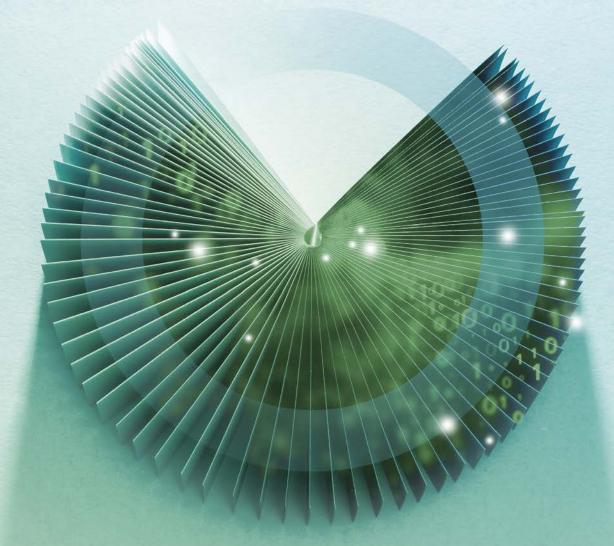**Deloitte.**

The Government
& Public Services
AI Dossier

By Deloitte AI Institute

About the Deloitte AI Institute
The Deloitte AI Institute helps organizations connect all the different dimensions of the robust, highly dynamic and rapidly evolving AI ecosystem. The AI Institute leads conversations on applied AI innovation across industries, with cutting-edge insights, to promote human-machine collaboration in the "Age of With."

The Deloitte AI Institute aims to promote the dialogue and development of artificial intelligence, stimulate innovation, and examine challenges to AI implementation and ways to address them. The AI Institute collaborates with an ecosystem composed of academic research groups, start-ups, entrepreneurs, innovators, mature AI product leaders, and AI visionaries, to explore key areas of artificial intelligence including risks, policies, ethics, future of work and talent, and applied AI use cases. Combined with Deloitte's deep knowledge and experience in artificial intelligence applications, the Institute helps make sense of this complex ecosystem, and as a result, deliver impactful perspectives to help organizations succeed by making informed AI decisions.

No matter what stage of the AI journey you're in; whether you're a board member or a C-Suite leader driving strategy for your organization, or a hands on data scientist, bringing an AI strategy to life, the Deloitte AI institute can help you learn more about how enterprises across the world are leveraging AI for a competitive advantage. Visit us at the Deloitte AI Institute for a full body of our work, subscribe to our podcasts and newsletter, and join us at our meet ups and live events. Let's explore the future of AI together.

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What's inside

After decades as science fiction fantasy, artificial intelligence (AI) has made the leap to practical reality and is quickly becoming a competitive necessity.

Introduction

After decades as science fiction fantasy, artificial intelligence (AI) has made the leap to practical reality and is quickly becoming a competitive necessity. Yet, amidst the current frenzy of AI advancement and adoption, many leaders and decisionmakers still have significant questions about what AI can actually do for their businesses.

This dossier highlights several of the most compelling, business-ready use cases for AI in Government & Public Services. Each use case features a summary of the key business issues and opportunities, how AI can help, and the benefits that are likely to be achieved. The dossier also includes several emerging AI use cases that are expected to have a major impact on the industry in the future.

Of course, the best uses for AI vary from one organization to the next, and there many compelling use cases for AI beyond the ones highlighted here. However, reading through this collection should give you a much clearer sense of what AI is capable of achieving in a business context—now, and over the next several years—so you can make smart decisions about when, where, and how to deploy AI within your own organization (and how much time, money, and attention you should be investing in it today).

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Six ways that AI creates business value

Looking across all AI use cases, there are generally six major ways that AI can create value for a business:[1]

Cost reduction
Applying AI and intelligent automation solutions to automate tasks that are relatively low value and often repetitive, can reduce costs through improved efficiency and quality.

Example
Automating data entry and patient appointment scheduling using natural language processing.

Speed to execution
Reducing the time required to achieve operational and business results by minimizing latency.

Example
Accelerating the process of drug approval by using predictive insights to create a synthetic trial.

Reduced complexity
Improving understanding and decision making through analytics that are more proactive, predictive, and able to see patterns in increasingly complex sources.

Example
Reducing factory downtime by predicting machinery maintenance needs.

Transformed engagement
Changing the way people interact with technology, enabling businesses to engage with people on human terms rather than forcing humans to engage on machine terms.

