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Artificial Intelligence (AI) and Public Managers: Key Questions and Recommended Actions

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October 2023

Acknowledgement

The Center for Technology in Government, University at Albany, State University of New York (CTG UAlbany) is grateful to our Global Advisory Board Members for their generosity in sharing their expert insights about building understanding of Artificial Intelligence (AI) and using that understanding in their decision making about AI in the public sector.

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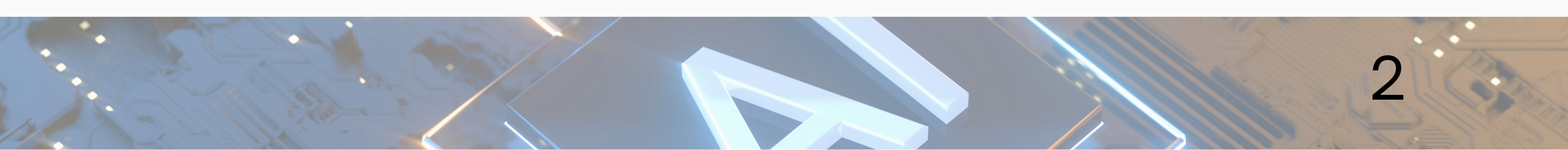


Introduction

Rapid advances in Artificial Intelligence (AI) research and development are driving the integration of AI into the operational systems that underlie the effective functioning of governments at all levels and around the world. As government leaders and managers ready themselves to transform their agencies through digital strategies and make enterprise technological investment decisions, they must consider that most new systems include some form of AI. Therefore, it is essential that government leaders understand AI and its potential for revolutionizing government services and decision-making. Although much has been written about AI in the public sector, there is little that offers practical guidance for use by government leaders as they make strategic investments that involve AI.

Conceptualizing AI as part of a larger set of cognitive computing systems — systems that can learn from data and interact with humans to assist public employees — can be traced back to the early 1950s [5]. However, the past two decades have produced significant advances in enabling technologies, such as cloud computing and more recently, several key AI technologies such as deep learning and reinforcement learning have reached their tipping point toward practical applications. As a result of such advances, a range of AI applications including chatbots, predictive analytical systems, and automated-decision systems, are increasingly used by governments at all levels.

As more AI-based technologies evolve from the lab to practical use, government agencies worldwide are building policy and practice guidelines and frameworks to guide this use. For example, in 2022 and 2023, the U.S. Federal Government released the National AI R&D Strategic Plan, the AI Bill of Rights, and the AI Risk Management Framework. These documents provide a roadmap for federal agencies in the U.S. as they work to support the White House goal of advancing research on responsible AI to “seize the opportunities AI presents” and to “manage its risks” [48]. These evolving legal frameworks and strategic plans have established the basic landscape and vision of AI applications for government agencies.

This Primer is organized into five sections, in addition to this introduction.

- The Significance of AI to the Public Sector
- Definitions, Core Characteristics, and Components of AI and AI-Based Systems
- Key Questions to Help Public Sector Leaders Prepare for AI-Related Decision Making
- AI in Action
- Recommendations for Building Readiness for AI Use in the Public Sector

This Primer was developed by the Center for Technology in Government at the University at Albany, State University of New York (CTG UAlbany), in partnership with CTG UAlbany's Global Advisory Board. It includes both original and cited information showcasing definitions, descriptions, classifications, use cases, and considerations drawn from CTG UAlbany's expertise as well as a body of practitioner and academic literature. It is a curated mix of perspectives designed to provide government leaders and managers with a foundation on AI as well as some recommended actions they can take now.

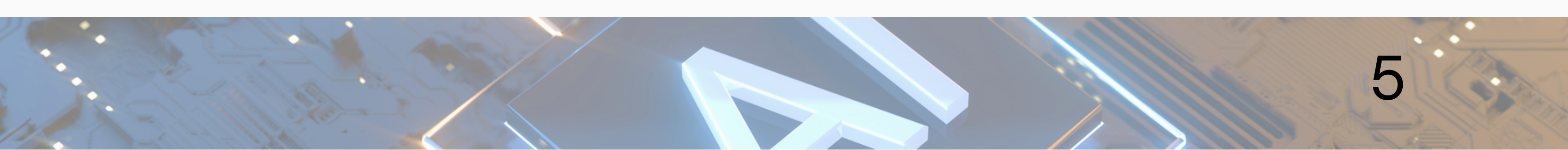
The Significance of AI to the Public Sector

Three key points characterize the significant impact that AI is already having on the operation of government agencies and underscore the need for this primer.

- **AI is in regular and increasing use across federal and state governments.** The use of AI spanned various governmental functions. In 2019, nearly half (45%) of U.S. Federal Government agencies had planned, piloted, or implemented AI-related techniques in their operation [14]. State governments have also shown increased interests in incorporating AI into their systems. For instance, the application of robotic process automation and machine learning is surging across state governments [33]. These trends are requiring government leaders to develop a level of understanding of AI necessary to guide their executive decisions.

- **AI is increasingly being used as a proxy for public employees.** As AI systems are increasingly integrated into public sector operations, they are being used to perform tasks and make decisions that were once performed by humans. In law enforcement for example, AI is being leveraged across the U.S. criminal justice systems including in predictive policing strategies that aim to increase the probability of detecting criminal activity based on advanced statistical models and algorithms [31], facial recognition technologies used to identify suspected criminals [24], and risk assessment tools applied to screen offenders' parole applications [20].

