside fact that 50% of organizations expect AI to drive job growth,<sup>iv</sup> this underscores AI's role in driving economic expansion and reshaping employment sectors. These jobs represent new roles in managing, developing, and integrating AI technologies into various industries.

#### Supporting individual needs

Governments deploying AI signifies a leap toward more efficient and responsive public services. By automating routine and administrative tasks, AI has the potential to alleviate the paperwork burden, which 53% of state and local officials report as a significant challenge.<sup>v</sup> Generative AI in particular could lead to \$1.75 trillion in productivity gains by 2033.<sup>vi</sup>

Beyond operational efficiencies, AI-powered analytics and decision-making tools will enhance government services' quality and accessibility, offering more effective, personalized solutions to individual needs.



Artificial Intelligence (AI) is the **defining technology of our times**. The future we will invent is a choice we make, not something that just happens"

– Satya Nadella, Microsoft CEO

## 4 A guide to assessing the current landscape

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Whether they are at the start of the journey or already working with AI, governments should evaluate their current AI landscape to ensure they can harness its full potential. By combining AI maturity models with SWOT analysis, governments can establish a thorough understanding of the opportunities and challenges associated with AI adoption, and highlight current capabilities and future aspirations, taking internal and external factors into account.

### 4.1 The value of conducting an AI maturity assessment

Technology maturity models measure an organization's readiness compared to its goals and identify the gaps in its existing capabilities. Whatever the tool, an AI maturity assessment can help government teams:



**Understand the current state** by creating a clear idea of an organization's operational readiness for AI by assessing attributes that support effective technology adoption.



**Identify strengths and limitations** by highlighting specific activities that demonstrate advancing maturity and capabilities that need further attention and development.



**Guide AI adoption** by providing recommendations for building a foundation for successful AI implementation and identifying gaps between different maturity stages.



**Plan for the future** by clearly laying out the next steps, the work required, and the most efficient ways to accelerate time-to-value and improve performance.



**Measure progress** throughout the maturity stages once the foundational work—or even a specific implementation—is underway.



**Visualize and communicate results** with key stakeholders to ensure everyone understands the organization's position, goals, and roadmap.

Organizations that rush to deploy AI technologies without considering their readiness are likely to come up against challenges. If they fail to match their strategy with their maturity, leaders risk investing budget and time in the wrong technologies or use cases.

For governments that already report high maturity for general AI applications, leaders' attention should be focused on emerging technologies in the space, including generative AI.



## Purpose-built assessment tools for advanced projects

For organizations that are pushing ahead with more complex initiatives, we've also outlined maturity models for machine learning and large language models, to help teams accelerate from planning to a production-ready environment.

- [Machine learning operations maturity model](#)
- [Large language model operations maturity model](#)

## The stages of maturity—and the building blocks for progress

In [Building a Foundation for AI Success: A Leader's Guide](#), we outlined five stages of AI maturity, designed to help organizations categorize their current capabilities. The stages range from early exploration to consistent realization.

Global AI readiness varies widely, with North America and Western Europe outpacing other regions. In many countries, especially those classed as lower income, lagging digital maturity will mean AI maturity will be more difficult to achieve on a national level, especially when it comes to implementing generative AI.<sup>vii</sup>

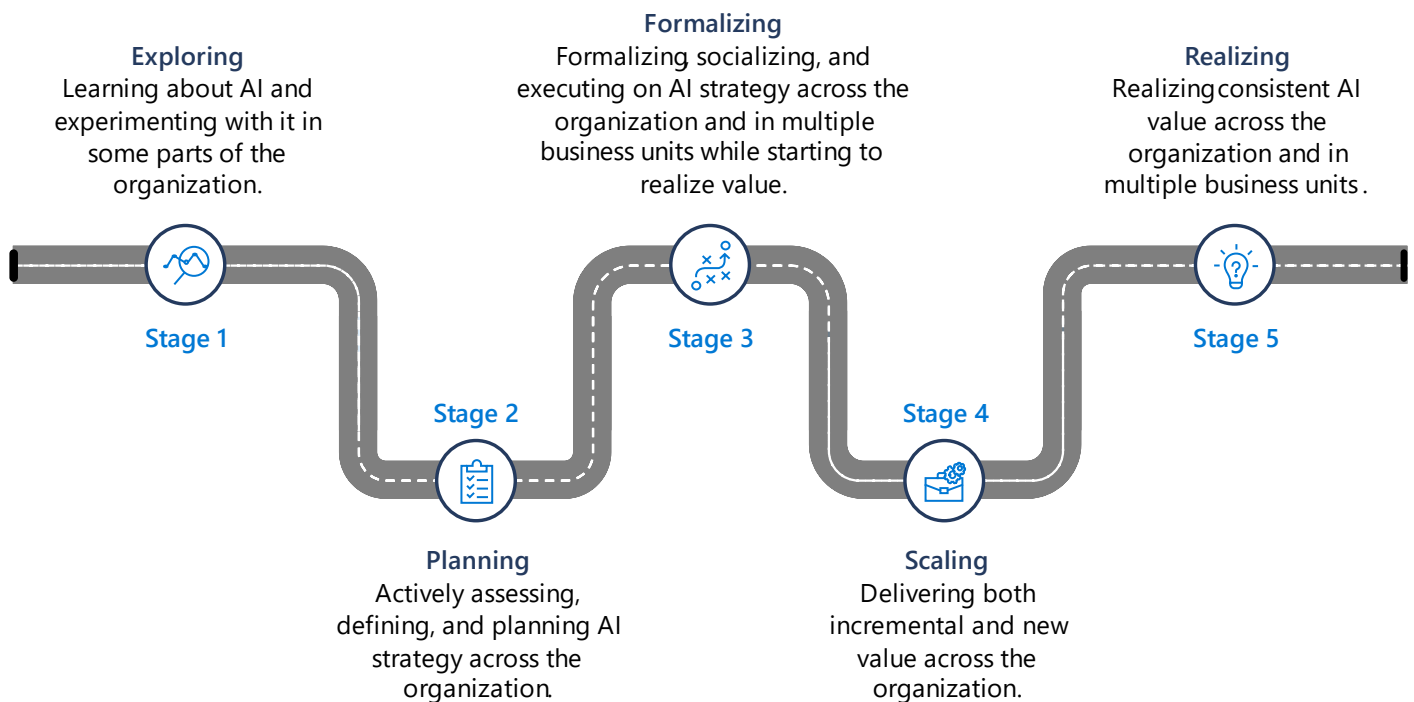


Figure 2: AI Maturity Stages

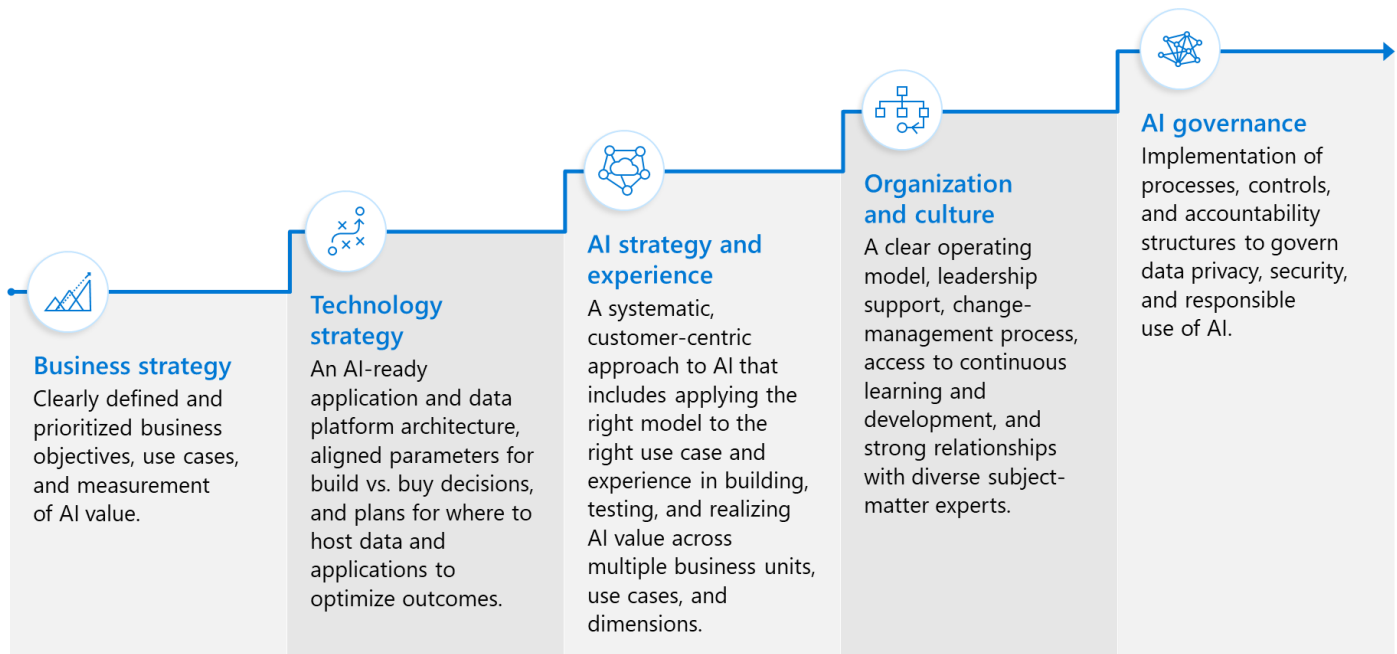


Figure 3: Building Blocks for AI Transformation

## Defining maturity in the age of generative AI

With recent developments in the technology, the global spotlight has turned to generative AI specifically. The new capabilities that generative AI offers could catapult governments to high levels of maturity quickly but, as a rapidly changing technology, leaders will need to pay close attention to defining frameworks for responsible use. This has placed a new level of pressure on governments, many of which are still working to establish their position on AI in general.

Canada's government was among the first to publish guidelines for generative AI in the public sector, with an additional voluntary code of conduct for private entities. In East Asia, China has approved interim legislation for generative AI use ahead of a broader AI law, while Singapore is already trialing a generative chatbot for public servants. There's also notable movement in Australia and New Zealand, with both governments publishing guidance for using generative AI in public services. This is particularly promising for New Zealand, as this marks the first AI policy documents that leaders have released publicly. viii

These developments appear to be pushing governments to consider their positions more quickly, while encouraging leaders to experiment with small-scale generative AI applications. This iterative approach will help agencies realize value quickly while embedding AI within the organizational culture, enabling AI transformation and supporting governments as they aim for stages four and five of the maturity model above.

## Understand your government’s maturity level

The following guides and models can help you define your current maturity, and start outlining your next steps:

<a href="#">Responsible AI Maturity Model</a>	The Microsoft Responsible AI Maturity Model framework uses 24 empirically derived dimensions to help organizations identify their current and desired levels of RAI maturity.
<a href="#">Empowering responsible AI practices</a>	This Microsoft information hub offers policy updates, tools, and guidance for applying responsible AI principles.
<a href="#">Building a foundation for AI success: A leader’s guide</a>	This guide from Microsoft offers pragmatic next steps to accelerate your organization’s AI progress, whether you’re just getting started, developing your organizational expertise, or well along the path.
<a href="#">The art of AI maturity</a>	This Accenture report defines AI maturity and recommends five ways to advance and accelerate AI business transformation.
<a href="#">AI Capability Maturity Model</a>	The AI Capability Maturity Model, developed by the GSA IT Modernization Centers of Excellence (CoE), provides a common framework for federal agencies to evaluate organizational and operational maturity levels.
<a href="#">Artificial intelligence in the public sector: A maturity model</a>	IBM’s AI Maturity Model focuses on the adoption of AI in enterprise applications, and emphasizes the importance of AI engineering delivering AI solutions at scale.
<a href="#">The OECD framework for classifying AI systems</a>	This structure helps differentiate AI systems and map implications for key policy areas, framed by the OECD AI Principles, the first intergovernmental standards for AI.

## 4.2 Completing a SWOT analysis

As governments seek to position themselves as leading players in the global AI landscape, a comprehensive analysis of their strengths, weaknesses, opportunities, and threats (SWOT) is essential. By understanding the internal capabilities and external factors influencing a country's AI ecosystem, stakeholders can navigate challenges, leverage opportunities, and chart a path toward sustainable growth and competitiveness in the rapidly evolving AI market.

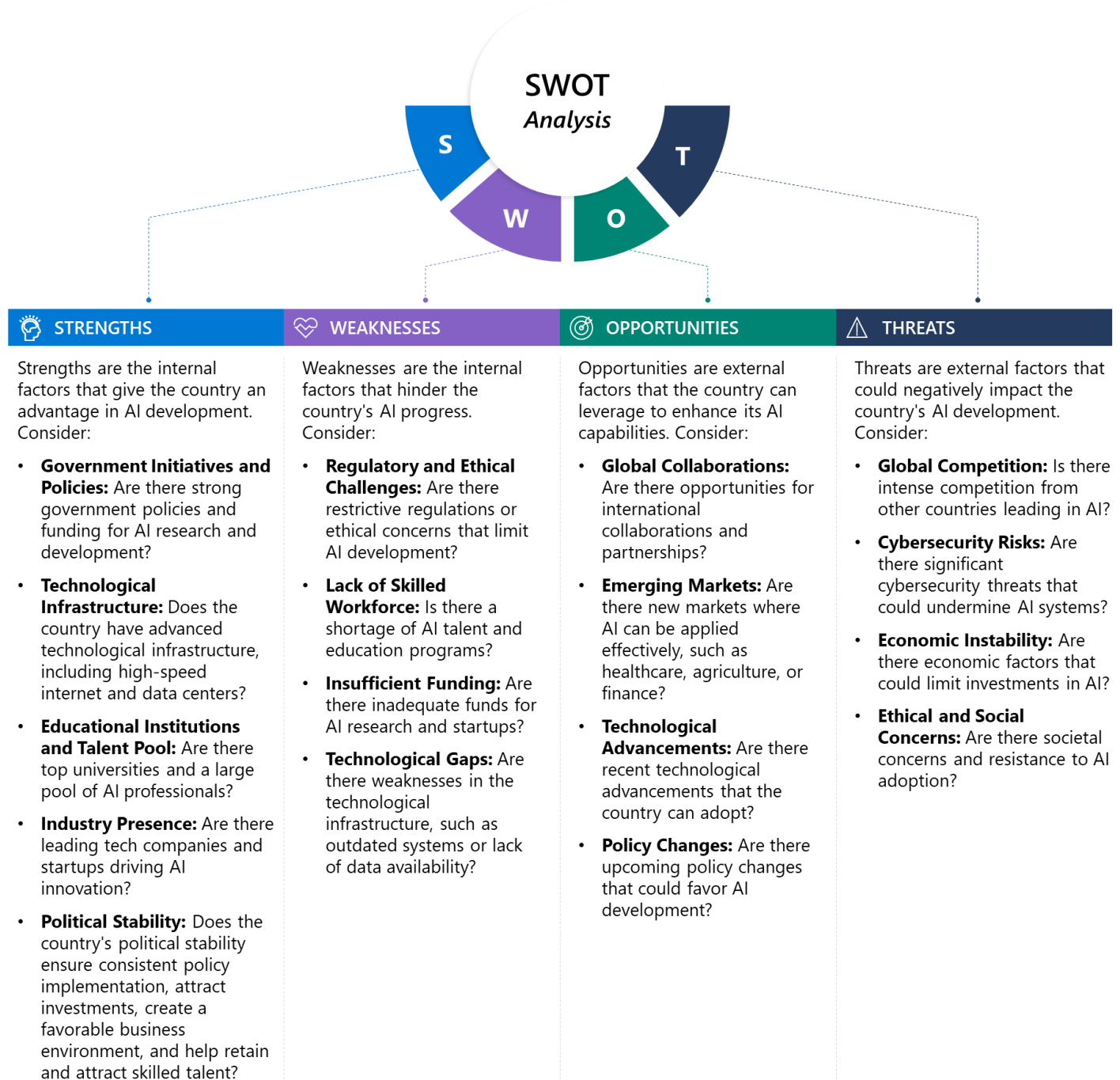


Figure 4: SWOT Analysis Guidance

## 5 Defining the government's strategic objectives

Within the national AI strategy framework, it is vital for governments to articulate their strategic goals clearly, especially when their aims will target multiple sectors and require collaboration between different departments.