Example
Using conversational bots that can understand and respond to customer sentiment to address customer needs more effectively.

Fueled innovation
Redefining where to play and how to win by using AI to enable innovative new products, markets, and business models.

Example
Recommending new product concepts and features based on customer needs and preferences mined from social media.

Fortified trust
Securing a business from risks such as fraud and cyber—improving quality and consistency while enabling greater transparency to enhance brand trust.

Example
Identifying and anticipating cyber attacks before they occur.

Top use cases in Government & Public Services

In the government & public services (GPS), AI adoption and maturity levels tend to vary depending on the government agencies, their existing infrastructure's reliance on legacy systems, and workforce fluency.

Defense, intelligence, and law enforcement agencies are commonly deploying and scaling AI, actively embracing advanced technologies such as computer vision, leveraging graph analysis, using deep neural networks to uncover suspicious activities and actors in large data sets, streamlining functions and supporting the warfighter in mission applications and weapons systems, and monitoring and improving readiness of personnel and equipment.

Civil and health agencies are leveraging AI across the AI spectrum—from early stages of conducting assessments to evaluating the organization's readiness for AI and identifying where it could bring the greatest return on investment, to operationalizing and deploying AI for a wide range of critical use cases such as climate and economic analysis, trade surveillance, research, and fraud detection. Health agencies are leveraging AI to expedite the process for drug trials, drug discovery, and analysis of health records and medical data (including complex imaging data from microscopes, MRIs, and x-rays). This has led to a spur of greenfield and brownfield projects in genomic and personalized medicine.

Several state governments have begun adopting AI/ML capabilities to improve and support the services they provide to their citizens, including areas such as public transit, modernizing DMV capabilities, and helping make intelligence decisions for enrollment analytics.

Looking across the public services, a common trend emerges from the growing use of robotic process automation (RPA) to automate back-office activities such as finance and HR, which better enables government employees while reducing or eliminating their time focused on manual activities that are repetitive and time-consuming.

Compared to private sector organizations, government agencies face additional legal and risk constraints which can inhibit their ability to quickly adopt and deploy AI. Given their responsibility to support the public in an equitable manner, public services organizations tend to face high standards when responding to fundamental AI issues such as trust, safety, morality, and fairness. In the face of these challenges, many government agencies are making a strong effort to harness the power of AI while cautiously navigating through this maze of legal and ethical considerations. Lastly, government budgets fund specific programs and activities—not necessarily the underlying technologies that enable them—meaning AI investment generally plays a supporting role in public services plans and strategies, rather than on the converging and enabling collection of technologies themselves.

Nonetheless, there appears to be growing support, recognition and action within the executive and legislative branches in the United States government as to the role AI will play in our nation's overall competitiveness. This recognition and shift in mindset will have a trickle-down effect on AI adoption and maturity throughout the public services.

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Pushing back on paper pushing
(Claims Processing Back Office Automation)

Use robotic process automation (RPA), natural language processing (NLP), and computer vision to digitize paper documents and accelerate processing.

Issue/Opportunity

Most government agencies spend countless hours processing paper documents and manually entering data into back-office systems and databases. For example, processing claims and applications for assistance from the Department of Social Services (DSS) and other agencies requires laboriously reviewing 70,000+ applications per month.

Many back-office functions rely on paper documents that must be manually digitized downstream in preparation for processing. A lack of intelligent online intake systems can create efficiency bottlenecks.

Intelligent IT systems have the potential to increase analytics capabilities and simplify audit and historical document tracing efforts. Today, implementing a combination of computer vision, NLP, and RPA is becoming the norm—enabling end-to-end back-office automation, from service intake to feedback.

How AI can help

- *Enable intelligent portals.* AI-powered online self-service portals can increase data intake capacity and reduce reliance on brick-and-mortar government centers.

- *Capture and prepare data.* Widespread digitization using computer vision to digitize paper documents—as well as NLP to enable smart searches on digitally submitted forms and applications—can improve speed and reduce the need for manual data entry.

- *Process data more efficiently.* In many cases, RPA systems—combined with machine learning—can learn how to assess applications, understand the potential actions given certain criteria, and completely automate the review process—eliminating many overhead costs.

- *Drive continuous improvement.* Intelligent automation can improve public service outcomes by displaying case status, e-notices, and account balances (where applicable). These advanced systems incorporate feedback loops to gauge service levels and continually improve performance at procedural pain points.