- **Government leaders are increasingly expected to develop localized AI strategies.** Countries and international organizations have begun promoting regulatory frameworks and guidance aimed at addressing the risks associated with AI, while also underscoring the importance of national and regional AI strategies. State and local government officials are being asked to develop AI strategies or weigh in on AI. As a result, public managers should have a foundational understanding of AI, a feasible process for developing and acquiring necessary resources and capabilities, relevant examples that demonstrate successful implementation in real-world contexts, and guidelines for addressing potential ethical and accountability issues. Nevertheless, the inconsistent regulations among different cities and states form a 'regulatory patchwork', creating higher compliance costs for AI-related technology companies [12].



Definitions, Core Characteristics, and Components of AI and AI-Based Systems

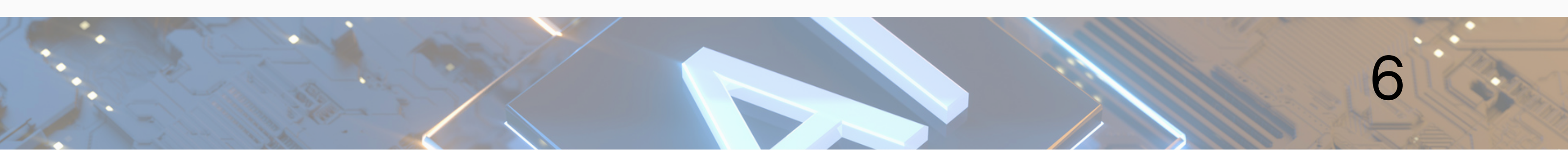
While there is no universally accepted definition of artificial intelligence (AI), there are certain characteristics of AI-based systems that have been widely accepted. Based on definitions proposed by the U.S. Congress [50], [1] the UK government [47], [2] the OECD [3:12], [3] and the European Commission [15:6], [4] AI-based systems possess five core characteristics as outlined below:

1. **Designed by humans to solve problems:** AI is created by humans and can assist humans in various industries such as healthcare, transportation, education, and law enforcement. For example, AI could aid in disease diagnosis, teacher evaluation, and crime prediction.

2. **Combining machines, algorithms, and data:** AI integrates hardware, algorithms, and data to produce specific results. The hardware component collects, processes, and stores data, the software component contains algorithms for data analysis and outcome generation, and the data component serves to train and improve the system.

3. **Attempting to imitate human intelligence and learning processes:** AI can mimic and, in some cases seem to surpass, human intelligence through processing data, interacting with humans and systems, and learning from information and patterns. Chatbots and digital assistants, for instance, can offer real-time responses in a human-like manner.

4. **Possessing a certain level of autonomy:** AI tools and applications can have autonomy to make decisions with minimal human intervention. They recognize patterns in data and make decisions based on analysis, not just following initial designer instructions.



5. **Evolving through environmental feedback:** AI evolves through feedback, adjusting algorithms based on new information. Through iterative learning, machine learning algorithms, for instance, can improve accuracy and efficiency, optimizing over time to achieve goals.

In addition to understanding the core characteristics of AI-based systems, it is essential that government leaders understand, at a high level, how these systems function and interpret the environments in which they operate.

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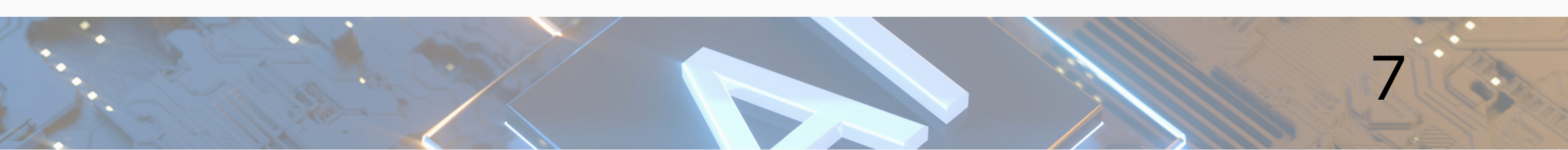
[1] “Artificial intelligence” means a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations or decisions influencing real or virtual environments. Artificial intelligence systems use machine and human-based inputs to (A) perceive real and virtual environments; (B) abstract such perceptions into models through analysis in an automated manner; and (C) use model inference to formulate options for information or action.

[2] AI can be defined as the use of digital technology to create systems capable of performing tasks commonly thought to require intelligence. AI is constantly evolving, but generally it: (1) involves machines using statistics to find patterns in large amounts of data; (2) is the ability to perform repetitive tasks with data without the need for constant human guidance.

[3] A machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations or decisions influencing real or virtual environments. AI systems are designed to operate with varying levels of autonomy. In addition, AI are “machines performing human-like cognitive functions”.

[4] “Artificial intelligence (AI) systems are software (and possibly also hardware) systems designed by humans that, given a complex goal, act in the physical or digital dimension by perceiving their environment through data acquisition, interpreting the collected structured or unstructured data, reasoning on the knowledge, or processing the information, derived from this data and deciding the best action(s) to take to achieve the given goal. AI systems can either use symbolic rules or learn a numeric model, and they can also adapt their behavior by analyzing how the environment is affected by their previous actions.