The following are sample objectives that could form the core of the strategy:

<b>Establish the nation as an AI innovation hub</b>	<p>To position the country as an AI innovation hub, leaders will need to focus on creating state-of-the-art research facilities and collaborative environments. With generative AI's comparatively recent rise, there is still a significant opportunity for government leaders to push their countries to the forefront of discovery.</p> <p>Attracting globally renowned AI researchers, fostering partnerships between academia and industry, and incentivizing groundbreaking AI projects will be crucial. Encouraging the exchange of knowledge and ideas through conferences, workshops, and international collaborations will be the cornerstone of establishing the country as a distinguished AI hub.</p>
<b>Transform key sectors with AI</b>	<p>Most governments will investigate ways to strategically integrate AI technologies into sectors such as healthcare, education, energy, and finance.</p> <p>Effective collaboration between the government and industry is vital for the seamless deployment and integration of AI solutions to enhance public services and productivity.</p>
<b>Institute strong governance and responsible frameworks</b>	<p>It's essential to establish comprehensive governance and responsible guidelines for AI deployment, which are regularly updated as the technology advances.</p> <p>Policies and standards should reflect national values and align with international best practices, ensuring AI is developed and operated responsibly. Collaboration with global regulatory bodies and experts will enhance these frameworks.</p>
<b>Enhance government and public services</b>	<p>Revolutionizing government services with AI-driven solutions involves streamlining operations and improving service delivery.</p> <p>Initiatives may include implementing automation in administrative processes, introducing chatbots for support services, and utilizing data analytics for decision-making. Ensuring transparency, accessibility, and user-friendliness is central to this transformation.</p>
<b>Build a robust AI ecosystem</b>	<p>By encouraging innovation, entrepreneurship, knowledge-sharing, and collaboration, governments can create a robust AI ecosystem.</p> <p>Facilitating and funding startup incubation programs and establishing policies that incentivize collaboration between startups, established companies, and research institutions will lay the foundation.</p>
<b>Empower talent and a future-ready workforce</b>	<p>AI technologies have the capacity to automate tasks, leading to a significant shift in the way people work within their roles. Governments need to develop effective strategies to manage this transition.</p>

	<p>Addressing the challenges of evolving workforce demands requires equipping individuals with AI-relevant skills. We will likely see many governments establishing educational programs tailored to meet the needs of AI-driven industries.</p>
<b>Leverage data as a strategic asset</b>	<p>Data is a critical asset in AI development and deployment; it needs to be secure, accessible, and high quality.</p> <p>Policies must be in place to govern data usage, sharing, and privacy as leaders encourage data-driven decision-making and implement the infrastructure to support large-scale data analytics. Sharing between public and private sectors will enhance AI capabilities and innovation.</p>
<b>Prioritize research and development</b>	<p>Investment in research and development (R&amp;D) will drive innovation and keep the nation at the forefront of AI technology.</p> <p>The government should foster a culture of innovation and experimentation by forming partnerships with academic and research institutions. Promoting the commercialization of AI research will translate innovations into practical applications, driving economic growth and societal benefits.</p>



## 6 Identifying and transforming key sectors with AI

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Each country will have different priorities and needs, and that will be reflected in the sectors government leaders choose to focus their AI efforts on.

By accurately pinpointing the vital sectors that drive a nation's progress, governments can strategically deploy AI to bring about transformative changes. AI's potential to enhance efficiency, foster innovation, and improve overall effectiveness can significantly impact various sectors. From optimizing government operations to transforming sectors such as healthcare, education, and energy, identifying these key areas is the first step toward leveraging AI's full potential.

Below, we explore some of the sectors with the most potential in brief, with a full breakdown in the appendix.

- 
-  **National and local government**
  -  **Healthcare**
  -  **Education**
  -  **Public finance**
  -  **Transportation and infrastructure**
  -  **Public safety and justice**
  -  **Defense and intelligence**
  -  **Energy**
  -  **Sustainability**



## 6.1 National and local government

For many countries, the AI transformation will begin with the national government's own operations, before expanding into local governments and wider sectors.

AI can make an impact in both internal and external applications. Early implementations will likely target efficiency in the daily workflows of government workers, from analyzing and reporting on research to preparing presentations and communications. These new technologies will also have a key role to play in making government services more accessible, helping people break through bureaucracy to get the support and answers they are looking for.

Success within national and local government will set the stage for transformation across sectors—and all eyes are on leaders as they decide how to take the first step with AI.

[Read more](#)



## 6.2 Healthcare

AI is already making waves in healthcare; there is a rapidly expanding market for innovative technologies in prevention, supporting diagnosis, medical imaging, intervention, research, and more.

For healthcare providers, there are clear opportunities to alleviate the administrative burden in medical professionals' workloads, improving operational efficiency while driving improved outcomes for patients. Healthcare payors are investing in AI for claims processing and customer service applications, while pharmaceutical companies are using its capabilities to bolster their research and development work.

Healthcare is one of the most promising sectors for AI implementation—but it is also one of the sectors where responsible AI practices are most important.

[Read more](#)



## 6.3 Education

AI has been slowly transforming the education sector for years; it is already integrated into many of the Microsoft solutions that teachers and students use every day, for example.

As its footprint in the sector grows, we see eight key areas where AI can make the most difference: personalized learning, student engagement, data analysis, accessibility, custom content, virtual assistants, automated grading, and academic research.

AI will also play a crucial role in cultivating skills for a digitally driven world—supporting students as they enter the evolving workplace.

[Read more](#)





## 6.4 Public finance

Public finance agencies are under significant pressure to improve resilience, boost investment, and support citizens against a background of global instability. AI could play a significant role in both simplifying processes and making systems and services more sophisticated.

Large-scale data analysis, predictive modeling, and automated reporting will all be vital capabilities for finance agency leaders to consider as they scope out their AI initiatives.

[Read more](#)



## 6.5 Transportation and infrastructure

From inner-city mobility to rural road networks, managing transportation across an entire nation is a difficult feat of organization, analysis, and prediction. The way people use transport is changing, and coupled with a growing push toward sustainability, this means leaders need to adapt their approach.

There is an exceptionally wide range of potential AI applications in transportation, such as dynamic traffic management, predictive asset maintenance, automated incident detection, and proactive congestion management.

[On a broader infrastructure scale](#), cities are becoming increasingly sophisticated through technology, and these developments are starting to proliferate in rural spaces, too. AI has a key role to play in government initiatives to improve the quality of life for individuals, by making their environments more liveable, sustainable, and resilient.

Large-scale data analysis and reporting are critical capabilities in this sector, as they will allow leaders to understand public needs in greater depth, and allocate resources and investment based on that insight. The public-facing aspect is important here, too; people who have simple, reliable routes to accessing government services and information that offers personalized responses will be more engaged with their communities.

[Read more](#)



## 6.6 Public safety and justice

Public safety agencies are a crucial part of secure and thriving communities—and when they are not functioning effectively and efficiently, it's people who feel the impact.

There are three key areas where AI can benefit public safety agencies: improved situational awareness, enhanced emergency response, and efficient data management. Initiatives that target these areas will help leaders improve their teams' effectiveness with deeper insight into where they are needed and how they respond.

On the justice side, AI can transform the disjointed legacy processes that create bottlenecks, limit collaboration, and slow down court processes. With modernized case management systems and even virtual hearings, leaders can create a more efficient, collaborative, and equitable justice system.

[Read more](#)



## 6.7 Defense and intelligence

On a complex and constantly changing global stage, defense and intelligence agencies will benefit significantly from secure, purpose-built AI applications that help decision-makers adapt quickly to new situations and risks.

Autonomous systems, advanced cybersecurity measures, and new intelligence-gathering and surveillance techniques will all be enabled by AI in the coming years. AI's ever-evolving capabilities and highly flexible technologies are ideal in an environment where up-to-the-minute insight and the ability to make the right decisions rapidly are paramount.

[Read more](#)



## 6.8 Energy

The energy industry is changing rapidly. Ensuring sustainable, stable, and affordable access to power is becoming increasingly challenging in a world of rising demand and ambitious decarbonization goals.

There are wide-ranging applications for AI across oil and gas and power and utilities. Leaders will be looking for opportunities to improve productivity in field and back-office operations, streamline the supply chain, and improve decision-making.

This is an industry where large-scale data analysis and predictive capabilities will prove particularly impactful.

[Read more](#)



## 6.9 Sustainability

Solving complex, interconnected sustainability issues requires coordinated, collaborative action across government agencies, businesses, and international organizations.

AI can transform sustainability efforts by helping people and organizations extract accurate, timely insights from complex sustainability information—identifying patterns, predicting outcomes, and evaluating the likely impact of potential solutions. AI can also accelerate the development of valuable, industry-specific sustainability solutions and equip the sustainability workforce with intelligent tools that help them do their jobs more efficiently and effectively. [Read more](#)

## 7 AI governance, privacy, and security

Around the world, governments and organizations are looking for guidance on how best to govern AI. How can organizations use this technology to solve our problems? How do they avoid or manage new problems it might create? There is, of course, no single correct approach. However, after years of working to create our own AI systems that are safe, secure, and trustworthy, Microsoft is sharing its learnings and advice to empower governments and other organizations.

### 7.1 A blueprint for AI governance

In May 2023, Microsoft published [Governing AI: A Blueprint for the Future](#), which addresses several current and emerging AI issues in public policy, law, and regulation. The paper is centered around a governance blueprint, which outlines five vital considerations for ensuring responsible AI:

#### A five-point blueprint for governing AI

- 01 Implement and build upon new government-led AI safety frameworks.** One of the most effective ways to move quickly is to build on recent advances in other governments' work. The new AI Risk Management Framework<sup>ix</sup> introduced by the U.S. National Institute of Standards and Technology is a great example.
- 02 Require effective safety brakes for AI systems that control critical infrastructure.** Any technology that controls or interacts with critical systems requires stringent safety protocols. We propose a comprehensive approach that maintains effective human oversight, resilience, and robustness.
- 03 Develop a broader legal and regulatory framework based on AI's technology architecture.** We believe organizations involved in managing different aspects of AI should be subject to specific regulatory responsibilities. This would encompass those involved with the applications layer, the model layer, and the infrastructure layer.
- 04 Promote transparency and ensure academic and public non-profit access to AI.** Improving transparency and broadening access to AI resources is a critical goal. Microsoft, for example, has made a commitment to inform the public about its AI policies, systems, performance, and progress through an annual transparency report.
- 05 Pursue public-private partnerships to address new societal challenges with AI.** When societies harness the power of technology and bring the public and private sectors together, they can achieve great things. Public and private organizations must work together to use AI to protect democracy and fundamental rights, provide broad access to AI skills that will promote inclusive growth, and advance the planet's sustainability needs.

## 7.2 Establishing robust security systems

As AI technologies become increasingly integrated into various aspects of government operations, it is critical that teams have strict security controls in place to safeguard sensitive data and mitigate cybersecurity risks.

A security baseline provides a structured approach to identifying potential vulnerabilities, establishing protective measures, and enforcing compliance with regulatory requirements. With the proliferation of AI-driven applications in government departments, maintaining a secure environment not only protects valuable assets but also fosters trust among users and stakeholders.

It is also important to ensure that application safety systems are built to protect AI applications from malicious activities. A safety system provides deep inspection of the content being used in AI operations, as well as interactions with plugins, data connectors, and other AI applications, to ensure the tool is being used as intended.

By adhering to established security standards and best practices, teams can proactively address security challenges and ensure the integrity and reliability of their AI implementations.

For governments deploying Azure OpenAI, Microsoft offers [specific security baseline guidance](#) to help teams align their controls with industry-leading security standards.

## 7.3 How AI is transforming cybersecurity

AI needs to be secured, but it can also play a significant role in governments' cybersecurity strategies.

On average, security teams use nearly 80 different tools<sup>x</sup> to protect their increasingly complex environments and expanding attack surfaces. As a result, they are inundated with data, with limited visibility across security solutions. It is an overwhelming task that often leads to a heavy workload and alert fatigue. However, it only takes one weak point for threat actors to infiltrate a network—and in government, that could mean access to highly sensitive data or even critical national infrastructure.

As nation-states and cybercriminals increasingly use AI to launch attacks, governments need to fight fire with fire. That means leveraging a hyperscale cloud security platform that uses AI-based automation to augment the skill, speed, and knowledge of security teams.

By leveraging AI and large language models, it will become possible to automate many aspects of cybersecurity, including threat intelligence, incident response and recovery, monitoring and detection, testing and validation, and security governance, risk, and compliance. AI will be a central component of the next-generation security operations center (SOC), helping to rapidly detect, prepare for, and respond to threats.

## Further reading

- [Meeting the AI moment: Advancing the future through responsible AI](#)
- [How do we best govern AI?](#)
- [Announcing Microsoft's AI customer commitments](#)
- [Microsoft's responsible AI toolkit | Github](#)



## 8 A national AI strategy: From vision to execution

Let's turn our focus to how governments can progress their national AI strategies from vision to execution. There are six key steps to follow that help ensure long-term value and success:

1	<b>Advancing responsible AI</b>	Develop and deploy AI responsibly with strict governance frameworks to ensure all AI is held to the same standard.
2	<b>Strengthening data and technological infrastructure for AI advancement</b>	Invest in data infrastructure, cybersecurity measures, and cutting-edge technological platforms to help build robust foundations for AI implementation.
3	<b>Identifying and engaging key stakeholders for AI governance</b>	Foster collaboration among key stakeholders across government entities, the private sector, academia, and the public to maximize the benefits of AI and address potential challenges.
4	<b>Empowering the workforce for an AI-driven future</b>	Implement initiatives to upskill and reskill the workforce, equipping them with the necessary skills and resources to thrive in an AI-driven economy.
5	<b>Executing the national AI strategy</b>	Navigate the evolving landscape of AI implementation with adaptable strategies, balancing immediate successes with sustainable, forward-looking actions.
6	<b>Monitoring and continually evaluating</b>	Introduce a monitoring and evaluation plan to support effective execution and continuous improvement.

### 8.1 Making a commitment to responsible AI

In adopting AI, governments are embracing a powerful technology that offers countless opportunities for operational and service excellence—but they are also taking on an important responsibility. Departments throughout the government impact nationwide policies, welfare, international relationships, and much more. When AI is introduced to the mix, it is imperative that leaders consider how it could affect privacy, equity, and security for communities and partners. Every project should be carefully scoped to account for potential risks, biases, and unintended impacts.

AI should be designed, developed, and deployed with these core values in mind:

- Transparency
- Accountability
- Fairness
- Inclusiveness
- Reliability and safety
- Privacy and security

These are the values that underpin all our work at Microsoft, and they have become especially important as we work to advance responsible AI with our clients and communities.

AI is evolving quickly, especially with recent developments in generative AI, and in many areas, it is outpacing industry-wide frameworks and legislation. Governments need to formalize their commitments and share them with their stakeholders, people, and partner organizations to promote transparency and foster trust as they deploy new solutions.

Taking inspiration and guidance from other government or industry frameworks—such as the U.S. National Institute of Standards and Technology’s AI Risk Management Framework—can accelerate this process. Additionally, with multiple governments pulling in the same direction, it is likely that industry-wide standards will be reached more quickly.

### **The responsible AI transparency report**

Microsoft now publishes an annual report on its responsible AI program, which provides insight into how teams:

- Build applications that use generative AI
- Make decisions and oversee the deployment of those applications
- Support customers as they build their own generative AI applications
- Learn, evolve, and grow as part of a responsible AI community

[Read the inaugural report](#)

## **8.2 Strengthening data and technological infrastructure for AI advancement**

AI advancement will require a dual focus on strengthening data management and digital infrastructure to address challenges such as data fragmentation, security concerns, and technical limitations. Some governments will already have achieved this, but leaders should reassess their infrastructure to account for the new demands and challenges associated with generative AI and each future advancement; this will be a continuous process for every agency.