Possible benefits

Do more with less.
Back-office automation should be considered an essential enabling technology for government agencies facing constant pressure to provide higher levels of service to more people with fewer human capital resources.

Getting in front of social problems
(Population Risk Support)

Use AI and human-machine teaming to better predict risk for housing and food insecurity, addictions, and mental health episodes—enhancing public policy to improve citizens' quality of life.

Issue/Opportunity

Homelessness, drug abuse, and mental health deterioration are widespread problems across the US, with those issues often compounding each other to degrade quality of life and increase the need for government assistance. Historically, legislators responsible for making social policy focused on relief efforts that address problems after they occur, with prevention taking a back seat. However, thanks to the advent of predictive modelling, policymakers are increasingly adopting a data-driven approach to help them better understand risk factors and adjust social policy accordingly.

How AI can help

- *Identify risk factors.* Leveraging public health records and independent study data, AI can identify trends and pick out key environmental, psychological, and behavioral factors that lead to homelessness, drug abuse, and other health-related social issues.

- *Predict risks.* Machine learning algorithms can screen localized populations using identified risk factors and local environmental conditions (such as housing and food security, addiction, and mental health) to predict how the factors might compound to affect risk.

- *Enable human-machine teaming.* Policymakers can use the outputs of predictive models to determine the likely efficacy of proposed programs and then shape their policy goals for specific outcomes, such as lowering drug addiction within a specific community and reducing the likelihood of food security in underserved communities.

Possible benefits

Improved understanding of health determinants.
Trend analysis of population risk factors alongside local policies and programs can provide insight into which social and environmental factors are the most telling determinants of health.

Better prediction of proposed policy impacts.
Machine learning can leverage health data and known local risk factors to predict the impact of proposed policies and inform targeted legislation to achieve specific population health goals.

Medical breakthroughs at record speed
(Biomedical Data Science)

Use AI algorithms to analyze large quantities of biomedical data—including genomic, imaging, and clinical data—to accelerate discovery of new ways to prevent, diagnose, and treat diseases.

Issue/Opportunity
Medical research and discovery has long been a time and capital-intensive endeavor, with new research projects requiring significant vetting and funding before getting the go-ahead to ensure resources are not wasted. Research projects typically generate large, complex data sets that may be difficult or near impossible for humans to fully interpret. However, with advances in AI technology and rapidly growing stores of biomedical data, AI-powered systems are now capable of conducting automated discovery research to help drive scientific discovery and identify new medical trends and solutions.

How AI can help

- *Interact with researchers in their natural language.* Stores of biomedical data are compiled into a database that researchers can query in plain language to obtain updated medical statistics, new research outcomes, and answers to diverse bioinformatics questions.

- *Analyze a broad range of biomedical data.* AI can help analyze biomedical imaging, genomics, and clinical data—along with data from wearable and implantable devices—to accelerate detection, prevention, and treatment of diseases.

- *Improve drug discovery.* Machine learning models can predict how molecular compounds might interact, helping to identify targets for drug discovery and flag promising findings for further investigative research.

Possible benefits

Easier access to complex data.
Natural language processing is making complex biomedical data more accessible to medical professionals, enabling greater utilization of the ongoing research and data being collected.

Discovery of new disease trends and drugs.
Machine learning algorithms are gleaning insights from vast data sets to discover new disease trends and drugs—improving diagnostic and treatment capabilities

Making sense of HR benefits
(Benefits Administration)

Use AI to optimize service recommendations and enhance customer engagement, improving both the speed and quality of service delivery while transforming the employee work experience and reducing workloads.

Issue/Opportunity
AI plays a large role in how people now interact with many consumer products and brands. However, it has not affected HR activities to the same extent. In particular, continued lack of individualized guidance about sponsored benefits—as well as issues with program delivery quality—are having a detrimental impact on employee engagement and employer decision-making about benefit programs.

How AI can help

- *Understand how employees currently engage with HR.* AI can be used to detect engagement trends across programs to gain insights about which programs are preferred by specific employee segments, and to gauge each group's satisfaction with their chosen programs.

- *Optimize benefit offerings.* Using predictive modeling, HR departments can understand the financial impact of adding specific programs and then benchmark against the expected net advantage to employees most expected to enroll. This can provide employees personalized and refined options when selecting programs that will best benefit them.