The report ‘A definition of Artificial Intelligence: main capabilities and scientific disciplines’ issued by The European Commission provides a high-level view of the core components of an AI-based system, as well as how AI interacts with the environment and people [15].

- **Perception component and sensors.** To interact and respond to the environment where an AI system is deployed, sensors such as cameras, microphones, and web scraping tools, capture and detect specific information and data from the environment. The collected data provide the inputs necessary for the AI to perceive its surrounding environment.
- **Algorithms for reasoning and decision-making.** Models process data, generate reasoning and provide tailored decision recommendations. For instance, in a facial recognition system, the applied algorithmic models would first transform images captured by cameras into data, then based on specific mathematical formulas, determine whether a face matches a stored profile. Based on this reasoning, the algorithms would accordingly form decisions that direct the actions of actuators.
- **Actuators taking actions.** Actuators take actions based on the recommendations from the algorithms. Actuators are both physical actors, such as humans or robots and the systems and software that interface with the environment. Actions taken by actuators can modify the environment, thereby creating feedback loops for sensors receiving updated information resulting in the generation of new recommendations and decisions.

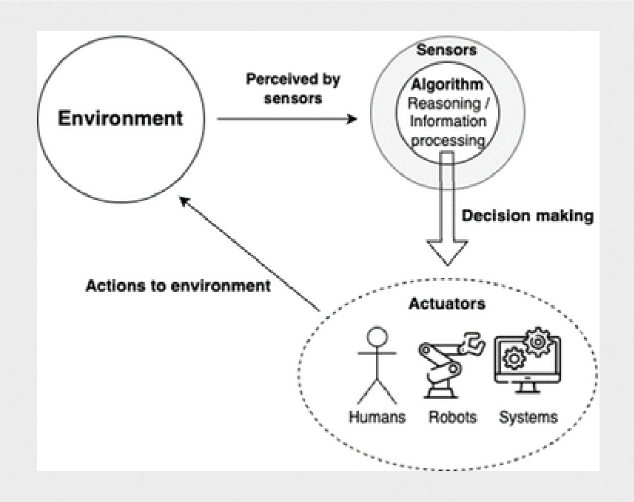


Figure 1: A schematic depiction on AI

Source: Adapted and revised from [15]

In summary and as shown in Figure 1., in an AI system, perception components (e.g., sensors), models that process information to provide reasoning, and actuators that take actions to impact the environment work together.

Key Questions to Help Public Sector Leaders Prepare for AI-Related Decision Making

This Primer presents five questions that government leaders and managers must be ready to answer as they build understanding of the various nuances of AI-based systems and begin to use that new understanding to inform strategic decisions about or related to the use of AI-based systems in government.

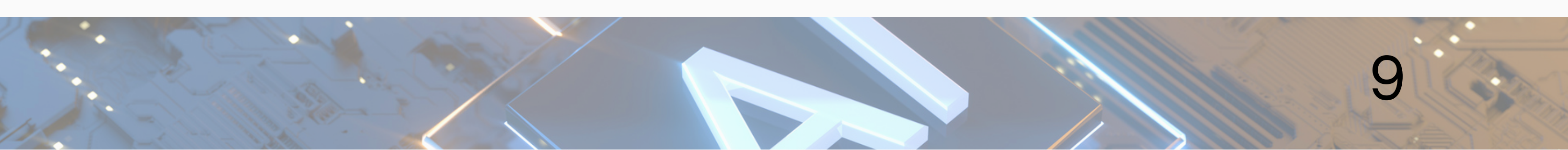
1. What is the potential impact of AI on the economy, the workforce, individual privacy, administrative fairness, and public accountability and transparency?

2. What features of AI make it distinct from other technologies?

3. How visible to the user is the AI in this AI-based system?

4. How autonomous is this AI-based system?

5. What are some ways to understand the range of AI technologies, applications, functions, and intelligence type?

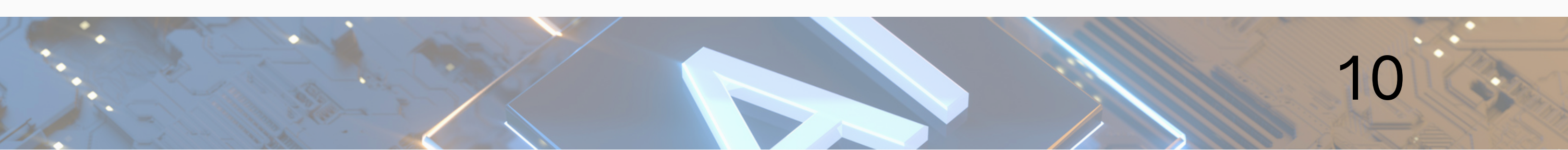


1. What is the potential impact of AI on the economy, the workforce, individual privacy, administrative fairness, and public accountability and transparency?

1.1 Impact on the economy. AI has already demonstrated its double-edged impact on the global economy. In a report estimating the economic potential of AI, experts have projected that global GDP could increase by up to 14% by 2030, owing to the adoption of AI [40]. For instance, in the context of government operations, there is potential for generative AI to be employed by government procurement professionals, reducing manual labor and potential errors in contract drafting [32]. Nevertheless, the sunk cost of adopting AI in the public sector is significant, reflecting challenges related to financial feasibility. To implement AI and its associated systems in governmental tasks, it is necessary to not only construct a robust technological infrastructure, but also to invest in educational programs for their employees [53]. Either path could impose potential economic burdens on agencies whose resources are invariably limited and scarce.