### **Data management enhancement**

To improve data management practices, government leaders should:

- Conduct an extensive audit of existing data management to identify strengths, weaknesses, and gaps
- Develop comprehensive data governance policies and standards focused on security, privacy, quality, and access
- Establish secure protocols and platforms for data sharing among government entities, research institutions, and businesses to ensure data privacy and security
- Implement centralized data repositories, quality assurance mechanisms, and comprehensive security protocols to safeguard sensitive information

### **Digital infrastructure enhancement**

To improve the government’s digital infrastructure, leaders should:

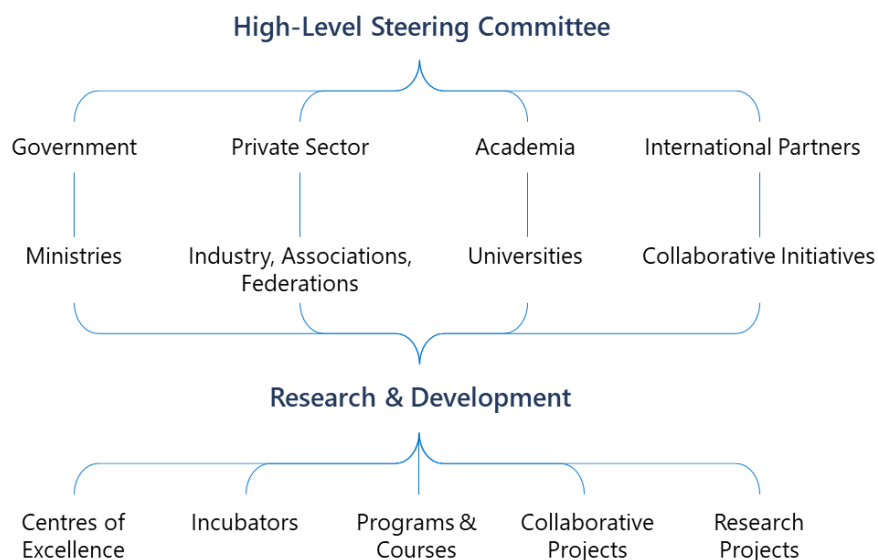
- Allocate resources toward digital infrastructure, including the adoption of cloud services, to bolster the AI ecosystem’s expansion

- Develop a strategy for cloud migration and adoption to leverage the flexibility, scalability, and cost-efficiency of cloud platforms for managing and analyzing vast datasets
- Strengthen cybersecurity measures, employing encryption, multi-factor authentication, regular audits, and compliance checks to protect against data breaches and security threats

By strengthening data management and digital infrastructure in tandem, governments will create a more effective environment for AI integration, driving innovation, efficiency, and competitiveness across sectors.

### 8.3 Optimizing stakeholder engagement

Successfully executing any strategy relies on engaged stakeholders and clear lines of responsibility. This organizational chart suggests a structure to facilitate coordination and cooperation:



*Figure 5: Proposed Stakeholders Organizational Chart*

This proposed structure envisions a high-level steering committee at the top, representing government bodies, private sector leaders, academic institutions, and international partners. This committee serves as the central decision-making and coordination body, with sector-specific task forces formed to delve into individual sectors, identify AI integration opportunities, and design sector-specific solutions.

Government departments would oversee policy and regulatory development, with the private sector providing industry expertise and practical feedback. Academia would play a key role in sharing research and helping to foster and educate future AI talent. In addition, international industry partners would be critical for collaborating on global best practices and thought leadership.

Finally, various entities would contribute research and development to the high-level steering committee, including centers of excellence, incubators, and educational programs.

This structure—or a variation on it, depending on the country’s strategy—will help create a cohesive, coordinated approach to building an AI ecosystem.



## 8.4 Empowering the workforce for an AI-driven future

If governments fail to address the skills gap, the demand for AI expertise across the globe will rapidly exceed the supply of qualified professionals. This is already becoming a concern as AI technologies advance across various sectors, from healthcare to finance.

Over half of chief information officers surveyed by Gartner identified the skills shortage as the biggest challenge in adopting AI technologies,<sup>xi</sup> highlighting the critical need for education and training programs to bridge this gap.

The skills gap not only hampers the adoption of AI but could also widen the technological divide across regions and industries. It must be addressed through concerted efforts in education, workforce development, and policymaking.

To bolster the workforce transition, governments must implement initiatives to equip individuals with the necessary skills, knowledge, and awareness to thrive in an AI-driven environment, while fostering responsible development and usage of AI technologies.

<b>A</b> Launch skills development programs	<ul style="list-style-type: none"><li>• Tailor comprehensive skills development programs to the needs of different industries and job roles, focusing on AI-related skills such as data analysis, machine learning, and AI programming.</li><li>• Collaborate with educational institutions, industry partners, and training providers to design and deliver targeted training courses, workshops, and certification programs to build employees' AI proficiency.</li><li>• Establish AI centers of excellence or innovation hubs within organizations to provide hands-on training, mentoring, and support for employees to experiment with AI technologies and develop practical skills.</li></ul>
<b>B</b> Promote digital literacy and public awareness	<ul style="list-style-type: none"><li>• Promote digital literacy initiatives to enhance the understanding of AI concepts and technologies among the general population, including students and non-technical professionals.</li><li>• Launch public awareness campaigns and educational programs to demystify AI, raise awareness about its potential benefits and implications, and empower individuals to make informed decisions in the AI-driven world.</li><li>• Provide accessible and user-friendly resources, such as online courses, tutorials, and interactive tools, to facilitate self-paced learning and skill development in AI-related topics.</li></ul>
<b>C</b> Foster collaboration and knowledge-sharing	<ul style="list-style-type: none"><li>• Encourage cross-sector collaboration and knowledge-sharing platforms to facilitate the exchange of best practices, lessons learned, and innovative ideas in AI implementation.</li><li>• Establish professional networks where AI enthusiasts, practitioners, and experts can connect, collaborate, and learn from each other's experiences.</li></ul>

By empowering the workforce with the right skills, knowledge, and resources, governments can cultivate a thriving ecosystem of AI-driven innovation and entrepreneurship.

## 8.5 Charting the course: The AI journey

As governments venture into harnessing the transformative potential of AI, it is crucial to acknowledge that there are different maturity levels—sometimes even within departments or individual teams.

Some governments may already have existing AI initiatives underway, while others are starting from scratch. Those with high maturity may be implementing large-scale generative AI projects. Leaders need to tailor their approach according to their own maturity level and align it closely with the country’s unique vision and strategic objectives.

The table below outlines a series of AI advancement strategies, covering quick wins, mid-term growth, and long-term vision.

<b>Quick wins</b>	<b>Building an AI foundation</b> <p>To begin their national AI journey, governments should focus on achievable objectives in the first year, setting the stage for more extensive AI initiatives in the future.</p> <ul style="list-style-type: none"><li>• <b>Regulatory frameworks:</b> Develop adaptable regulatory frameworks to govern AI development and usage, ensuring responsible practices.</li><li>• <b>Centralized data management:</b> Implement centralized data repositories to facilitate efficient data management and sharing among different sectors.</li><li>• <b>Infrastructure enhancement:</b> Upgrade critical infrastructure to support the storage, processing, and transmission requirements of AI applications, with initiatives tailored to the government’s maturity level and strategic objectives.</li><li>• <b>Sector-specific pilot projects:</b> Launch targeted pilot projects in various sectors to kickstart adoption.</li><li>• <b>Workforce training and development:</b> Develop comprehensive training programs to enhance the workforce’s capabilities.</li><li>• <b>Public awareness campaigns:</b> Educate the community about the benefits of AI and the importance of data privacy and security.</li></ul>
<b>Mid-term growth</b>	<b>Expanding AI horizons</b> <p>Governments should advance their maturity by building on their early wins.</p> <ul style="list-style-type: none"><li>• <b>Scale pilot projects:</b> Expand successful pilots into full-scale implementations, integrating AI technologies into core government functions to drive efficiency and innovation.</li><li>• <b>Continuous skills development:</b> Establish mechanisms for ongoing development to keep pace with evolving AI technologies.</li><li>• <b>Cross-sector collaboration:</b> Foster relationships across different sectors to maximize the impact of AI.</li><li>• <b>Data governance refinement:</b> Refine data governance frameworks to address emerging ethical and regulatory considerations.</li><li>• <b>Infrastructure and cybersecurity investments:</b> Continue investing in infrastructure upgrades and cybersecurity measures to address growing demands and emerging security risks.</li></ul>

## Long-term vision

### Maximizing AI potential

For the long term, governments should aim for sustainable growth and maximizing AI benefits across all sectors.

- **Targeted technology integration:** Focus on integrating AI solutions tailored to specific sector challenges, promoting practical and impactful technological enhancements.
- **Enhanced data ecosystems:** Develop secure, interoperable data-sharing frameworks that protect data sovereignty while fostering innovation.
- **Comprehensive talent ecosystems:** Build partnerships across academia, industry, and continuous learning platforms to cultivate a diverse, AI-ready workforce.
- **Adaptive strategy frameworks:** Establish flexible frameworks that adjust to technological advancements and global economic shifts, ensuring strategies remain relevant.
- **Responsible governance:** Embed ethical considerations and inclusivity in governance structures, with oversight bodies ensuring equitable benefits and adherence to global standards.

This adaptive strategy ensures that the roadmap to AI success is flexible and responsive to the evolving landscape of AI technology and its applications. As each new wave of AI technology emerges, leaders can revisit each stage to provide a structure for additional goals.



## 8.6 Monitoring and continually evaluating

A robust monitoring approach will enable governments to track the impact of AI initiatives, make necessary adjustments, and maximize the benefits. Here are eight key monitoring and evaluation tasks that will help leaders gauge their progress:



**Set clear key performance indicators (KPIs)** that are measurable, specific, and relevant to the strategic objectives.



**Collect and analyze data** on an ongoing basis, including AI project outcomes, financial investments, and user feedback.



**Establish a reporting mechanism** that enables teams to share their progress regularly with all stakeholders.



**Adopt adaptive management** techniques to allow for flexibility in the implementation approach as requirements and technologies change.



**Seek independent evaluation** from external experts for an unbiased assessment and recommendations tailored to government strategy.



**Raise public awareness** to build trust and support by providing regular updates.



**Create a culture of learning** that uses successes and failures to guide future initiatives.



**Focus on continuous improvement** by establishing feedback loops and iterative adjustments that allow teams to adapt quickly to changing dynamics and new opportunities.



## 9 Next steps

This framework serves as a proposed guide for governments worldwide to systematically develop and execute their national AI strategies. To make the most of AI's emerging potential for government operations, leaders need to be swift and decisive in developing and implementing an AI strategy tailored to their country's priorities and needs. By focusing on the fundamental pillars we have outlined in this guide, governments can create a solid foundation for fostering AI-driven advancements and innovation in their key sectors.

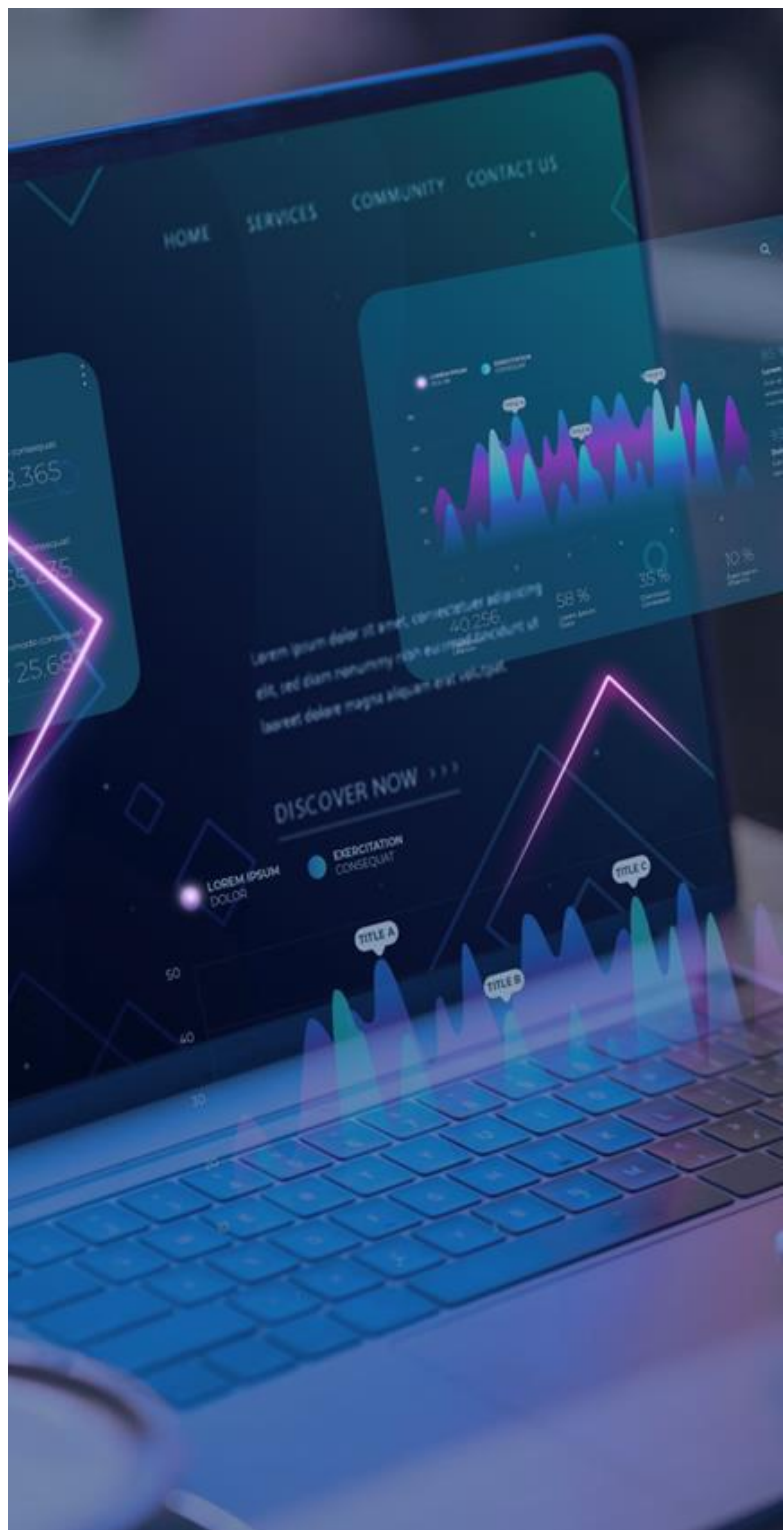
Moving forward, government leaders should continue to build on this foundation with a focus on continuous learning, innovation, and adaptation to emerging AI technologies. This will ensure their strategies remain dynamic and responsive to both national and global AI advancements and that the country's systems and workforce are ready to support initiatives that are yet to come.

Recognizing that the journey toward digital transformation, including the pivotal role of AI, is continually evolving, ongoing dialogue and collaboration with industry stakeholders are crucial.

To facilitate this dialogue, Microsoft is committed to hosting workshops with government stakeholders. These workshops offer a platform for in-depth discussions on each key pillar outlined in the framework, fostering true partnership and working together to transform government operations on a global scale.

**Interested in joining our workshops?**

Reach out to your Microsoft Sales representative or to our [Worldwide Public Sector Team](#)



# 10 Key sectors appendix

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## 10.1 National and local government

Against a backdrop of tense geopolitical relations and a volatile global economy, government leaders are all trying to find the most efficient route to enhanced services and higher levels of productivity within their teams.

In many countries, public services—and those that deliver them—have struggled with consistent budget cuts and growing demand. Legacy systems, outdated workflows, and opaque processes often leave government workers unable to serve the public effectively, while people in the community cannot easily access the services and support they need.

Alongside the more traditional challenges of government operations, there is now also an expectation to lead the way with AI innovation. The work national and local government leaders do to integrate AI into their operations will set the foundation for every other sector we examine in this guide. As such, the vision for AI transformation in government is broad<sup>xii</sup>—and that’s reflected in the wide range of potential use cases. Applied properly, AI could have a significant impact on internal department operations and public-facing services.

### Rethinking the daily workload

AI represents an unprecedented opportunity to increase the productivity of the government workforce. Many common tasks performed by public sector employees can be accelerated significantly by introducing AI assistants such as Copilot, including:

- Conducting research
- Drafting correspondence
- Analyzing or summarizing data
- Creating memos or talking points
- Previewing counterarguments
- Designing presentations

Tasks like these consume hours of a government worker’s daily schedule, but with a small amount of training in how to work with an AI assistant, employees can work faster and dedicate their time to higher-value tasks. This productivity gain should not result in a reduced headcount, however; the aim is to create a more capable and well-utilized government workforce.

### Making the government more people-friendly

Defying the stereotypes of arcane bureaucracy, paperwork in triplicate, and the never-ending shuffling between departments in pursuit of a simple task, AI provides an always-on interface that offers easy access to government services in any channel, in any language.

Working with Apolitical, Microsoft has published a report that shows some early transformational use cases within the public sector.<sup>xiii</sup> An AI interface could help people interact with departments such as:

- Marriages and births
- School registration
- Passport and visa applications
- Vehicle permits and licenses
- Business licensing
- Municipal service requests
- Social benefits and employment support

Due to the potentially sensitive nature of some of the requests and data involved, leaders will need to ensure that the tools they choose for public-facing interactions offer high standards of security.