- *Enhance service delivery.* Intelligent benefits "mentoring" systems use data about employee claims history and coverage requirements to provide a range of recommended programs (with estimates of total cash outlay for each plan). Personalized recommendations can be presented in a web portal that includes informative materials to help educate employees about the recommendations and why they might choose to enroll. These tailored solutions and recommendations can help improve employee fluency with benefits programs and packages, helping ensure that employees are prioritizing the right investments and activities to achieve their goals.

Possible benefits

Smarter benefit investments.
By gaining deeper insight into how employees engage with benefits programs, employers can make more informed benefit investment decisions that optimize employee satisfaction and total benefits spend efficiency.

Increased program engagement.
Intelligent personalized recommendation engines can bridge the gap between optimized offerings and broad employee awareness and education, leading to higher program engagement from employees.

Tackling problems before they become crises
(Health and Environmental Predictions)

Use AI to identify patterns, impacts, and mitigation options for challenges related to public health and climate change.

Issue/Opportunity

Epidemics and pandemics have challenged populations throughout history by spreading faster than governments and health entities can research and formulate tactics for prevention. COVID-19 has reignited an urgency for the public services to combat disease outbreaks and other health crises through a data-driven approach. Compounding the challenge is the issue of climate change, which exacerbates health inequities and poses broad risks to social well-being and the global economy.

How AI can help

- *Disease outbreak prediction.* Modern health information extends beyond what has traditionally been measured, now including economic, social, cyberspace, and IoT data. Deep-learning neural networks can use this wealth of new and traditional data to assess the risk of an epidemic, predict the trend of an ongoing epidemic, detect abnormal changes, and issue early warnings as needed. For example, COVID spikes could be detected within a specific geography by monitoring sewage data.

- *AI-informed public intervention.* Machine-learning algorithms can identify at-risk populations and consider subtle factors (such as human behavior, disease transmission patterns, and natural and man-made environmental factors) to calculate the optimal sensing and screening strategies—and

to create public health communications that can have the broadest possible impact. In addition, AI can be used for longitudinal forecasting of co-factor and long-term health effects (e.g., co-morbidity and chronic condition modeling). Also, in the event of future pandemics, AI can help improve the resilience of global supply chains, workforces, and intervention channels.

- *Health crisis investigation and AI-assisted drug development.* During an epidemic, AI can analyze incoming data to identify the source of the outbreak and inform the discovery process with additional data-driven trends and insights. It can also accelerate vaccine development and improve diagnostics.

- *Environmental modeling and monitoring.* AI can model changing global weather patterns using predictive analytics and agent-based simulation models to enable more accurate tracking and forecasting of extreme climate events and inflection points. Using computer vision and machine learning, AI can also analyze satellite images and draw insights about trends in biodiversity, wildlife health and activity, and environmental changes such as erosion and water loss—as well as track methane and other greenhouse gas emissions. In addition, advanced machine learning models can accurately estimate carbon emissions across international supply chains. These insights are important for climate impact assessment, abatement portfolio management, simulation of decarbonization scenarios, physical risk assessments, analysis of abatement impacts, monitoring the effectiveness of carbon offsetting efforts, and tracking and taxing emissions.

Possible benefits

Effective disease intervention in record time.
AI can be a powerful tool for combating public health crises — helping to curtail epidemics faster than previously thought possible by enabling: a data-driven approach to risk assessment; academic exploration to build essential knowledge; and accelerated development of intervention strategies and solutions. Also, novel AI technology can improve sequencing and sensing techniques, potentially catalyzing the development of effective epidemiologic and risk models, as well as interventions such as therapeutics and vaccinations.

Deeper understanding of climate change causes and impacts.
Predictive analytics, computer vision, machine learning, and simulation models are helping monitor and predict climate change's impact on weather patterns, environmental health, and human emissions. This data-driven approach to monitoring emissions and the climate can be a critical enabler for global efforts to mitigate and adapt to climate change—and to create more resilient health systems.

Emerging AI use cases in Government & Public Services

Spotting trouble before it occurs
(Video Surveillance Predictions)

Using AI and computer vision-enabled video surveillance to detect potential security threats more quickly and accurately.