1.2 Impact on the workforce. AI has profound impact on the workforce in a variety of aspects, including the design of work, the supply of labor, and the measurement of work. AI can not only automate routine and tedious tasks, freeing up public servants for more complex and strategic tasks, but also collaborate with humans to increase work performance [41]. However, as generative AI models become increasingly powerful and general in application, some observers express concern that specific jobs may be eliminated or face wage reductions due to heightened competition [51], as well as raised worries about the surge in contract work that might undermine workers' rights and weaken trade unions [29].

1.3 Impact on individual privacy. AI can pose both benefits and risks to individual privacy. On one hand, AI has been deployed to enhance individual cybersecurity, using measures such as automatic fraud and scam detection, as well as data encryption to prevent privacy breaches. On the other hand, however, potential privacy intrusions might occur during the development phase of AI, as AI designers may have access to large datasets containing personal data for training purposes without explicit consent from the data subjects. Certain AI-powered applications, such as facial recognition systems, may also pose potential risks to individual privacy due to their capability to conduct large-scale, around-the-clock surveillance.



2. What features make AI Distinct from other technologies?

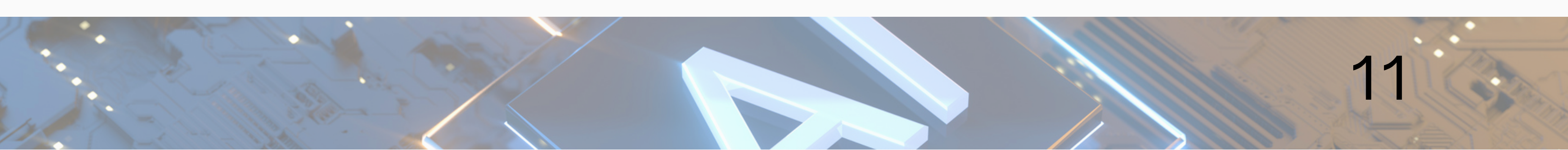
AI exhibits at least four features that make AI distinct from previous technologies and data processing systems.

2.1 Ability to perform human tasks. AI can imitate human intelligence by performing tasks such as pattern recognition, language utilization, and prediction. This feature is recognized for its potential to enhance productivity and lower human resources costs. It also raises concerns about the changing role of the human employee.

2.2 Certain degree of autonomy. Some AI-based systems can make decisions autonomously, with little, or even no, human intervention. This unique feature requires a level of transparency and accountability that allows government leaders to explain the decision-making processes and the reasoning logic employed by the AI in their agencies.

2.3 Self-adaptability. AI can “learn”. This feature of self-adaptability enables AI to improve both its inputs and outputs without a high degree of human intervention. This distinguishing trait of AI simultaneously creates potential benefits and risks. On one hand, it allows AI to continually evolve in response to changing circumstances or new data. On the other, it raises concerns that such continual evolution may allow the AI to evolve in ways not anticipated or worse, not acceptable.

2.4 Requirements of advanced infrastructures and appropriate datasets. AI requires robust infrastructures and vast datasets for training, leading to higher capital investments compared to other information technologies. Additionally, the requirements for data quality in training AI systems are more stringent, which underscores the need for new investments in the creation of robust and sophisticated data management capabilities.



3. How visible to the user is the AI in this AI-based system?

At its most basic level, this question can be answered in the following way. This aspect is important, because AI is not always visible in specific systems, but the implications of its use, positive and negative, will still be there.

3.1 Low Degree of Visibility. In AI tools and applications with a low degree of visibility, the user cannot easily identify it as a component of the system. In these cases, users may not be directly aware of the existence of AI-based components. AI-driven optimization systems are common instances of low-visibility AI. Although AI-based optimizations are widely deployed in systems that provide government services, such as automatic customs clearance or automatic license plate recognition, the AI technologies are not apparent to most users.

3.2 Medium Degree of Visibility. In AI tools and applications with a medium degree of visibility, the user is generally aware that AI is being employed but is not engaging directly with it. But rather are accessing AI functions through interfaces. For example, personalized recommendation systems and algorithm-based detection systems, such as spam email filters. In these cases, AI tools or their specific algorithms are not the direct objects perceived by users.

3.3 High Degree of Visibility. AI tools and applications with a high degree of visibility are easily identified by users. Examples include chatbots, digital assistants, and voice assistants. These applications are designed to be user-friendly and engaging and, in the public sector context, they often play the role of directly connecting citizens and government agencies.

4. How autonomous is this AI-based system?

A key advantage of AI is its ability to be autonomous, i.e., handling a multitude of human tasks without human intervention or oversight. Questions about the level of autonomy of AI-based systems can be answered using these two general categories based on different levels of human intervention.

4.1 Low Degree of Autonomy. Low autonomy AI tools and applications that require a high level of human intervention mainly operate in complex and unpredictable environments. In these uncertain scenarios, it is necessary to guide the AI system in making decisions that are aligned with human values and norms, as well as reducing some potential risks driven by the adoption of AI. Currently, low-autonomy AI includes crime risk evaluation systems in law enforcement agencies and medical diagnosis systems in healthcare organizations.