### Ensuring service accessibility for all

Embracing AI for accessibility should be a key component of any national AI strategy, demonstrating a commitment to inclusivity and innovation.

Leveraging AI for accessibility can significantly enhance the inclusiveness and usability of government services. AI technologies, such as Microsoft's AI for Accessibility projects, have shown how AI can be harnessed to break down barriers and empower individuals. For instance, generative AI tools can be used to develop more inclusive communication aids, automated sign language translation, and real-time text-to-speech applications. By integrating these AI-driven solutions, governments can create a more inclusive society, ensuring everyone has equal access to essential services.

### These capabilities are only the beginning

There are so many problems that governments have struggled to solve with legacy tools around transportation efficiency, treatment of mental health, urban planning, diversified education, and environmental sustainability. AI can use vast amounts of data to help policy makers and program managers proactively explore new ideas that could make a difference for government workers and communities alike.

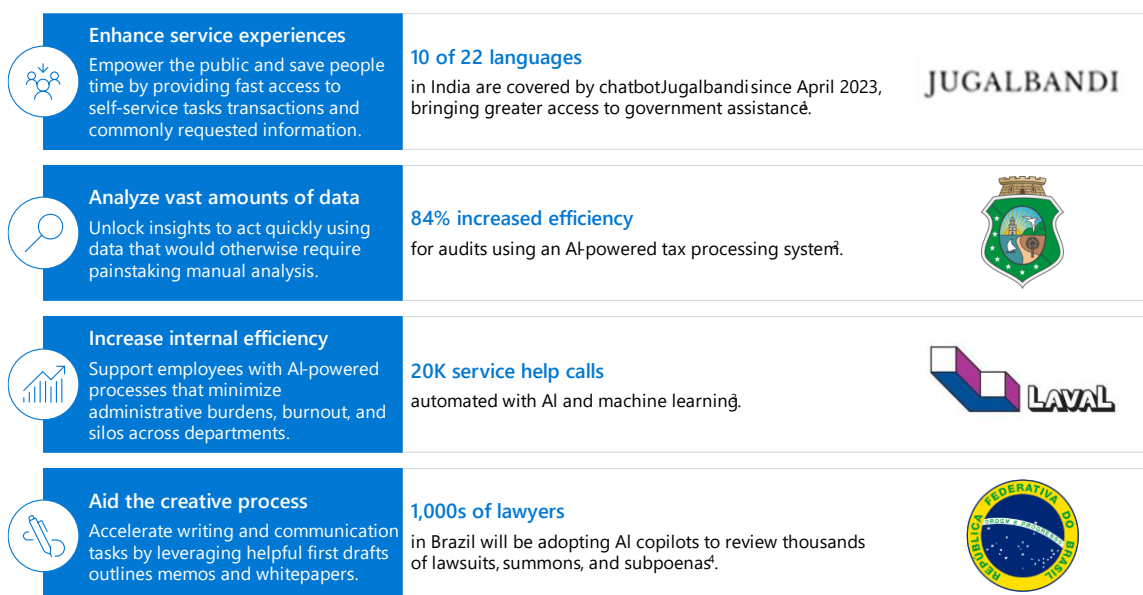


Figure 6: Governments around the world are transforming public services with the help of AI

## Pioneering applications in national and local government



- 1** The **Albanian government**, through the National Agency for Information Society (AKSHI), is on a path to modernize public services and government operations. Its primary focus includes developing IT infrastructure, promoting e-government services, and implementing digital policies that align with the nation's technological goals and needs. Through these efforts, AKSHI aims to enhance the efficiency of public services, ensure the security of digital systems, and foster a more digitally inclusive society. By using [Microsoft Azure OpenAI Information Assistant](#), [AKSHI developed an AI assistant](#) that answers inquiries about public services.
- 2** The **Greek government** launched the [first-ever public-facing, government digital bot assistant with Azure Open AI](#). Millions of people can now access over 5,000 government processes and services through a simple and intuitive conversational interface. They can ask questions, get information, complete transactions, and receive personalized guidance from the bot, anytime and anywhere. This ensures individuals have easy access to the information they need without navigating through complicated websites or contacting multiple offices.
- 3** The **Investment Promotion Agency Qatar** (Invest Qatar) has partnered with Microsoft to develop [Ai.SHA, an innovative AI-powered assistant that harnesses GPT capabilities through the Azure OpenAI service](#). Invest Qatar is one of the first investment promotion agencies in the world to adopt advanced technology, paving the way for transformative changes in professional interactions between investors and businesses in Qatar.
- 4** The **state of Ceará in Brazil** needed to improve tax compliance monitoring for retail vendors to enable an equitable and economically sustainable tax environment. This required the collection and analysis of millions of digital sales receipts each day to uncover possible errors and tax avoidance. To address this, [the state implemented the HMX Tax Intelligence System \(TIS\)](#), featuring proprietary AI processes to identify compliance issues and provide detailed explanations for efficient follow-up. TIS has generated a 7% annual increase in tax revenues over the past three years.
- 5** **One of the largest cities in Quebec, Ville de Laval**, is focused on developing smart city initiatives, which include [infusing AI and machine learning into its 311 non-emergency hotline](#). The system, which fields nearly 200,000 inquiries a year, now offers a virtual agent to accelerate interactions and answer more basic inquiries on its own. Built with capabilities in Microsoft Azure AI and Microsoft Power Platform, the system was also recently used to conduct consultations, and may soon be expanded to the city's 911 emergency response system.
- 6** The **City of Kelowna** implemented [cognitive search technology and conversational AI in support of its 311 non-emergency municipal services helpline](#). By sourcing real-time data and existing documentation, the solution can efficiently answer a wide range of questions. Next, the city plans to expand the solution to help translate complex legal documents, walk people through permit processes, and reduce the need for repetitive work for the public and governmental employees alike.



## 10.2 Healthcare

AI initiatives are already underway around the world to revolutionize healthcare delivery, improve patient access, and enhance the efficiency of healthcare systems. Developed through collaboration between government agencies, healthcare providers, technology companies, academic medical centers, and research institutions, these initiatives will address key challenges in healthcare.

### A rapidly expanding market

In 2022, the global AI in healthcare market reached approximately \$11 billion. Projections suggest remarkable continued growth, with estimates anticipating a surge to nearly \$188 billion by 2030,<sup>xiv</sup> representing a compound annual growth rate (CAGR) of 37% from 2022 to 2030. Early research has demonstrated AI's ability to outperform radiologists in certain types of disease detection.<sup>xv</sup> Additionally, studies indicate AI's effectiveness in predicting patient outcomes,<sup>xvi</sup> reducing hospital readmissions,<sup>xvii</sup> and optimizing treatment plans.<sup>xviii</sup>

The emerging era of generative AI in healthcare shows promise for personalized medicine, drug discovery, and disease modeling. With the right considerations for model interpretability, data privacy, and responsible use, AI is poised to transform healthcare roles and workflows globally—but we need to maintain a balance between automation and human expertise.

### Implementing healthcare AI responsibly

The World Health Organization published the first global healthcare AI report in 2021,<sup>xix</sup> which outlined the technology's potential, but also stressed the critical importance of ethical and human rights considerations in AI design and deployment.

Leaders need to be aware of concerns around unethical data collection practices, algorithmic biases impacting decision-making, and potential risks to patient safety. It's vital that stakeholders across the industry collaborate to establish robust frameworks that uphold ethical principles and protect human rights while enhancing global healthcare outcomes.

### A roadmap for AI adoption

The journey to revolutionize healthcare demands a comprehensive approach tailored to the distinct requirements and hurdles encountered by providers, payors, and pharmaceutical companies.

**For healthcare providers**, the revolution begins with establishing robust data governance frameworks and integrating diverse data sources such as electronic health records (EHRs) and medical imaging. This data foundation will underpin everything from predictive analytics to aid patient care and clinical decision-making to process optimization for operational efficiency gains. Cybersecurity is also key for safeguarding operational and patient data privacy at every level.

**For healthcare payors**, teams can enhance claims processing accuracy and fraud detection with machine learning algorithms, and bolster customer service with AI-powered chatbots. A strong data foundation combined with advanced analytics tools will offer insights into market trends and cost optimization, facilitating strategic decision-making.

For pharmaceutical companies, AI can revolutionize drug discovery, streamline supply chain management, and enable personalized medicine. Real-time drug safety monitoring, patient engagement tools, and adherence monitoring systems are vital for ensuring optimal patient outcomes.

There are cross-sector considerations, too. Stakeholders should focus on promoting interoperability, establishing responsible AI guidelines, ensuring regulatory compliance, fostering partnerships for data sharing, and prioritizing a patient-centric approach across all endeavors.

This comprehensive journey equips healthcare entities with the tools and methodologies for navigating the dynamic landscape of healthcare delivery and pharmaceutical innovation, ultimately leading to a revolutionized healthcare sector. Here is a breakdown of key use cases for healthcare organizations to explore as they plan their own journey with AI:

### Generative AI use cases in Healthcare

Provider use cases	Operational use cases	Administrative use cases	Research and life sciences
<ul style="list-style-type: none"> <li>• Ambient clinical intelligence: Voice to text, summarization, and transfer to EMR</li> <li>• Clinical summarization</li> <li>• Advanced knowledge search to surface relevant information, provide EMR summaries for GPs and doctors, and offer patient insights for personal care and precision health</li> <li>• Interpretation and explanation of results and procedures</li> <li>• Identify and mitigate risk</li> <li>• Patient education and engagement</li> <li>• Virtual assistants for early engagement and conversational services</li> <li>• Automatic intelligent image "reading" and transcription for detection and physician support, plus referral review and booking</li> <li>• Identify next best action (using national guidelines)</li> </ul>	<ul style="list-style-type: none"> <li>• Operational efficiency, visibility, and insights.</li> <li>• AI call center automation</li> <li>• Coordinating complex tasks – e.g. discharge processes</li> <li>• Resource optimization</li> <li>• Fraud, waste and abuse detection (processing prescription, paper forms, transactions clarification)</li> <li>• Operational efficiency, visibility, and insights</li> <li>• Appointment and scheduling management</li> <li>• Population health</li> <li>• Claims processing</li> <li>• Eligibility verification and automated documentation</li> <li>• Reporting</li> <li>• Asset management (e.g. theatre optimization)</li> <li>• AI patient journey</li> <li>• Governance, reporting, and medical coding</li> </ul>	<ul style="list-style-type: none"> <li>• Low-code automation</li> <li>• Code generation</li> <li>• Copilot document creation (HR, procurement, legal, finance)</li> <li>• Summarization of documents, search and automation of administrative tasks. Process mining</li> <li>• Advanced knowledge search for general organizational purposes</li> <li>• Information assistant</li> <li>• Reporting</li> <li>• Learning and onboarding</li> <li>• Medical publication, literature, and knowledge summarization</li> </ul>	<ul style="list-style-type: none"> <li>• Literature review and target finding</li> <li>• Clinical research, trial design, and patient finding</li> <li>• Clinical trial insights</li> <li>• Drug design and performance prediction</li> <li>• Regulatory and QA document generation</li> <li>• Customer (physician/patient) engagement</li> <li>• Genomic summarization and insights</li> <li>• Science knowledge mining</li> <li>• De-identification of health data</li> </ul>

Figure 7: Generative AI use cases in Healthcare

## Pioneering AI applications in healthcare



- 1** **Kry**, a Swedish digital healthcare provider, leverages Azure and OpenAI services to enhance patient care by [integrating AI-powered symptom checking and language processing into its platform](#), facilitating more efficient and accurate diagnoses remotely. This integration enables Kry to scale services, improve patient experiences, and provide accessible healthcare solutions.
- 2** By leveraging Azure Machine Learning, the **Northumbria Healthcare NHS Foundation Trust** [developed predictive models that forecast patient demand for services](#), enabling leaders to allocate resources more effectively and reduce waiting times. Additionally, the AI solutions help optimize staff schedules and improve patient flow within the hospital while minimizing costs.
- 3** With Microsoft and OpenAI capabilities, **Pangaea Data** built [a scalable, AI-powered product platform](#) to help clients in healthcare and pharmaceuticals discover patients with conditions that are miscoded, undiagnosed, or misdiagnosed and connect to them. This platform protects patient data while using text analytics to identify characteristic symptoms of 7,000 difficult-to-diagnose conditions.
- 4** **Bayer**, one of the world's largest pharmaceutical companies, uses Azure data analytics services to [reduce the time it takes for clinical trials to yield insights](#). With an integrated analytics platform on Azure, Bayer no longer needs to deal with fragmented infrastructure and can analyze clinical trial data more efficiently to accelerate drug research.
- 5** The **Cambridgeshire and Peterborough NHS Foundation Trust** leverages Azure Cognitive Search to make 23 years' worth of patient data—including information in handwritten notes—more discoverable. The trust's clinicians can now [access 3.1 million patient records in one simple search](#), saving them valuable time.



## 10.3 Education

According to a report by the World Economic Forum,<sup>xx</sup> AI could transform education systems, primarily by freeing up teachers' time to focus on creating a more individualized learning environment. Generative AI tools, in particular, can offer value by curating content and completing administrative tasks such as building lesson plans.

However, AI in education isn't completely new. Microsoft has been working with schools and universities around the world on use cases such as predictive analytics to help reduce drop-out rates and support decision-making around professional development programs.

In fact, many educators already use AI-powered technology in Microsoft 365 to:

- Create slides in seconds with [PowerPoint Designer](#)
- [Analyze data in Excel](#) to ask questions without having to write complicated formulas
- Up-level writing with [Microsoft Editor](#) by checking documents for spelling and grammar
- Prepare for a presentation with [Speaker Coach](#), which gives rehearsal feedback
- Support reading fluency improvement with [Reading Progress](#)
- Create content and images with GPT-4 and Dall-E in [Microsoft Copilot in Bing](#)

Further integration of Copilots and other AI technologies across the Microsoft educational technology stack will continue to support educators as they re-imagine education delivery at all levels.

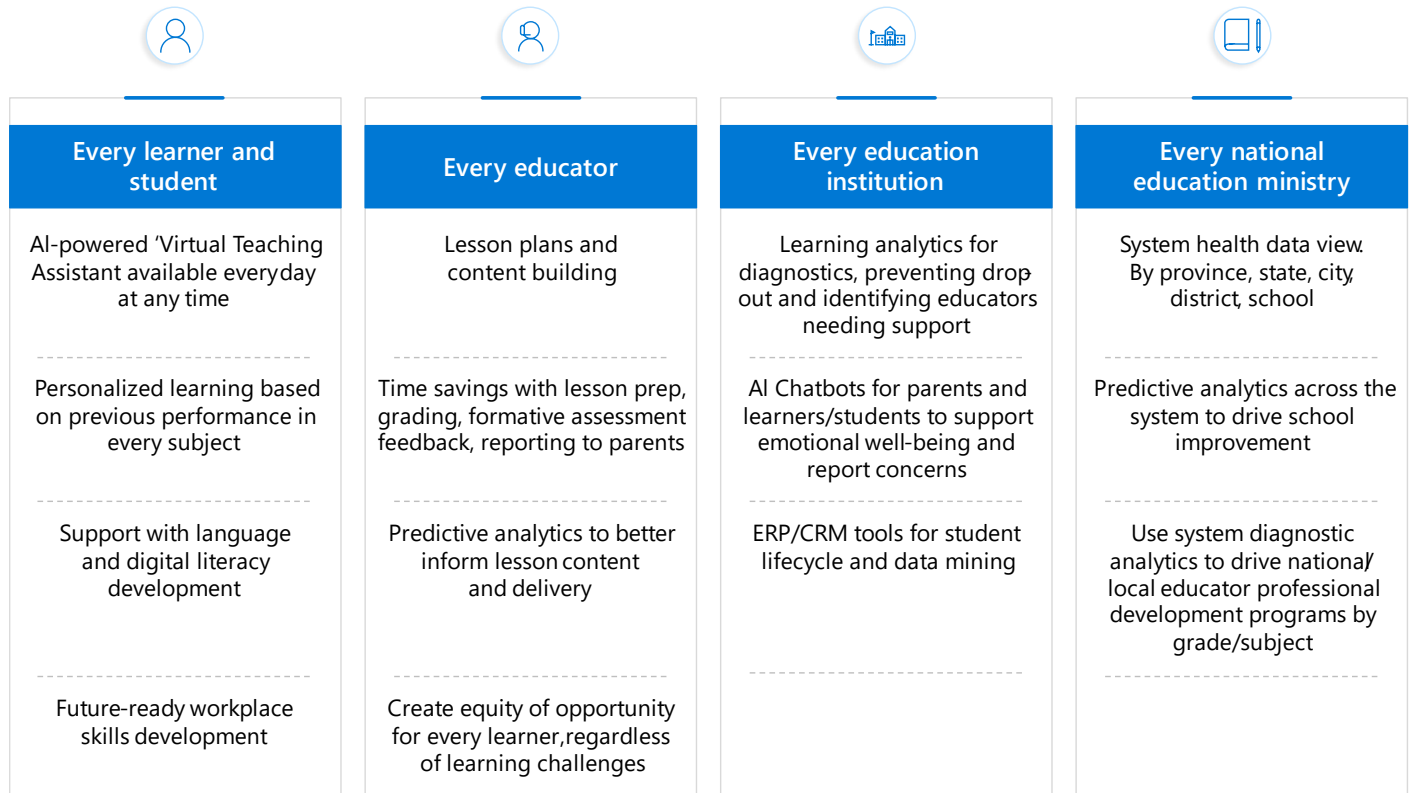
### Use cases for AI in education settings

As awareness and adoption grow, it's likely that more institutions will explore AI for more complex tasks such as marking and grading using rubrics, and reporting to parents and caregivers.