Video surveillance is an essential tool for maintaining law and order, but has traditionally required constant monitoring by humans. Now, however, AI is increasingly becoming a core enabler for video analytics. Deep learning, computer vision, and object/face recognition are enabling unprecedented levels of speed and accuracy—making it possible for systems to conduct automated monitoring and analysis, and then trigger corrective actions in real time. Also, deep learning is enabling multiple systems to communicate and coordinate with each other, processing and analyzing multiple video and data streams at the same time. In prisons, these AI-driven video surveillance solutions could detect weapons and analyze activities for potential threats, issuing alerts and highlighting possible problems on the screen so security personnel can quickly pinpoint and address them.

Emerging AI use cases in Government & Public Services

The art of war in the AI era

(Agent-based Simulations to Refine Military Strategy)

Using deep learning to simulate tactical moves and refine military strategy in real time.

Although the fundamental principles of military strategy and tactics have been around for thousands of years, that doesn't mean the art and science of war are stagnant. On the contrary, emerging AI systems are proving useful for simulating human decision-making and predicting the actions of complex systems in which millions of individual "agents" (whether humans, economies, transactions, cars, or viruses) all behave in their own unique ways. With AI techniques such as deep learning and reinforcement learning, the interactions and behaviors of all those individual agents can be simulated and modeled with unprecedented accuracy. This new capability could give military leaders a powerful new weapon for refining their strategies and simulating tactical moves in real time.

Emerging AI use cases in Government & Public Services

City of the future

(Civil Asset and Infrastructure Management)

Using AI to monitor and maintain a city's physical assets and infrastructure, ensuring they are fully functional and operating safely.

Managing all the physical assets and infrastructure necessary to keep a city running smoothly is a massive undertaking. AI and machine learning—in conjunction with sensor networks and camera feeds—can make the job a lot easier, helping to monitor and maintain everything from parking meters, fire hydrants, and emergency call boxes to street lights, bridges, and road signs. In addition, sensors and AI can be used to monitor actual usage levels, enabling cities to conduct use-based maintenance, which can be far more efficient and effective than time-based maintenance. The result? Cities that can operate more smoothly and safely while getting the most value from every taxpayer dollar.

Emerging AI use cases in Government & Public Services

Emerging AI use cases in Government & Public Services

Augmenting and assisting the judgement of our judges

(Legal Outcome Predictions)

Using machine learning and deep learning to analyze decades of case law—and millions of past cases—to predict outcomes for future cases and accelerate case resolutions in both domestic and international courts.

One of the hallmarks of human intelligence is judgment—and no aspect of our society poses a greater test of intelligence and judgment than the legal system. While machine learning and other AI technologies operating today are moderately in their infancy state, they are making tremendous strides at leveraging past decisions and case law to predict future case decisions. This can help human judges resolve new cases much more quickly and efficiently by providing a starting point for them to think about each case, supported by a robust analysis of related case law and past precedent.

Making adaptive learning truly adaptive

(Education Tech: Learning Analytics for Adaptive Learning)

Using AI to deliver a one-on-one education experience that truly adapts to the needs and abilities of the learner.

The concept of learning systems that can intelligently adapt to the learner's unique needs and abilities has been around since the 1950s. And, of course, it's the way parents of all species naturally teach their offspring. However, when it comes to computer-based learning, traditional "adaptive" learning systems have been using simple decision techniques, such as branching, that provide only the most basic level of adaptation. With AI, on the other hand, adaptive learning systems can now be truly adaptive, tailoring their teaching approaches and content to each individual learner.

Conclusion

The key to success is to start small but think big.

Although AI adoption rates and maturity levels vary widely across industries—and even within them—there seems to be no question that AI is here to stay. In fact, AI is quickly becoming a competitive necessity for nearly all types of businesses—driving unprecedented levels of efficiency and performance and making it possible for businesses of every shape and size to do things that simply weren't possible before.

The key to success is to start small but think big. According to a recent Deloitte survey—*State of AI in the Enterprise,* 3rd Edition—74 percent of businesses surveyed are still in the AI experimentation stage with a focus on modernizing their data for AI and building AI expertise through an assortment of siloed pilot programs and proofs-of-concept, but without a clear vision of how all the pieces fit together. By contrast, only 26 percent of businesses surveyed are focused on deploying high impact AI use cases at scale, which is when the real value kicks in.

In this compendium, we've highlighted many of the most compelling and business-ready use cases in every major industry. However, a use case is only as good as the extent to which it is actually used. No matter how compelling an AI use case might seem on paper, its full value can only be unlocked if you embrace and deploy it at scale across your broader enterprise and ecosystem.

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Endnotes

1. Source: Deloitte analysis

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