4.2 High Degree of Autonomy. In general, AI tools and applications with a high degree of autonomy are designed to perform well-defined and repetitive tasks with minimal complexity. Within these systems, humans may only exercise a low level of intervention, such as monitoring the performance of inherent functionality and occasionally troubleshooting errors. Examples of high-autonomy AI include voice assistants and image recognition systems in customs. Additionally, generative AI models, which have made a significant leap recently, can also be categorized as highly autonomous AI, as they can create text, code, images, and voices with minimal human intervention.

5. What are some ways to understand the range of AI technologies, applications, functions, and intelligence type?

Four classification tables are presented to help government leaders understand the complexity of AI and provide them with knowledge needed to answer questions and make decisions about AI-based systems and the policy and management context within which they will be implemented. The classification tables should not be seen as mutually exclusive, but as complementary, providing different lenses into AI.

1. AI Classified by Technology
2. AI Classified by Application
3. AI Classified by Function
4. AI Classified by Intelligence

5.1 AI Classified by Technology

AI can be categorized by the technologies embedded in the systems. Table 2 shows that AI can be broadly classified into three major domains of technology, including machine learning, deep learning, and natural language processing. While Table 1 is not an exhaustive list, and different technologies often overlap and interact with each other to create more advanced AI, these three technologies form the cornerstone of AI applications in government. This technology-based classification can help public managers evaluate whether organizations possess the corresponding skills or expertise for developing specific applications and identify other stakeholders who could assist in providing these skills. For example, if an organization decided to develop an application related to chatbots, it might be necessary to acquire Natural Language Processing technology expertise from external or internal resources. As a result, this classification can be used for assessing the alignment between required technologies and the available technical skills that government organizations already possess.

Table 1: AI CLASSIFIED BY TECHNOLOGY

Technology	Description	Applications
Machine Learning (ML)	Algorithms that allow systems to learn from data and optimize their performance, including supervised learning, unsupervised learning, and reinforcement learning	Personalized recommendation systems, Fraud detection
Deep Learning (DL)	Deep learning is a subfield of machine learning that more focuses on multi-layer neural networks. The general purpose of deep learning algorithms is to mimic the learning process within the human brain.	Image recognition and Speech recognition
Natural Language Processing (NLP)	Processing and analysis of human language, such as speech recognition, text analysis, and machine translation.	Chatbots, Digital assistants

Source: Adapted and revised from [2]

5.2 AI Classified by Application

With advanced algorithmic techniques such as machine learning and deep learning, numerous applications have been developed using a combination of these techniques and vast amounts of training data. Table 2 provides a basic overview of AI's classification based on applications. This application-based classification highlights the specific goals and purposes for which AI tools have been designed. Furthermore, contemporary AI not only processes existing information but also strives to generate new content based on historical data. For instance, the application of speech generation aims to synthesize human-like voices through acoustic modeling, and generative AI models are now capable of creating high-quality content in the form of images and text in various scenarios. As a result, how to understand and minimize the diverse risks associated with different applications is a new challenge for public managers.

Table 2: AI CLASSIFIED BY APPLICATION

Application	Description	Examples
Robotics and Autonomous Systems (RAS)	Autonomous systems that can operate human tasks without human intervention.	Drones, Services robots
Computer Vision (CV)	Processing and analysis of video and image, including object recognition, image classification, and facial recognition	Surveillance systems
Speech Recognition and Generation	The goal of speech analytics is to enable machines to understand human speech and to generate human-like voices for synthesized speech based on acoustic modeling	Real-time universal translation, digital voice assistants
Predictive Analytics	Identifying patterns and forecasting future events based on historical data	Risk evaluation systems
Generative AI	By combining machine learning algorithms and big data, generative AI models aim to create high-quality content that closely resembles the existing patterns found in the training data	Creating text, images, or music

Source: Adapted and revised from [53]

5.3 AI Classified by Function

AI tools can be differentiated by their function, or the set of tasks they can perform. Table 3 shows a classification proposed by the OECD. In addition to the original seven functions proposed by the OECD, we have expanded upon this classification by adding an eighth function: communication. This newly proposed function is rooted in the emergence of communicative AI, such as language-generation software and chatbots, which challenge the anthropocentric assumption of communication. Therefore, given AI's potential to enhance communication between groups or individuals, AI is likely to be increasingly integrated into roles traditionally demanding human communication [19]. This classification can be a useful reference for public managers looking to develop AI strategies within their own agencies or departments. Managers could first define the main functions that are important to the tasks in their organizations, and then search for more details on relevant applications that correspond to the specific functions. For instance, if an organization has specific policy objectives aimed at increasing interactions with external or internal clients, managers could start by developing an AI strategy focused on the function of “interaction support” and its corresponding applications, such as chatbots and voice assistants. Additionally, it is important to note that an organization may have multiple objectives, and this classification could also serve as a checklist for managers when searching for the appropriate toolkits.