In the next 10 years, AI is expected to help reshape pedagogical approaches in classroom practice and system administration in several ways:

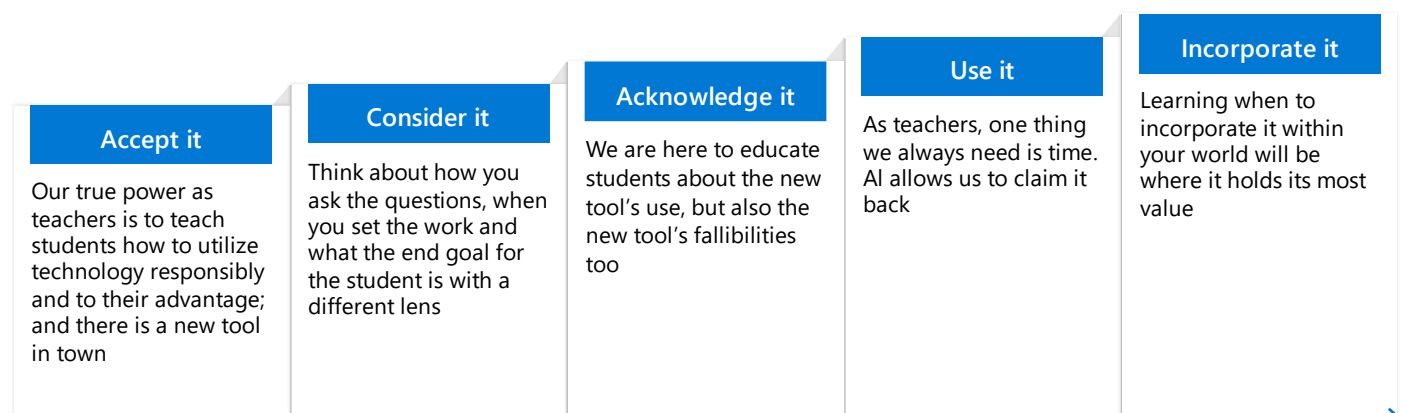
- **Personalize learning** by analyzing individual learning needs so educators can tailor instruction and materials for each student.
- **Engage learners** with interactive experiences and immediate feedback, helping them jumpstart the creative process and improve learning outcomes.
- **Analyze data efficiently** to assist educators in delivering actionable insights from sources across the institution, such as in Microsoft Teams' Class Insights.
- **Improve accessibility** with tools such as Read aloud, dictation, translation, and captioning.
- **Create custom content** such as lesson plans, quizzes, rubrics, and other class resources in any language and for any level of learner.
- **Introduce virtual assistants** that can help students with their homework and provide personalized feedback.
- **Automate grading** to free up teachers' time and allow them to focus on other aspects of teaching.
- **Support academic research** by enhancing the use of data for predictions and trends, and using Copilots to highlight patterns, trends, and outliers in research-generated data sets.

The goal is to use AI to empower education systems at all levels, to achieve more:



### Encouraging AI adoption in education settings

For many institutions, careful change management will be needed for successful AI adoption. Encouraging engagement with educators is vital, and will likely go through five stages:



Kristy Kendall  
Principal at Toorak College, Mt Eliza

Professional development and support for educators are critical requirements when considering adoption of AI and generative content tools in education settings. We host purpose-built courses for this on our [Microsoft Learn for Educators](#) site, designed to guide educators and system leaders through the pedagogical shift.

## Maximizing contact time with learners

In 2020, a global McKinsey survey of teachers and students showed that not only are educators working 50-hour weeks on average, but less than half of that time is spent interacting with their students.<sup>xxi</sup> This makes the potential for AI tools to reduce non-contact time very clear.

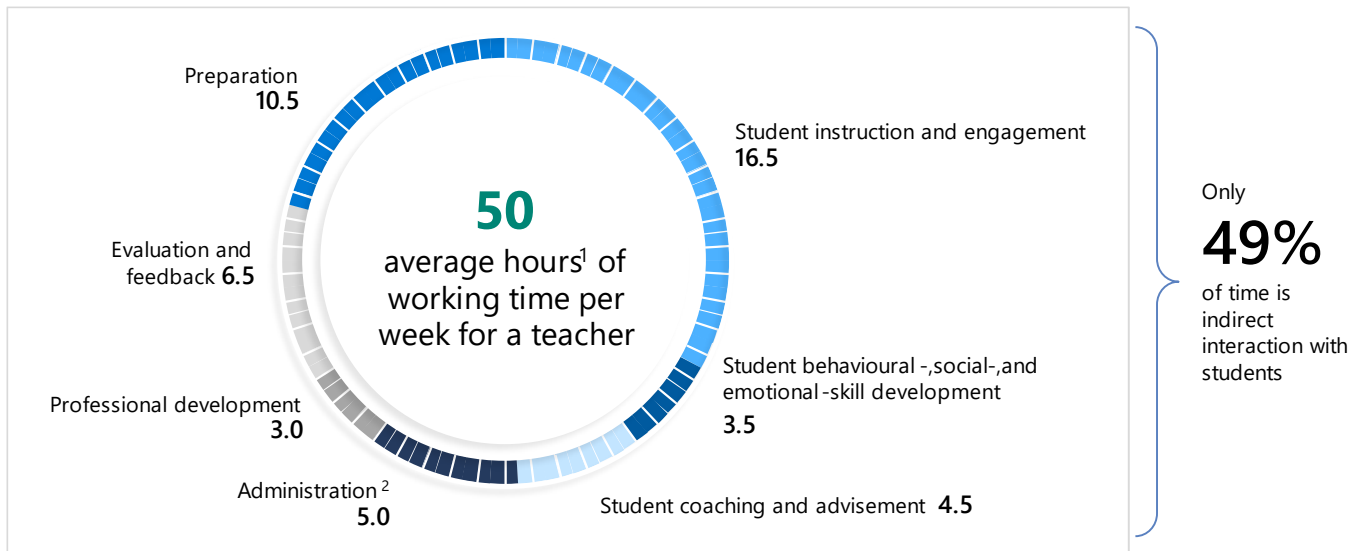


Figure 8: Activity composition of teacher working hours, number of hours

## Curating skills for an AI-driven world

Educators, school leaders, and policymakers need to work together to define the skills students need to navigate uncertainty, solve complex challenges, and shape meaningful futures in a changing economy.

This will involve finding ways to foster new core competencies around agency, awareness, critical thinking and problem-solving skills, connectedness, and wellbeing. AI tools deployed by well-trained and well-supported teachers can be invaluable for accelerating progress toward this vision.

The less students need to rely on educators as the main source of knowledge, the more educators can focus on curating, guiding, critically assessing learning, and helping students gain skills that are far more important than memorizing information.

In a recent Microsoft Work Trend Index Report,<sup>xxii</sup> 82% of leaders agreed that employees will need new skills to prepare for the growth of AI, including:

01	02	03	04	05	06	07
Analytical judgment	Flexibility	Emotional intelligence	Creative evaluation	Intellectual curiosity	Bias detection and handling	AI delegation (prompts)


Today's learners will enter a workforce where AI hasn't only undergone substantial improvements but has also transformed existing careers and created new professions. As educators incorporate AI technologies into teaching and learning practices, they prepare learners more effectively for this environment.

### Challenges with AI use for education

There are, of course, challenges that must be addressed. Like other sectors, rapid developments in AI have outpaced policy debates and regulatory frameworks, which means leaders, educators, and technology providers need to be considerate and responsible in the ways they use AI.

According to UNESCO data from early 2022,<sup>xxiii</sup> only 15 countries were underway with government-endorsed curriculum content aimed at AI skills development. The latest developments in generative AI tools have reinforced the urgent need for guidance that ensures every learner and educator achieves at least a basic level of AI literacy.

As more governments start developing their frameworks, we're helping bridge that gap with our own tools, advice, and policies. For example, we've developed the new Microsoft classroom toolkit, [Unlock Generative AI Safely and Responsibly](#), to support educators as they increasingly work with AI. To address concerns around potential IP infringement through generative AI, we're also launching a [new Copilot Copyright Commitment](#).

Pioneering applications in education		
1	<b>Wichita Public Schools</b> are <a href="#">using Microsoft Copilot to personalize learning experiences</a> for students, enhancing educational outcomes through AI-driven tools and applications.	
2	As <b>the world's largest language exchange platform</b> , <b>HelloTalk</b> uses <a href="#">Azure AI to empower language learners</a> by facilitating practice and cultural exchange among users worldwide.	
3	The <b>United Arab Emirates</b> plans to <a href="#">introduce a personal AI tutor for every student</a> , leveraging AI to enhance educational outcomes through a student-focused and locally informed AI tutoring platform.	



## 10.4 Public finance

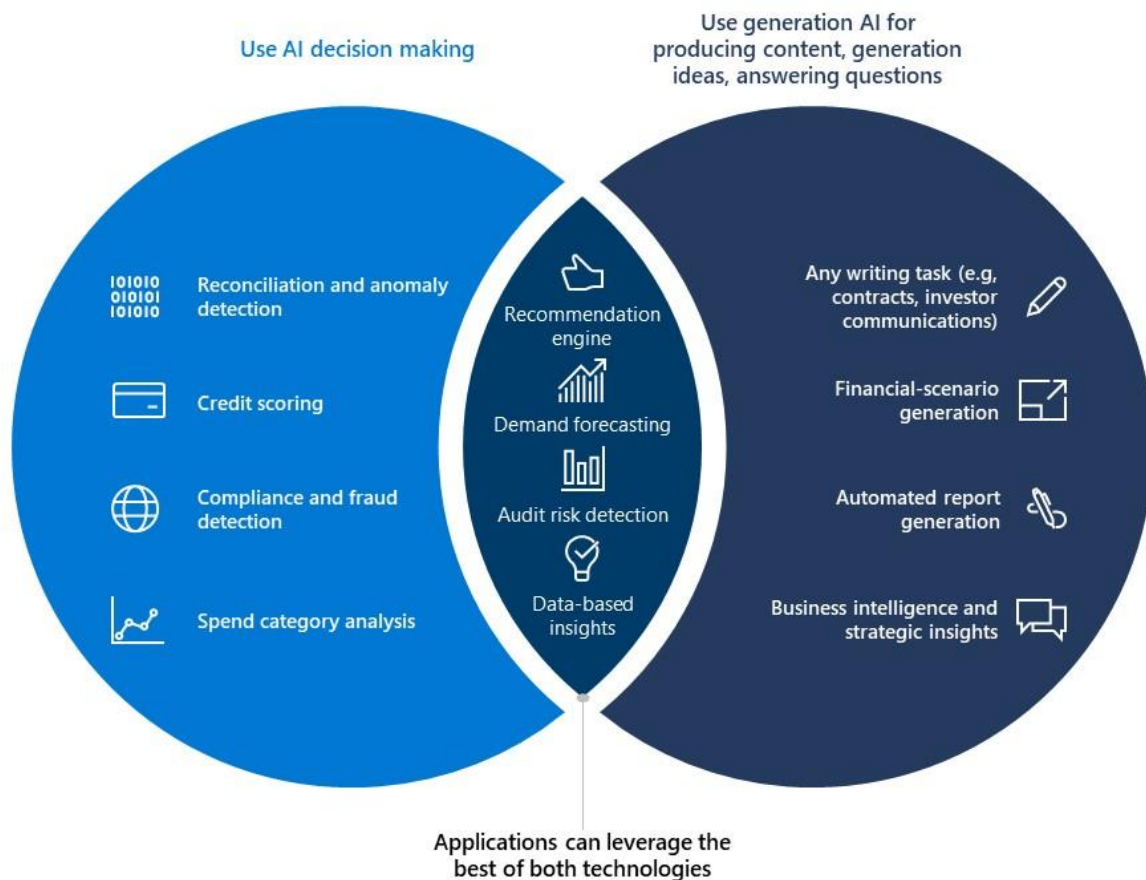
In a difficult economic climate, there is a lot of pressure on public finance organizations to improve revenue collection, fuel economic development, simplify processes, attract investments, and improve trust. Leaders must accelerate the shift from the traditional, manual processes of budgeting and revenue collection to intelligent, data-driven, and connected systems that automate operations, enhance the public experience, and improve compliance.

With AI-powered fraud detection and prevention algorithms, customer service chatbots, risk assessment and trading, and personalized financial advice, AI-driven platforms offer a lot of promise for individuals and organizations alike.

### Can AI revolutionize public finance management?

Three major AI capabilities will make a difference for public finance agencies: large-scale data analytics, real-time visualization, and predictive modeling. Combined, these capabilities will allow teams to quickly and accurately process the vast stores of data generated by the government's finance-related programs, draw conclusions, simulate the impact of decisions, and report on their findings.

Public finance leaders are constantly making decisions that impact trade, the economy, communities, businesses, and national and international partnerships. AI can help ensure every one of these decisions is made with full, up-to-the-minute context, communicated clearly with the relevant stakeholders, and fully documented for auditing.



Source: BCG analysis



## Exploring the AI opportunities for public finance

Applied in the right ways, AI can support public finance agencies as they work to:

- Improve revenue collection to fuel economic development
- Simplify processes to support businesses and attract investment
- Boost trust to drive engagement and compliance
- Ensure fair distribution of government funds
- Enable a thriving economy
- Get the right benefits to the right beneficiaries at the right time

As these agencies accelerate the shift from traditional, manual processes to connected systems driven by data and AI, they can automate operations, enhance user experience, and improve compliance. AI becomes a crucial building block powering each of these responsibilities, and will need to be supported by strong data collection and preparation processes.

There are seven key areas where AI can support public finance—and potential use cases for departments to explore:

Taxpayer engagement	Record to report	Quote to cash	Revenue collection & treasury management	Planning & analysis	Procure to pay	Risk management & compliance
<ul style="list-style-type: none"> <li>• Virtual assistants</li> <li>• Modern contact center</li> <li>• Interactive automated policy and regulation briefings</li> <li>• Public finance knowledge mining</li> </ul>	<ul style="list-style-type: none"> <li>• General accounting</li> <li>• Intercompany accounting</li> <li>• Fixed Asset Accounting</li> <li>• Period-end Close</li> <li>• Revenue recognition</li> <li>• Financial &amp; Statutory reporting</li> </ul>	<ul style="list-style-type: none"> <li>• Order entry and fulfillment</li> <li>• Billing</li> <li>• Credit &amp; Collections</li> <li>• Cash applications</li> <li>• Contact and data services</li> </ul>	<ul style="list-style-type: none"> <li>• Tax data collection and processing</li> <li>• Tax forms prefilling</li> <li>• Customs clearance automation</li> <li>• Tariffs and goods classification</li> <li>• Cash forecasting and management</li> <li>• Tax reporting and statutory</li> </ul>	<ul style="list-style-type: none"> <li>• Revenue collection performance management</li> <li>• Investment optimization</li> <li>• Planning &amp; forecasting</li> <li>• External reporting</li> <li>• Recession predictions</li> </ul>	<ul style="list-style-type: none"> <li>• Sourcing automation</li> <li>• Suppliers network analysis</li> <li>• Invoice capture and processing</li> <li>• Disbursement</li> <li>• Spend analysis</li> <li>• Master data management</li> </ul>	<ul style="list-style-type: none"> <li>• Taxpayer 360 view</li> <li>• Risk scoring and profiling</li> <li>• Audit automation</li> <li>• Business conduct investigations</li> <li>• Case management</li> <li>• Risk management</li> <li>• Fraud prevention and detection</li> </ul>

### Pioneering AI applications in public finance



1

The [Inter-American Center of Tax Administrations \(CIAT\)](#) collaborated with Microsoft to launch the e-Invoicing Anomaly Detection Solution Accelerator in Costa Rica. This initiative aims to [enhance tax compliance and efficiency by leveraging Microsoft Azure's AI and analytics technologies](#). It assists in identifying e-invoice anomalies and streamlines tax administration processes, improving data governance, compliance, and operational speed for the Costa Rican Ministry of Finance. The success of this program is now extending to other CIAT member countries.