Table 3: AI CLASSIFIED BY FUNCTION

Function	Description	Applications
Recognition	Identifying and classifying data into specific categories	Facial recognition, gesture detection
Event detection	Detect patterns, outliers, and anomalies	Fraud and risk detection, flagging human mistakes
Forecasting	Using existing data to predict future outcomes	Decision-support systems, intelligent navigation systems
Personalization	Developing a profile of an individual	Recommender systems
Interaction support	Interpreting and creating content for machine-human interactions	Chatbots, voice assistants
Goal-driven optimization	Finding the optimal solution to a problem for a specified cost function	Resource/logistics optimization, scenario simulation
Reasoning	Inferring new outcomes through modelling and simulation	Expert systems, diagnosis and planning
Communication	Facilitating communication between people and groups	Generative AI that is applied to foster content marketing

Source: Adapted and revised from [36]

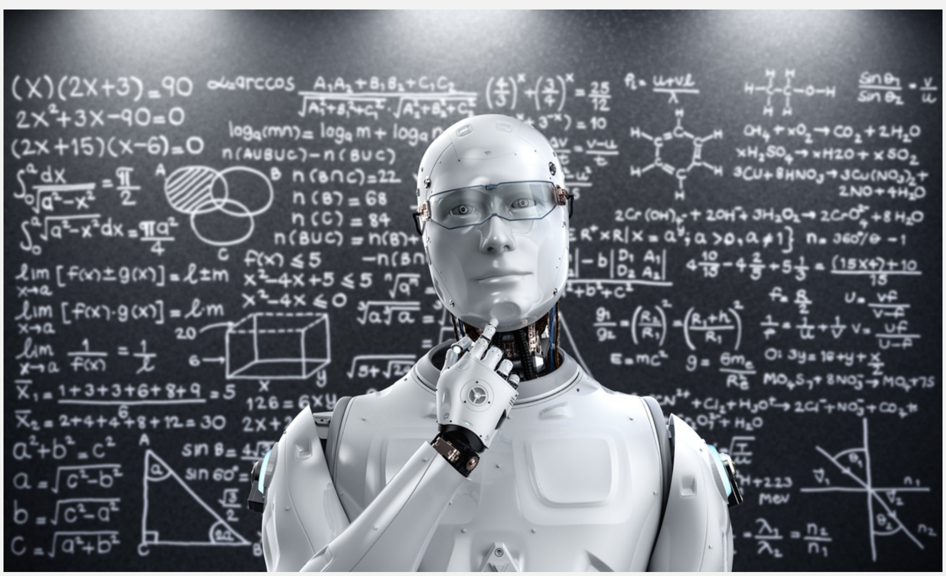
5.4 AI Classified by Intelligence

When considering AI, one way to approach it is to examine the intelligence of the AI tools and applications. Intelligence in AI can be defined as the ability to learn, reason, adapt, and perform tasks that typically require human intelligence, and the intelligence-based classification is related to the age-old philosophical question—“Can machines think?”. Based on the philosophical notion of intelligent machines, AI can be classified into three categories, as shown in Table 4, including artificial narrow intelligence, artificial general intelligence, and artificial super intelligence. Generally, AI with a lower level of intelligence may be more suitable for repetitive and specific work in stable environments, while the general intelligence is essential for AI to perform complex tasks. For example, generative AI models are introduced in dealing with various tasks in diverse scenarios. As a result, this intelligence classification can inform public managers about the potential limitations and appropriate scenarios for different AI systems, guiding them in determining the suitable level of intelligence that a specific AI tool or application should possess.

Furthermore, the importance of intelligence classification lies in helping researchers identify the current state of AI development and highlight future directions for research and practice.

Table 4: AI CLASSIFIED BY INTELLIGENCE		
Type	**Description**	**Applications**
Artificial narrow intelligence	AI designed to solve specific tasks. Generally, AI with narrow intelligence excels in their given domain but lacks the ability to perform tasks beyond the programmed scope	Most AI, such as AI recommendation systems and facial recognition systems
Artificial general intelligence	AI with general intelligence is expected to achieve a human-level skill set, exhibiting common sense across a wide range of human tasks	Not fully achieved yet, but large generative AI models such as GPT-4 are considered the beginning of general intelligence
Artificial super intelligence	AI that can perform all human tasks and even surpass human intelligence	Still a theoretical concept

Source: Adapted and revised from [2]



AI in Action

This section presents twelve AI use cases across a range of policy domains, and the federal-level and subnational-level cases each account for half. These real-world cases provide a snapshot of the diverse environments in which AI tools and applications are embedded, highlighting many of the technologies, applications, functions, and types of intelligence presented in the previous sections.

- **VA RPA Platform.** The Department of Veterans Affairs (VA) has established a Robotic Process Automation (RPA) platform to develop secure and reliable digital assistants [46]. Based on the description of the RPA platform provided by the VA, these digital assistants aim to alleviate the workload of current employees and improve the level of service provided to veterans. Specifically, the RPA platform can be utilized for tasks such as reviewing medical specialist referrals, reducing the number of forms to fill out, scheduling follow-up appointments, processing claims, ensuring compliance with regulations, and determining eligibility for services from local health care providers. Through these measures, the VA aims not only to boost satisfaction among veterans and their families but also to minimize administrative errors during the application process.
- **AI Cybersecurity Analytics Sandbox.** The Department of Homeland Security (DHS) and the Cybersecurity and Infrastructure Security Agency (CISA) are building a machine learning analytics platform to enhance cybersecurity [4]. This platform, known as the CISA Advanced Analytics Platform for Machine Learning (CAP-M), will experiment and evaluate different methods to assist other government agencies to respond to the evolving cybersecurity threats. In addition, the system has the capability to self-improve by creating an automated attacker that runs repeated attacks to train the analytics tools and to teach the system to identify incorrect alerts. This cybersecurity analytics platform could support the cyber missions from the back-end and will have “a multi-cloud environment and multiple data structures, a logical data warehouse to facilitate access across CISA data sets, and a production-like environment to enable realistic testing of vendor solutions,” according to the project description of DHS and CISA [43].

- **CBP Traveler Identity.** Customs and Border Protection (CBP) utilizes facial recognition technology to verify the identity of travelers at airports and border crossings [11]. At boarding or arrival, travelers' photos are taken and compared with existing passport or visa photos. This not only helps to decrease the threat of imposters but also streamlines inspections for travelers. According to CBP, the adoption of biometric facial comparison technology stems from the aftermath of 9/11, with the goal of reducing the workload for CBP officers and allowing them to focus more on safety concerns.
- **Emergency Response Systems.** The Federal Emergency Management Agency (FEMA) collaborated with research institutions to create a massive dataset, known as U.S. Structures [35]. This dataset integrates critical information such as high-resolution images from satellites and the location and occupancy of buildings. FEMA and its coordinators use deep learning techniques to process the images and compile the data, making predictions based on patterns detected by the algorithm. As the volume of training data used to inform the AI-based model grows, the accuracy of emergency predictions maps is expected to increase, with less human intervention needed.
- **Solicitation Review Tool.** Launched by the General Services Administration (GSA), the Solicitation Review Tool (SRT) aims to help public agencies improve solicitation compliance in terms of accessibility, cybersecurity, as well as other regulations and requirements [16]. The SRT utilizes natural language processing, text mining, and machine learning technologies to determine whether the solicitations posted on government contracting websites meet the requirements of federal IT laws. For public agencies posting ICT-related solicitations, the SRT can flag non-compliant solicitations initially, and contract officers can then assess these flagged solicitations and make the necessary revisions to ensure compliance with federal accessibility regulations.
- **Snow Survey and Water Supply Forecasting Program.** Developed by the USDA Natural Resources Conservation Service (NRCS), the Snow Survey and Water Supply Forecasting Program (SSWSF) aims to monitor and estimate the runoff that will occur when snow melts. The program integrates multiple resources such as mountain snowpack and precipitation data. To forecast different types of natural resource concerns related, for example, to soil, water, and plants, the SSWSF program has incorporated autonomous machine learning (AutoML) that allows for automated training and operation [34].

Table 5: FEDERAL-LEVEL AI USE CASES BY CLASSIFICATION						
Use Case	**Policy domains**	**Technologies**	**Applications**	**Functions**	**Intelligence**	**Visibility and Autonomy**
VA RPA platform	Veterans Affairs	Natural language Processing	Robotics and Autonomous Systems	- Interaction support - Goal-driven optimization	Artificial narrow intelligence	High visibility and low autonomy
AI-based cybersecurity analytics sandbox	Cybersecurity	Machine learning	Predictive Analytics	Event detection	Artificial narrow intelligence	Low visibility and low autonomy
CBP Traveler Identity	Transportation	Deep learning	Computer Vision	Recognition	Artificial narrow intelligence	High visibility and high autonomy
Emergency response systems	Environment	Deep learning	Predictive Analytics	- Forecasting - Reasoning	Artificial narrow intelligence	Medium visibility and low autonomy
Solicitation Review Tool	General Services	Natural language processing	Robotics and Autonomous Systems	- Recognition - Reasoning	Artificial narrow intelligence	Low visibility and high autonomy
Snow Survey and Water Supply Forecast program	Agriculture	Machine learning	Predictive Analytics	- Forecasting - Reasoning	Artificial narrow intelligence	Medium visibility and low autonomy

Source: Authors own elaboration.

- **Image Recognition for Cattle Branding.** Utah's Department of Agriculture has combined the practice of branding livestock with image recognition technology to identify the owner of cattle. Before introducing image recognition for cattle branding, government staff had to rely on text-based brand descriptions to resolve issues such as identifying the owner of escaped cattle or avoiding conflicts between new and existing brands [28].With the combination of a database that stores the image of each cattle brand and image recognition technology, public employees of the agriculture agency in the state of Utah are expected to approve applications for new brands more efficiently, as well as quickly identify the owner of stray cattle [33].
- **Therapeutic Robotic Pets.** Since the outbreak of the coronavirus, the Florida Department of Elder Affairs (DOEA) issued a novel strategy to cope with loneliness in nursing homes [26]. Due to the imposition of strict visitation rules, elderly people living in nursing institutions experienced a disproportionate amount of social isolation, which could significantly affect their physical and mental health. To address this issue, the agency provided therapeutic robotic pets to socially isolated seniors and adults with Alzheimer's Disease and Dementia. While therapeutic robotic pets do not possess human-like attributes, such as language or gestures, they can respond to the emotional needs of elderly people and display a certain degree of emotional intelligence.