- 2 The [Information System Authority of Estonia](#) developed Bürokratt, an [open-source communication assistant to enhance access to government services](#). This AI-based virtual assistant, developed in collaboration with Microsoft, streamlines the public's interactions with state institutions, significantly reducing response times. Bürokratt and its underlying Distributed Message Rooms technology, which ensures secure data exchange, are part of Estonia's national strategy to adopt AI solutions across public and private sectors, demonstrating a commitment to open government and digital innovation.



## 10.5 Transportation and infrastructure

### Transportation

The transportation sector must harness the potential of AI and other technologies, and collaborate closely with its partners and stakeholders, to achieve its goal of providing safe, efficient, and sustainable mobility for all. The drive for change in this industry is driven by several key factors:

**Transport demand:** According to the International Transport Forum's 2023 Transportation Outlook,<sup>xxiv</sup> international and intercity passenger travel will double between 2019 and 2050, and urban transport demand will grow by 74%.

**Transport emissions:** Nearly 25% of global energy-related CO<sub>2</sub> is due to the transport sector,<sup>xxv</sup> with passenger cars producing over half of those emissions.

**Emissions goals:** Under current trends, the International Transport Forum's report predicts transportation-related emissions will fall by 2050, but not reach the levels outlined in the Paris Agreement.

**Safety:** In 2022, road fatalities increased by about 5% compared to pre-pandemic levels.<sup>xxvi</sup>

**Public transport and pedestrians:** According to a World Health Organization study, despite more than half of people considering themselves pedestrians and public transport users, close to 80% of roads assessed don't meet minimum ratings for pedestrian safety.<sup>xxvii</sup>

**Globally, public transportation organizations are seeking to:**

- **Improve the accessibility and connectivity of urban and rural areas** by providing diverse and inclusive transport options for different segments of the population.
- **Reduce the environmental and social impacts of transport** by promoting low-carbon and low-emission modes, and by enhancing the livability and resilience of communities.
- **Support economic and social development** by facilitating the movement of people, goods, and services, and by creating jobs and opportunities.
- **Enhance satisfaction and trust in public transport** by delivering reliable, comfortable, and affordable services, and by engaging and empowering customers through digital platforms and channels.

However, the industry also faces several challenges, including:

- **The COVID-19 pandemic severely affected the public transportation sector**, causing a sharp decline in passenger numbers, revenue, and service levels. The industry must also adapt to the changing travel patterns and preferences of the post-pandemic era, such as increased home-working and online shopping.
- **The increasing competition from private and shared mobility options**, such as ride-hailing, car-sharing, bike-sharing, and micromobility. These modes offer convenience, flexibility, and affordability to customers, especially in areas where public transport is inadequate or unreliable. The industry must find ways to integrate with these modes, as well as to improve its own service quality and customer experience.
- **The sector requires significant infrastructure and technology investment** to meet the evolving needs of customers and stakeholders. The industry must upgrade and expand its physical assets, such as vehicles, stations, tracks, and bridges, as well as its digital assets, such as data, software, and communication systems. The industry should also explore new technologies, such as autonomous vehicles, electric vehicles, smart ticketing, and real-time information, to enhance its efficiency, safety, and sustainability.

### **AI's role in enhancing transport efficiency and solving key issues**

Governments can introduce AI to support traffic management, predictive maintenance for transportation infrastructure, smart logistics, and route optimization—all of which will help enhance safety, efficiency, and convenience. AI can also support the workforce by enabling better access to information and streamlining administrative workloads, so employees can focus on tasks aligned with their domain expertise and organizational priorities. Supported by high-quality data inputs, AI is being used in various aspects of the industry, including:

**Planning and optimization:** Optimize routes, schedules, fares, and capacity based on real-time data and demand forecasting. AI can also help the industry design its infrastructure and services based on scenario analysis and simulation.

**Operation and maintenance:** Monitor and control vehicles, systems, and networks using sensors, cameras, and algorithms. AI can also support predictive and preventive maintenance using data analytics and machine learning.

**Customer service and engagement:** Provide seamless, personalized customer service using chatbots, voice assistants, and facial recognition. AI can also help the industry engage and retain its customers through loyalty programs, gamification, and feedback systems.

### **AI use cases in transportation**

AI for public transportation encompasses several subfields, including generative AI, machine vision, predictive analytics, natural language processing, speech recognition, computer vision, robotics, and more. These technologies can be put to work across various areas of the transport sector, using data from sensors, cameras, GPS, weather, and other sources to support numerous use cases, including:

**Traffic forecasting:** AI can predict traffic demand, volume, speed, and travel time for different segments of the road network and provide real-time information and recommendations to travelers and operators.

**Incident detection and response:** AI can detect and classify incidents, such as accidents, road closures, hazards, or unusual events, and alert the relevant authorities and responders. AI can also suggest optimal routes and strategies for emergency vehicles, and coordinate with other agencies and stakeholders to manage incidents effectively.

**Congestion management:** AI can analyze the causes and patterns of congestion and propose mitigation actions. For example, AI can adjust traffic signals, ramp meters, variable message signs, and other devices to optimize traffic flow and reduce delays.

**Variable speed limits and adaptive signal controls:** AI can dynamically change speed limits, signage, and signals based on environmental context—including the road surface, visibility, precipitation, temperature, wind, and air quality—to improve road capacity, safety, and efficiency.

**License plate detection:** AI can use optical character recognition (OCR) to extract license plate numbers from images and videos and match them with existing databases. This can help transportation agencies enforce traffic rules, collect tolls, manage parking, and enhance security.

**Dynamic lane management:** AI can assess and predict traffic demand and conditions, determining the optimal lane configuration for each scenario. It can then safely communicate lane changes to road users and monitor traffic flow for safety.

**Infrastructure management:** AI can facilitate regular and accurate inspections, detect and report faults and damages, and prioritize maintenance and repair needs. AI can also assist field service workers by providing them with relevant information, guidance, and tools to perform remediation tasks more effectively and safely.

**Asset and inventory management:** AI can help catalog and organize the vast amount of data generated by photo and video sources, and make it easier to search, access, and share. AI can use metadata, such as geolocation, date, time, and asset type, to classify and label images and videos to create a comprehensive and searchable database. This can help transportation agencies keep track of their inventory, monitor the condition and performance of their assets, and plan for future needs and investments.

## Generative AI transforms internal processes

Generative AI is transforming the way public transportation agencies manage their internal processes, such as permitting, licensing and field service work. Using natural language generation and computer vision, generative AI can automate the creation of documents, reports, forms, and invoices to reduce errors and save time.

Generative AI can also enhance the quality and accuracy of field service work, by providing real-time guidance, feedback, and recommendations to workers based on data analysis and image recognition.

Pioneering AI applications in transportation	
1	The <a href="#">San Diego Association of Governments</a> <a href="#">transitioned its data management to Microsoft Azure</a> with Qusitive's help, significantly enhancing its transportation planning capabilities. This migration streamlined data processing from months to days, boosting forecasting accuracy and innovation, and serving as a model for small government agencies seeking similar digital transformations.
2	<a href="#">Washington Metro Area Transport Authority</a> (WMATA) modernized its IT infrastructure by migrating to Microsoft Azure, enhancing the efficiency and reliability of its transit system. Partnering with Microsoft and Presidio, <a href="#">WMATA transitioned critical operations to the cloud</a> , improving data analysis and reducing service disruptions.
3	<a href="#">Nederlandse Spoorwegen</a> <a href="#">developed an app using Azure technologies</a> to provide real-time crowdedness indicators and travel alerts for train passengers, enhancing satisfaction and optimizing resource utilization. This innovative solution leverages IoT and machine learning to distribute passengers evenly across trains and encourage off-peak travel—a cost-effective approach to improving the train travel experience in the Netherlands.
4	<a href="#">Tokyo Metro Co., Ltd.</a> embarked on a project to enhance its track inspection process using AI, shifting from manual inspections to a system that analyzes images for equipment deterioration. By leveraging <a href="#">Microsoft Azure AI services and Microsoft Power Platform</a> , <a href="#">the company aimed to improve inspection quality and reduce employee workload</a> . This initiative represents an innovative step forward in maintaining subway safety and efficiency through technology.
5	<a href="#">Stadtwerke München</a> (SWM) uses Microsoft Azure IoT and AI to enhance Munich's energy, heating, and mobility infrastructure. Its <a href="#">in-house developed solution, INSIGHT, uses big data and AI</a> for predictive maintenance and optimized operations, making SWM's processes more efficient and sustainable. This initiative supports Munich's vision of a fully electrified public transport fleet, contributing significantly to the city's transition into a smart and sustainable urban area.
6	<a href="#">Arizona Motor Vehicle Division</a> used the trusted Microsoft Azure Government cloud, SQL Server, and a full Microsoft technology stack to <a href="#">build a new portal called AZ MVD Now</a> . Residents can now remotely manage many common tasks, such as ordering specialty license plates or checking insurance information.

## Urban infrastructure and rural environments

The integration of AI in urban and rural environments holds significant promise for revolutionizing people's lives and changing the way groups and organizations operate in these spaces, making them smarter, more efficient, and sustainable.

### AI in the urban environment

Cities around the world have already successfully implemented AI-driven technologies to enhance urban living.

Singapore, for example, boasts a city-wide smart transit system that uses AI and other technologies for traffic data collection and analysis, contributing to its status as a leading smart city. This system also helps in other critical urban management areas such as water, energy, and waste.<sup>xxviii</sup>

Similarly, Dubai has launched an AI and data science-based platform<sup>xxix</sup> to alleviate traffic congestion and improve its transportation network. The platform uses machine learning to analyze traffic data, identify trends, and predict road network design and maintenance needs, showcasing a proactive approach to urban planning. This system, along with related initiatives, has played a crucial role in reducing traffic congestion by up to 25%<sup>xxx</sup> and lowering commute times.

These developments underscore the transformative impact of AI on urban infrastructure, demonstrating how intelligent systems can significantly enhance the efficiency and sustainability of city living.

### AI in rural spaces

AI also has the power to transform rural areas—in many different ways.

For example, precision agriculture helps farmers optimize crop yields through data-driven insights, potentially increasing yields by up to 20%.<sup>xxxi</sup> Managing natural resources becomes more efficient, promoting sustainable practices and improved livelihoods. Elsewhere, AI-driven healthcare solutions can help overcome the rural healthcare divide, providing more remote communities with access to medical expertise through telemedicine.

Ultimately, the power of AI to transform urban and rural environments lies in its ability to improve people's quality of life. By automating routine tasks, optimizing resource allocation, and enhancing public services, AI contributes to the creation of more livable, sustainable, and resilient communities.

### Transforming infrastructure with AI

- **Infrastructure management:** AI helps monitor and manage city infrastructure, such as bridges, roads, and utilities, to predict maintenance needs and optimize resource allocation.
- **Urban mobility and traffic management:** AI-powered traffic monitoring and optimization systems help manage traffic flow, reduce congestion, and enhance overall transportation efficiency.
- **Public engagement:** AI-powered chatbots and virtual assistants provide personalized responses to queries, improving the accessibility of government services.

- **Urban planning:** AI analyzes demographic data, traffic patterns, and environmental factors to optimize the layout of urban spaces. Machine learning can also predict future growth, helping planners make informed decisions.
- **Waste management:** AI optimizes waste collection routes based on real-time data, reducing costs and minimizing environmental impact.
- **Public building energy optimization:** AI helps monitor and optimize energy usage in public buildings, street lighting, and other facilities.
- **Climate and environmental monitoring:** AI-driven sensors and satellite data analysis help monitor environmental factors, air quality, and climate change impact.

## Pioneering AI applications in urban infrastructure and rural environments



- 1 The **municipality of Alkmaar** completed a [large-scale migration to Microsoft Azure to drive business continuity and overall agility](#). It also improved system performance, scalability, and security, making its digital offerings faster and more available. This has improved the city's ability to provide services that are more responsive and easier to update when conditions change, as well as ensuring availability in times of high demand.
- 2 [Dynamics 365 underpins a transformational data strategy](#) for **Cornwall Council** that will create a single view of each individual. Having proved the effectiveness of Dynamics 365 Customer Insights by creating a golden employee record, the next stage is to create a golden record for each Cornwall resident, pulling in data from all CRM systems.
- 3 The **New Zealand Department of Internal Affairs** used Azure Active Directory to create a centralized online platform where residents can affirm their legal identities and easily access services. [Called RealMe, this sign-in service means people can use a single username and password to access 163 government services across 56 public agencies.](#)
- 4 To enhance interaction with its communities and provide greater transparency into the progress and quality of services, the **Gauteng Provincial Government** created The Digital Platform—an e-government web portal, mobile app, and chatbot service [based on Microsoft Azure PaaS, Dynamics 365 for Customer Engagement, and Office 365.](#)
- 5 The **Ministry of Communications and Information Technology** aims to transform Qatar into a world-class smart nation. The [Smart Qatar platform, built on Azure services](#), facilitates the development and deployment of innovative national services.



## 10.6 Public safety and justice

### Public Safety

Public safety agencies—encompassing police, fire, emergency services, and disaster management organizations—are the backbone of every community's resilience and security. These agencies are tasked with the monumental responsibility of safeguarding lives and property, often operating in high-stress, rapidly evolving, and unpredictable environments. On top of their core responsibilities, these teams are faced with complex challenges, such as:

- **Limited transparency with the community**, which impacts trust and cooperation between public safety agencies and the people they serve.
- **Difficulty establishing secure, consistent real-time collaboration** among first response stakeholders, which is crucial for effective emergency response operations.
- **Limited data insights from numerous legacy, siloed data sources**, hindering the ability to make informed decisions quickly during critical incidents.
- **Challenges with situational understanding and data sharing** during disaster response, affecting the coordination and efficiency of relief efforts.
- **Increasing volume of digital evidence** creates data processing challenges, which can lead to investigative backlogs and impact crime clearance rates.

These challenges underscore the need for innovative solutions that enhance communication, transparency, and data management in public safety agencies.

### Why public safety agencies should move to AI

By integrating AI into their operations, public safety agencies can revolutionize their capabilities. This integration enhances agencies' efficiency and effectiveness, allowing them to respond more quickly and prepare more thoroughly for incidents. With AI, public safety agencies can:

**Improve situational awareness:** AI solutions provide agencies with real-time data analysis, leading to better situational awareness. This allows for quicker and more informed decision-making during critical incidents, ensuring resources are deployed effectively and emergency personnel have the information they need to respond to situations safely and efficiently.

**Enhance emergency response:** AI helps agencies streamline their emergency response protocols. This includes optimizing dispatch systems, improving communication between responders, and providing predictive insights that can save crucial time during emergencies, leading to better outcomes for the public and first responders.

**Increase data management efficiency:** By utilizing AI, public safety agencies can manage and analyze vast amounts of data more efficiently. AI tools can assist in automating routine tasks, processing large volumes of digital evidence, and providing actionable insights, which can significantly reduce the time spent on administrative work and allow agencies to focus more on strategic operations.



## Justice

When justice systems fall short, it erodes trust between governments and their people—and puts fundamental pillars of our society at risk.

By transforming their operations through solutions that increase fairness, accountability, and transparency for all, teams involved in justice work can [earn more trust within their communities](#). Technologies like AI can empower everyone in the justice system—from judges to defendants, attorneys to prosecutors, and across the many agencies and stakeholders that make up the legal ecosystem.

### Courts face unique challenges modernizing technology

Judges and government leaders recognize the potential of generative AI and [cloud computing to transform operations](#) and solve some of their greatest challenges. Here are four major areas where modern technology can help:

**Disparate systems across agencies and justice partners:** Courts have traditionally been reluctant to adopt cloud-based solutions, but on-premises legacy systems and siloed data solutions are no longer viable. Their lack of interoperability results in inadequate information sharing between agencies and stakeholders, increasing the costs, time, and resources needed to complete tasks. Moving court systems and data to a cloud platform such as [Microsoft Azure](#) can help streamline secure communication across the ecosystem for a 360-degree view of all stakeholders and their needs.

**Antiquated case management systems:** Limited by disparate systems and disconnected data, many courts are hampered by process bottlenecks, increased errors, and greater security risks. Courts need interoperable case management systems that unify data and enable seamless, low-friction, and compliant court experiences while reducing delays, gaps in data, and operational costs.

**Limitations with hybrid hearings:** COVID-19 revealed that many courts were unprepared to deliver hybrid hearings, resulting in numerous backlogs and delays. Cloud-based solutions, such as virtual hearings, can deliver better evidence management and presentation capabilities, draft document sharing, digital court recording, and greater control over proceedings, as well as improved attendance.

**Manual processes and limited analytics:** Legacy approaches to data storage and management, including paper-based records management, inherently slow down processes and waste time. These can be dramatically minimized with a modern cloud platform and enhanced productivity tools. Beyond improving records management, compliance, and security, a modern digital platform can improve interoperability across agencies, derive important insights from unified data, and enable new solutions that take advantage of [generative AI](#) capabilities.

### How courts can move to AI

Courts need a high-level business architecture that meets the requirements of court staff, external users, and administration personnel (court, state, and federal). Leadership must define potential applications and portal solutions for each, and a baseline set of infrastructure requirements to enable them all.


The goal is to help courts succeed in achieving these key benefits:

Increase agility and efficiency	Accelerate delivery of essential services	Access advanced cybersecurity technology
<p>Like all government agencies, courts must adapt to changing demands and requirements, and evolve their operations to improve flexibility and efficiency. <a href="#">Hyperscale cloud</a> enables court systems and staff to scale and innovate quickly, while maintaining compliance and operational excellence. Generative AI can help court staff complete critical processes faster, such as creating daily court correspondence.</p>	<p>The public expects fast, seamless access to government services, including courts. Hyperscale cloud and solutions powered by AI enable courts to deliver personalized experiences and inclusive programs that improve accessibility and fairness for stakeholders across the justice system, helping deliver better outcomes for all. Moreover, implementing generative AI solutions can help improve information sharing and communications across agencies and processes, bypassing the bottlenecks.</p>	<p>Cyberattacks are becoming increasingly sophisticated and damaging, with ransomware attacks in particular targeting court operations. Hyperscale cloud provides world-class protection, with <a href="#">advanced security</a> embedded into the platform to protect against the vast majority of known, preventable attacks.</p>

Most courts need to address infrastructure first—in other words, finish the migration to a hyperscale cloud platform, such as Microsoft Azure, that provides a secure and compliant multi-tenant infrastructure. The next step is to get data in order with a data analytics platform such as [Microsoft Fabric](#), which can consolidate and manage data silos and lay the foundation for the era of AI. Then, courts can work with [Azure OpenAI Service](#) and begin exploring new use cases and solutions using generative AI.

The major factor for success is leadership—visionary judges and leaders who drive cultural change within the organization and shift their mindsets around growth and opportunity. The key is to make a commitment, take a strategic approach, and choose a technology partner to support every step of the transformation. Transforming court operations is a long-term journey, but one that delivers benefits early and often.

### Pioneering AI applications in public safety and justice



- 1

In [Alberta, Canada](#), during its most severe wildfire season, a collaboration between government agencies and AltaML led to the development of an AI tool that significantly improved wildfire management. Using [Microsoft Azure Machine Learning, the tool analyzes vast data sets to predict fire outbreaks](#), aiding in strategic resource deployment. This innovation not only enhances decision-making for wildfire managers but also offers substantial financial savings, estimated up to CA\$5 million annually, while addressing the broader environmental impact of wildfires.
- 2

Microsoft collaborates with [Thorn](#) and [All Tech Is Human](#) to implement strong child safety commitments for generative AI technologies. The initiative aims to prevent the misuse of AI in creating or spreading child sexual abuse material and other forms of sexual harm against children. [Microsoft commits to developing AI models that proactively address child safety risks](#), releasing and distributing models with child safety evaluations, and maintaining model and platform safety by actively responding to child safety risks.

- 3 Mexico's **Supreme Court of Justice of the Nation** built [a search engine to give the public digital access to the court's historical documents](#) and other information to research cases, resolutions, precedents, and more. The AI-powered model enables access for anyone, regardless of their knowledge of legal language.
- 4 The **Orange County Superior Court (OCSC)** [consolidated more than 70 million paper files across three disparate case management systems into a single data warehouse](#), greatly improving efficiency and laying the foundation to apply advanced analytics and build AI-powered solutions. Using Azure OpenAI Service and Copilot has also enabled the court to create an appellate record, which enables the filing of an appeal to a case in seconds.



## 10.7 Defense and intelligence

The evolution of technology is rapidly changing the defense and intelligence ecosystem. It's more important than ever for defense and intelligence organizations to understand and accelerate their adoption of mission-critical, data-driven solutions to address the complex, evolving global security environment. In this context, AI—especially generative AI—can be a positive force-multiplier. Governments can harness the value of AI for threat detection, predictive intelligence, and agentic query and control of battlefield systems and autonomous assets to enhance decision-making, safeguard national security, modernize defense capabilities, and ensure a safer future for their people.

### Key trends evolving the defense landscape

**Complex threats:** The global security environment is facing increasingly complex threats from established nations and non-state actors, including internal dissident groups. Threat vectors are becoming more sophisticated and attack surfaces are increasing; defense forces need to be ready for traditional engagements while also increasing their agility to respond to novel tactics and unpredictable threats.

**Data de-globalization:** There are growing concerns around data residency and data transfers outside the country of origin, immunity to law enforcement access, establishing sole operations and control over IT systems, and economic protectionism.

**Data management:** The quality and management of data are crucial for AI. In defense, there may be challenges related to the collection, storage, and processing of data, especially in environments with limited connectivity.

**Compute power:** Advanced AI models need substantial processing power, which is often missing in remote or isolated edge environments. This constraint can affect the deployment and efficiency of crucial AI applications for defense operations.

**Talent and expertise:** There is often a shortage of AI skills and expertise within the defense and intelligence sectors, which can impede the development and deployment of AI systems.

### Five ways AI is helping defense and intelligence organizations adapt

There is an urgent need for defense organizations to adopt emerging technologies that will help their countries stay ahead of bad actors. However, the race for a digital advantage cannot be won with the current siloed and constrained IT environments. The answer is increased adoption of technology such as hyperscale cloud and AI.

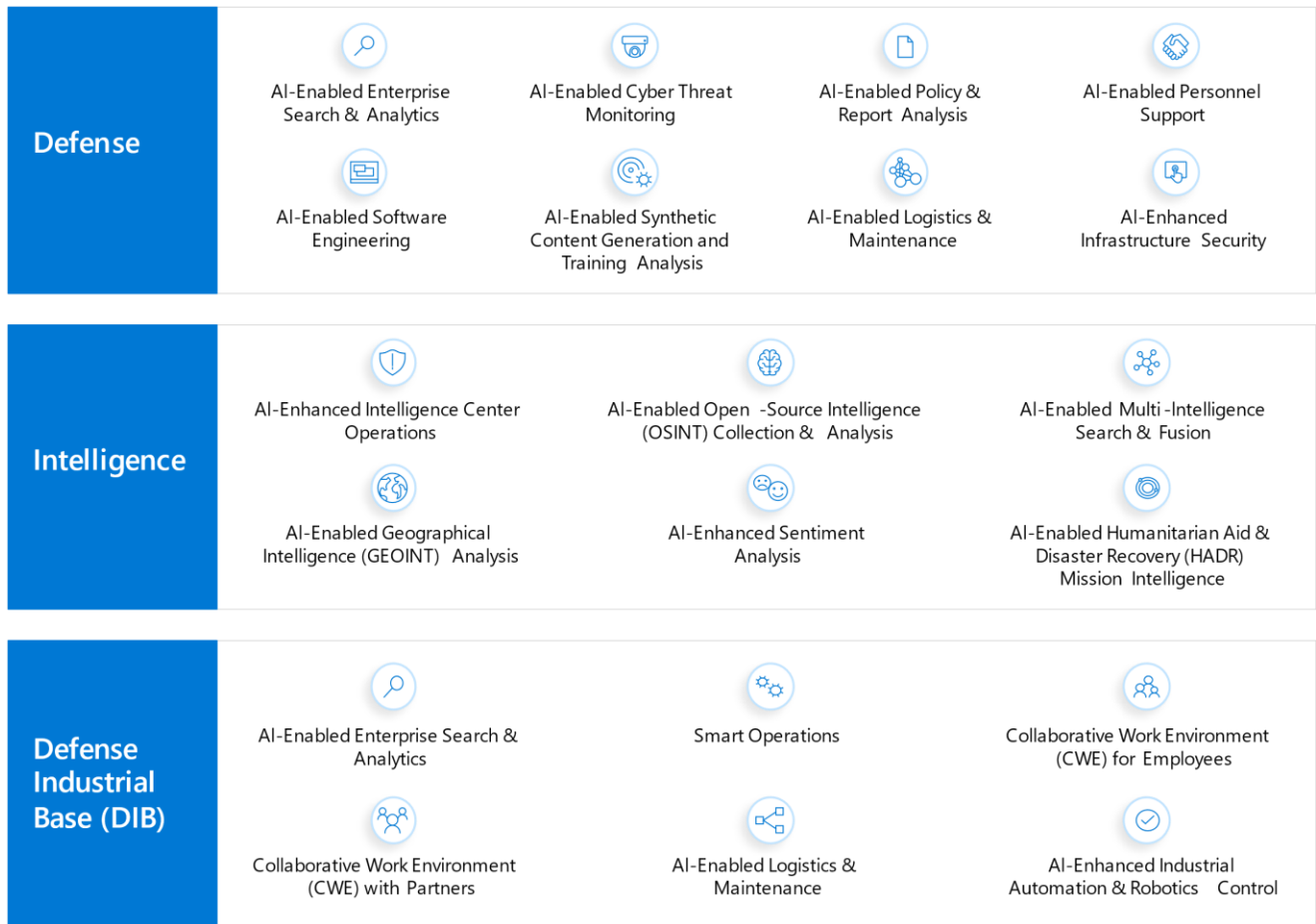
Governments that recognize this shift as an opportunity to transform critical processes and decision-making will realize the positive impact of AI in their outcomes and services. Leaders are starting to transform their defense services using AI in several areas:

1. **Cybersecurity:** AI is used to enhance cybersecurity in defense operations, detecting and responding to cyber threats in real time to help protect sensitive military and intelligence data from hacking, malware, and other cyberattacks. AI can also power threat analysis, anomaly detection, and predictive modeling.
2. **Intelligence, surveillance and reconnaissance:** By analyzing vast amounts of data, including images, videos, documents, and intercepted communications, AI can recognize objects, patterns, and

behaviors. This can facilitate threat detection, identify potential targets, and provide situational awareness and insights for decision-makers.

3. **Agentic query and control:** The application of language models and generative AI provides the ability for natural language interaction with command and control systems, enhancing decision support and speeding and automating information flows. Furthermore, AI can play a crucial role in the operation of autonomous and robotic systems and sensors, minimizing the need for dedicated operators and hands on control. On-board AI on these platforms can autonomously identify mission objectives without constant human oversight, especially in swarming scenarios.
4. **Containerization:** The use of lightweight containers to deploy AI models can ensure consistency and portability across different environments. Containers can be optimized to run efficiently on limited resources. Models deployed to edge compute can enable near-real-time data analysis from Military Internet of Things (MioT) systems, increasing operational efficiency and reducing risks to human operators.
5. **Leveraging low-code solutions:** Utilizing AI platforms and tools that offer user-friendly interfaces and pre-built models can simplify the adoption process. These tools often require less technical expertise to deploy and manage.

Beyond these strategies, the emerging field of generative AI can also play a major role in transforming governments’ defense mission capabilities, with some examples shown in the illustration below:



## Pioneering AI applications in defense and intelligence



- 1** The [Australian Army](#) collaborated with Microsoft on a program that explores how modern digital technologies could transform command and control in the future. The initial focus is on [using AI to transcribe and analyze voice communications over combat net radio](#). The Command, Control, Communications Process Optimization initiative aims to bring clarity to what can be a chaotic operational environment—with reports and searchable transcripts giving commanders improved situational awareness.
- 2** The [United States Department of Defense selected Microsoft to lead a coalition of industry leaders](#) focused on developing capabilities to support Rapid Assured Microelectronics Prototypes (RAMP). Other organizations in the coalition include Applied Materials, Inc., BAE Systems, Battelle Memorial Institute, Cadence Design Systems, GlobalFoundries, Intel Corporation, Nimbis Services, Inc., Northrop Grumman, Siemens EDA, Synopsys, Inc., and Zero ASIC Corporation.
- 3** The latest advances from aerospace pioneer [Airbus](#) include [two groundbreaking innovations that use Azure AI solutions](#) to reimagine pilot training and predict aircraft maintenance issues. Using containers, Airbus engineering teams can provide air-gapped solutions for stringently regulated customers.



## 10.8 Energy

The energy landscape continues to evolve at a rapid pace. Energy companies are grappling with economic uncertainty, rapid technological advancement, and a global transition to carbon-free energy. Leaders are in a race to build the resilience and agility to overcome disruptions—and maximize opportunities—before they arrive.

### Five key drivers in energy transformation

The ability to meet energy demand with a secure and resilient supply, abundant and equitable access, and sustainable practices impacts everyone. There are multiple forces driving the future of energy:

- **Access:** Increasing availability and affordability to meet growing demand and provide energy to the one billion people in the world who do not have stable or affordable access to power.
- **Demand:** Global energy demand is expected to increase by around 50% in the next 30 years.<sup>xxxii</sup> Technology can increase production and efficiency, helping redirect investment to additional energy capabilities.
- **Data sovereignty:** Amid growing concerns around energy security, technology optimizes operations and maintenance, increases reliability and resilience, and protects assets against cyber threats.
- **Climate:** Energy accounts for more than 75% of global greenhouse gas emissions.<sup>xxxiii</sup> Technology helps increase the pace and scale of decarbonization across the energy sector, including electrification, renewables generation, and emissions reduction.
- **Workforce:** There is a growing skills shortage in the energy sector. Technology upskills and empowers the workforce through improved collaboration, training, remote support, automated work processes, and knowledge assistance.

### The role of AI in enhancing sector efficiency and solving key issues

AI is making a transformational impact across the entire energy value chain. From predictive maintenance and load forecasting to customer service and cybersecurity, AI is redefining how energy companies operate, make decisions, and serve their customers.

AI can tap into ERP, ADMS, DERMS, AMI, and other critical systems to analyze data and provide actionable insights into predictive asset failure analysis, real-time trading, procurement optimization, and much more. From operational excellence to customer engagement, AI is a powerful tool to help leaders create a more efficient, reliable, and highly sustainable energy sector.



## Oil and gas

### Exploration and production

- **Seismic interpretation:** Use AI to unlock subsurface data and locate high-potential drilling sites quickly, accelerating the field development process.
- **Portfolio and risk management:** Identify and understand the potential risks and rewards associated with different strategies and exploration scenarios through modeling and simulation.
- **Drilling optimization:** Reduce NPT and well delivery cycles with actionable insights from real-time data, using reinforcement learning to support automated drilling and improve well placement.
- **Autonomous operations:** Enable autonomous drilling rigs and operations, enhancing safety, reducing labor costs, and improving overall operational efficiency. This helps ensure compliance with minimal NPT and maximum value from every barrel produced.
- **Production optimization:** Combine machine learning algorithms with real-time production data to ensure every field, well, and drilling rig is operating at the optimum capacity.
- **Emission management:** Monitor and reduce greenhouse gas emissions, ensuring compliance with environmental regulations and reducing reputational risks.
- **Safety:** Enhance safety measures through IoT sensors, AI analytics, and real-time monitoring to improve worker safety and minimize accidents.
- **Maintenance:** Shift away from reactive and scheduled maintenance by predicting when a failure is going to occur, with the ability to put in a work order, assign technicians with the right skills, and order parts automatically.
- **Uptime:** Minimize shutdown and turnaround through workforce empowerment, remote operations, and 24/7 monitoring systems that connect experts with the field.

### Midstream and pipelines

- **Integrity management and low-carbon preparation:** Use predictive and prescriptive analysis to maintain the integrity of pipelines and prepare infrastructure for the transportation of low-carbon fuels.
- **Pipeline monitoring and maintenance:** Use IoT and AI to provide real-time pipeline monitoring to ensure safety, prevent leaks, and optimize maintenance schedules.
- **Storage optimization:** Maximize storage capacity and tank utilization to reduce storage costs.
- **Market analysis and forecasting:** Provide key stakeholders with market insights and detailed forecasts to make more informed decisions in a dynamic energy market.
- **Risk management:** Assess and mitigate risks associated with transportation and storage.
- **Safety:** Use IoT and AI-based solutions to enhance safety in midstream operations by providing real-time monitoring and early warning systems.



## Downstream refineries

- **Asset management:** Move from reactive and scheduled maintenance to predictive and prescriptive maintenance.
- **Operational efficiency:** Minimize shutdown and turnaround times by monitoring equipment performance to optimize maintenance schedules.
- **Yield and process optimization:** Identify and implement efficiencies in refinery processes, maximizing yield and reducing waste.
- **Energy management:** Monitor energy consumption and costs to identify opportunities for more efficient operations.
- **Autonomous operation:** Automate refinery processes for safer operations and higher productivity.
- **Supply chain and scheduling optimization:** Ensure the timely delivery of feedstock and other products by analyzing usage, capacity, and costs.
- **Safety:** Enhance safety procedures and monitor compliance to help prevent accidents and create a clear regulatory audit trail.

## Retail and demand

- **New services:** Maximize margins and develop commercial value propositions around new models such as Energy-as-a-Service.
- **Dynamic pricing optimization:** Enable dynamic pricing strategies, responding to market demand and real-time data.
- **360° customer engagement:** Use AI to personalize customer interactions, enhancing customer loyalty and satisfaction.

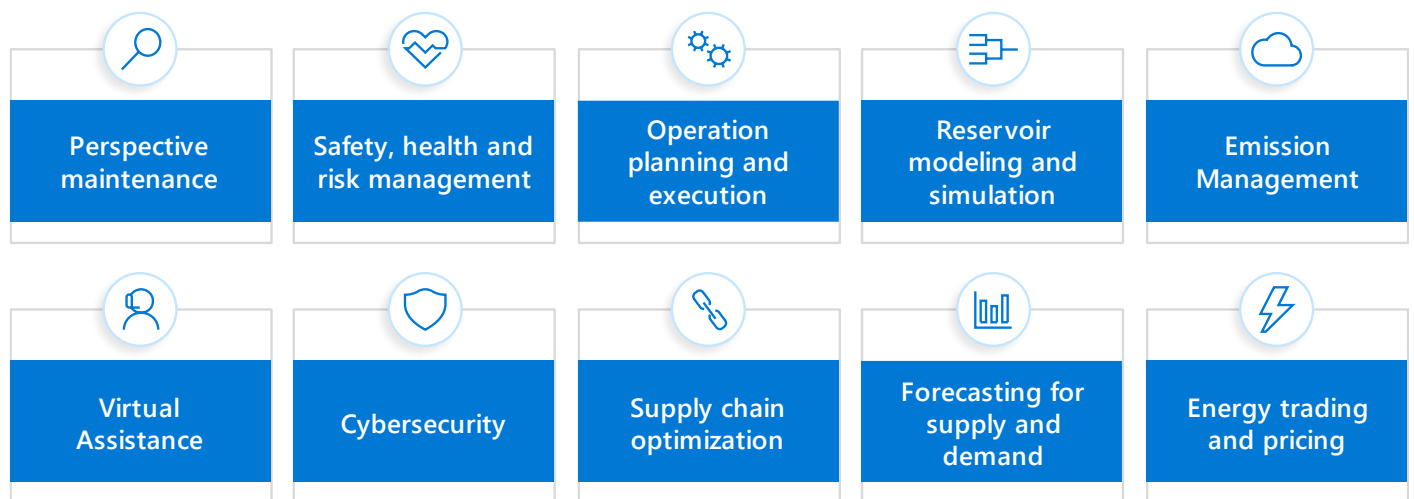


Figure 9: Example of Oil and Gas Generative AI Use cases



## Power and utilities

### Connected operations

- **Advanced forecasting:** Create a resilient grid that can anticipate and adapt to change in real time with highly tuned forecasts to support trading and drive profit.
- **Decision management:** Centralize information to create more intelligent, AI-driven, and efficient decision-making processes with real-time scenario analysis.
- **Real-time control:** Leverage cloud capabilities to orchestrate assets with full grid visibility, including data from distributed energy resources, to ensure optimum energy flow.
- **Security:** Prioritize safeguarding every data point, every process, and every grid operation through zero trust architecture and best practices.
- **Predictive analytics and maintenance:** Evaluate assets' current status and usage trends to inform maintenance teams of potential equipment failures in advance.
- **Operational improvements:** Create a holistic overview of the organization to highlight opportunities for more efficient operations—both internally and in collaboration with other entities in the supply chain.
- **Worker health and safety:** Analyze large data sets on worksites' operations, procedures, schedules, historical incidents, and environmental conditions to identify potential hazards and safety risks.

### Grid management

- **Grid efficiency:** Predict renewable energy generation to ensure intermittent energy sources can support the required energy grid load and supply.
- **Intelligent grid:** Optimize energy grids by managing energy flows between homes, businesses, storage batteries, renewable energy sources, microgrids, and the power grid.
- **Demand forecasting:** Provide more accurate demand and price predictions, identify areas with the highest potential for renewable energy development, and help grid operators accurately gauge when wind and solar resources are available.
- **Energy storage:** Integrate smart storage systems into the grid to improve energy management and resilience. Use energy storage to create virtual power plants to deliver energy during peak demand.

### Supply chain

- **Supply chain optimization:** Gain full visibility into every supply chain and optimize logistics processes to respond more effectively to market fluctuations and demand.

## Retail


- **Customer service:** Understand customer energy usage and provide customers with information on reducing their energy consumption by changing their usage habits.
- **Customer experience:** Automate responses to customer inquiries through advanced chatbots and summarize customer support conversation logs, improving resolution times and customer satisfaction.


## Harness the full power of AI for power and utilities



Figure 10: Example of Power and Utilities AI Use cases

### Pioneering AI applications in energy





#### Oil and gas

- 1 **Petrobras** recently implemented generative AI for all its 96,000 employees and service providers to boost productivity. [ChatPetrobras, powered by Microsoft](#), assists teams in day-to-day tasks, including summarizing content, generating content in different formats, translating content, rewriting in specific styles, and writing programming code. The system does all of this with the highest standards of security and data protection for corporate information.
- 2 **BP** has committed to making the transition to net zero carbon by 2050. To achieve that goal, BP must first become “carbon aware” and understand the impacts of its operations in real time. A key step on this journey was to create digital twins of its complex global assets to identify opportunities for optimization and carbon reduction. The first digital twin was built to calculate real-time carbon intensity and the energy efficiency of BP’s offshore Clair Ridge facility. By building on Azure, BP has positioned itself to scale across all its global operations while enhancing the security of its data.



## Power and utilities

- 1 **OPG** leveraged [ChatGPT to initiate a wave of productivity and efficiency](#). The results were staggering—with a visible uplift in company-wide productivity, marking a significant step forward in its operational efficiency.
- 2 Microsoft has launched [a first-of-its-kind DERMS platform on Azure](#) in collaboration with **PG&E and Schneider Electric**. PG&E was grappling with enormous challenges on its low-voltage network, complicated further by increasing adoption of rooftop solar and EV charging. The situation escalated to a point where PG&E was issuing alerts to urge customers to reduce consumption or risk rolling blackouts. However, the state-of-the-art DERMS platform now enables real-time power balancing and shifting.
- 3 Microsoft collaborated with **Constellation** to co-develop [a real-time carbon-free energy matching solution](#). The solution automates tasks that previously took hours or even days, such as creating work packages and orders; these can now be completed in minutes.



## 10.9 Sustainability

For governments, sustainability means balancing economic, social, and environmental goals and ensuring long-term wellbeing for their people and the planet. Governments play a key role in setting policies, regulations, and incentives that promote sustainable development and foster innovation and collaboration among different actors.

Some of the main challenges that governments face in pursuing sustainability are:

**Lack of unified data and transparency:** Many governments lack access to reliable and timely data on the environmental and social impacts of their activities, policies, and programs. This makes it difficult to monitor progress, evaluate effectiveness, identify areas for improvement and take action. Without this insight, many governments may also struggle to communicate their sustainability efforts and achievements to the public and other stakeholders.

**Complexity and skilling:** Sustainability issues are often complex and interconnected, involving multiple sectors, levels, and stakeholders. Because of this, new skills are needed at all levels of government to adequately make sustainability progress. Governments may need to adopt more flexible approaches to be ready to quickly respond to changing circumstances and new information.

**Coordination and collaboration:** Sustainability requires coordinated and collaborative action among different government agencies, levels, and sectors, as well as with non-governmental actors, such as businesses, civil society, and international organizations. However, many governments face institutional and cultural barriers, such as siloed structures, fragmented responsibilities, divergent interests, and lack of trust. Governments need to foster a culture of cooperation and partnership for sustainability progress.

### Three transformative AI abilities for sustainability

#### 1 Measure, predict, and optimize complex systems

AI enables people and organizations to simplify complexity sustainability information by helping discern patterns, predict outcomes, and optimize performance. Examples include modeling the impact of carbon emissions or predicting wildfires with greater accuracy than traditional methods.

#### 2 Accelerate the development of sustainability solutions

AI can support development of industry-specific solutions for sectors such as building management and transportation that enhance operations to improve sustainability.

#### 3 Empower the sustainability workforce

AI can enable targeted training and assistance in the field, leading to more efficient and effective work in the sustainability space. AI can also empower the workforce with the information they need to do their jobs well, for example using generative AI to summarize large data sets, analyze and make faster decisions.

### Examples of AI-driven sustainability solutions

AI can support sustainability initiatives and operational improvements in various domains, such as energy, transportation, agriculture, and education.

**Smart grids:** AI can monitor and control the flow of electricity across the grid, balancing supply and demand, detecting faults, and preventing blackouts. AI can also enable distributed energy resources, such as rooftop solar panels and batteries, to participate in the grid and provide flexibility and resilience.

**Demand response:** AI can forecast and adjust electricity consumption based on prices and users' preferences and needs. AI can also coordinate the demand response of multiple users, such as households, businesses, and electric vehicles, to reduce peak load and optimize energy use.

**Renewable energy integration:** AI can predict and optimize the generation and storage of variable renewable energy sources, such as wind and solar. AI can also facilitate the integration of renewable energy into the grid, ensuring reliability and stability.

**Building automation:** AI can automate and optimize heating, ventilation, air conditioning, lighting, and security systems, reducing energy consumption and improving comfort and safety. AI can also learn from the behavior and feedback of occupants and adapt to their preferences and schedules.

**Precision agriculture:** AI can help farmers optimize their inputs, such as water, fertilizer, and pesticides, based on the soil, weather, and crop conditions. AI can also provide guidance on planting, harvesting, and irrigation to improve crop yield and quality.

**Crop monitoring:** AI can use satellite, drone, or ground-based sensors to collect and analyze data on crop growth, health, and stress. AI can also detect anomalies, such as drought, flood, disease, or pests, and alert farmers in real time, enabling timely interventions and reducing losses.

**Pest detection:** AI can use image recognition and machine learning to identify and classify pests, such as insects, weeds, or rodents, that can damage crops. AI can also suggest the best methods to control or prevent pest infestations, such as biological, chemical, or mechanical solutions.

**Supply chain management:** AI can track and optimize the transportation, storage, and distribution of food products and monitor their quality, freshness, and safety, reducing spoilage and waste. AI can also enable traceability and transparency in the food supply chain, enhancing consumer trust and satisfaction.

#### Further reading



[Accelerating sustainability with AI: A playbook](#)



[Sustainable by design: Advancing the sustainability of AI](#)

## Pioneering AI applications in sustainability



- 1** **Dutch water utility PWN** has enhanced its operations by [moving its SAP estate to Microsoft Azure](#), allowing for better asset management and customer communication. Using Azure's capabilities and IoT sensor data, PWN can predict climate change effects and optimize water usage. This strategic use of technology supports PWN's mission to provide high-quality water and innovate for a sustainable future.
- 2** **Energinet**, a Danish state-owned energy company, embarked on [a digital transformation with Microsoft Azure](#) to enhance operational efficiencies and incorporate more renewable energy into the grid. The transition to the new digital drift planning platform has automated energy balancing processes and increased data resolution. This initiative supports Denmark's sustainability goals, including a 70% reduction in greenhouse gas emissions by 2030 and a 100% green power system.
- 3** **Pacific Northwest National Laboratory (PNNL)**, a US Department of Energy sustainability research laboratory, uses AI and high-performance computing technologies on Microsoft Azure to [accelerate scientific discovery](#). For example, when researching new battery materials, the Azure platform helped PNNL winnow 32 million potential inorganic materials to 18 promising candidates in just 80 hours.
- 4** **Vestas** has [transitioned from an on-premises supercomputer to Microsoft Azure and Azure high-performance computing \(HPC\)](#). This move has allowed Vestas to improve the reliability and efficiency of its turbine simulations, which are crucial for optimizing wind farm performance and extending equipment life. Vestas can now conduct more advanced simulations, re-simulate climate data at a higher resolution, and explore new business opportunities by potentially offering its comprehensive climate library to external clients.



# 11 The team

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## Author



**Yasmine Rifai**

*Technology Lead, Public Sector, Microsoft*

LinkedIn:



## Key Executive Contributors



**Alvaro Vitta**

*Worldwide Cybersecurity Lead, Public Sector, Microsoft*

LinkedIn:



**Ana Casillas**

*Senior Industry Digital Strategist, Worldwide Public Sector, Microsoft*

LinkedIn:



**Awadh Kapoor**

*Digital Transformation Director - Aero space & Defense, Microsoft*

LinkedIn:



**Dave Sloan**

*Chief Technology Officer, Worldwide Public Sector, Microsoft*

LinkedIn:



**David Williams**

*Director, Public Safety & Justice, Worldwide Public Sector, Microsoft*

LinkedIn:



**Dr. Doug Priest**

*Public Transportation Lead, Worldwide Public Sector, Microsoft*

LinkedIn:







**Jaye Richards-Hill**

*Education Lead, Central and Eastern Europe, Middle East and Africa (CEMA), Microsoft*

LinkedIn:



**Jeremy Goldberg**

*Director of Government Operations and Infrastructure, Worldwide Public Sector, Microsoft*

LinkedIn:



**Marc Pisan**

*Worldwide GTM Lead for Sustainability, Microsoft*

LinkedIn:



**Mohamed Sami El Tahawy**

*Industry Advisor – WW Government | WW Public Finance Community Co-lead, Microsoft*

LinkedIn:



**Mohamed Saleh**

*Regional Health Advisor – EMEA, Microsoft*

LinkedIn:



**Valentina Ion**

*Worldwide Public Finance and Public Transportation Lead, Microsoft*

LinkedIn:



**Yara el Atrach**

*Energy and Sustainability Digital Strategy Advisor, EMEA, Microsoft*

LinkedIn:



## Leadership Review Team



**Alli Weimer**

CTO Worldwide Defense & Intelligence, Microsoft



**Andreas Ebert**

National Technology Officer, EMEA



**Andrew Cooke**

Global Policy Lead, Worldwide Public Sector, Microsoft



**Evangelos Chrysafidis**

Public Sector GM, CEMA



**Greg Wilson**

Chief Technology Officer, Worldwide Public Sector, Microsoft



**Jenn Roth**

Director, HLS Platform Product Marketing, Microsoft



**Jonathan Beesley**

Director, Business Strategy, WWPS Defense & Intelligence, Microsoft



**Kirk Arthur**

Worldwide Government Solutions Lead, Worldwide Public Sector, Microsoft



**Lloyd Hewitt**

Director, Business Strategy, WWPS Defense & Intelligence, Microsoft



**Miki Usyak**

Director, Global Energy & Resources Product Marketing, Microsoft



**Olivia Neal**

Industry Advisor, Americas, Worldwide Public Sector, Microsoft



**Ratko Mutavdzic**

Industry Advisors Manager, Worldwide Public Sector, Microsoft



**Ronan Damasco**

National Technology Officer, Brazil Microsoft



**Sean Waters**

Senior Product Marketing Manager, AI Sustainability, Microsoft

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