- **Colorado Career Trail Guide.** The Colorado Department of Labor and Employment launched a personalized job-seeking portal called the Colorado Career Trail Guide [45], designed to connect job seekers and companies, based on job seekers' work history, personal preferences, and job skills. The Colorado Career Trail Guide combines machine learning techniques with state administrative data and personal profiles to provide customized job matches and position recommendations. Through this data-driven approach, the Colorado state government aims to equip job seekers with more suitable career paths and tailored training programs that benefit all participants.
- **Patternizr crime analysis tool.** The New York Police Department (NYPD) has adopted a pattern-recognition software called Patternizr to analyze crime patterns based on historical records in their database [44]. This crime analysis software is designed by data scientists at the NYPD and enables crime data analysts to compare the vast amount of crime records logged in the NYPD's database, identifying specific crime patterns in different districts [18]. According to its developer, the Patternizr, which consists of three supervised machine learning models trained on ten years of manually identified patterns, allows investigators to more easily identify similarities between crimes that would typically be hard to notice [8].
- **AI-powered instructional coach.** Targeted at K-12 schools, an AI-powered instructional tool designed to aid teachers in facilitating teacher-student interaction in the classroom has been piloted in several states [17]. For example, in the case conducted in Washington state, teachers participating in the pilot program upload their own instructional videos to the online platform. Then, the AI-powered coach will initiates a private conversation with the teachers, providing personalized feedback regarding their professional goals, teaching styles, and the reflectivity of classroom instruction [27]. According to the report on the case in Washington state, even though this AI use case is currently in its trial phase and has been implemented on a small scale, the development team plans to expand the scope to offer districtwide courses for a larger number of teachers.

- **Wildfire detection technology.** The Colorado State Senate has advanced a bill that provides funding to the Division of Fire Prevention and Control for the establishment of AI-equipped cameras designed to detect and locate potential wildfire ignitions [25]. According to the bill, the state government plans to implement small pilot programs in the wildland-urban interface, using AI-powered cameras to identify and monitor wildfire behaviors and provide crucial information for formulating evacuation and response plans. With the assistance of the supercomputer at the Center of Excellence for Advanced Technology Aerial Firefighting, AI can analyze real-time footage and automatically alert pre-designated communities in the event of a suspected ignition, potentially limiting the losses caused by wildfires [38].

Table 6: STATE-LEVEL AI USE CASES BY CLASSIFICATION

Use Case	Policy domains	Technologies	Applications	Functions	Intelligence	Visibility and Autonomy
Image Recognition for Cattle Branding	Agriculture	Deep learning	Computer Vision	Recognition	Artificial narrow intelligence	High visibility and high autonomy
Therapeutic Robotic Pets	Healthcare	Machine learning	Robotics and Autonomous Systems	Interaction support	Artificial narrow intelligence	High visibility and high autonomy
Colorado Career Trail Guide	Labor and Employment	Machine learning	Predictive Analytics	Personalization	Artificial narrow intelligence	High visibility and high autonomy
Patternizr crime analysis tool	Law enforcement	Machine learning	Predictive Analytics	Forecasting	Artificial narrow intelligence	Low visibility and low autonomy
AI-powered instructional coach	Education	Natural language processing	Generative AI	Communication	Artificial narrow intelligence, but near to artificial general intelligence	High visibility and high autonomy
Wildfire detection technology	Environment	Machine learning	Computer vision	- Recognition - Forecasting	Artificial narrow intelligence	Low visibility and high autonomy

Source: Authors own elaboration.

Recommendations for Building Readiness for AI Use in the Public Sector

This section presents seven recommendations for government leaders as they build their readiness to systematically consider AI-based systems and prepare their agencies to fully leverage the potential of AI as a tool for public value creation. Some of these recommendations are new in the context of AI, some have been presented before to guide government officials and public managers as they consider new and emerging technologies, and opportunities for new forms of public value creation.

The first four recommendations guide decision makers in creating key capabilities necessary for effective use of AI in the public sector including the identification of the public value potential of any AI investment within context, and the systematic use of data about the actual impact of those investments to guide future decision making. The second set of recommendations call for investments in shifts in organizational culture necessary to ensure that public agencies are aware of the potential for and the consequences of bias, and invest in identifying and eliminating it. The final recommendation draws attention to the need for government leaders to create context specific guidelines for their managers as they begin to adopt AI, in this case, generative AI.

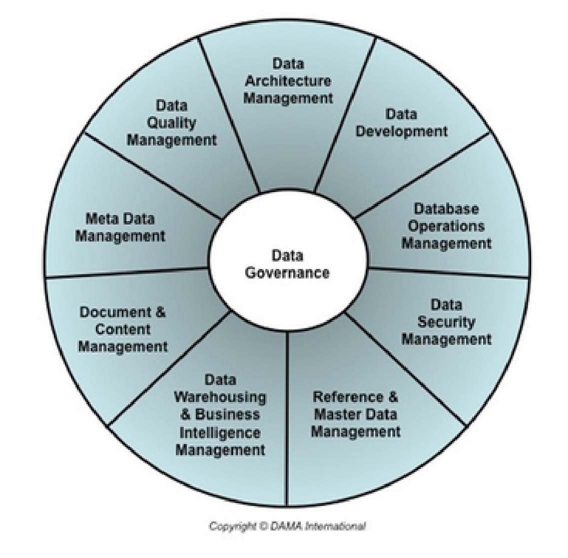
Recommendation # 1: Invest in your Agency's Data Ecosystem

According to Medaglia et al (2023), AI solutions are first and foremost data solutions. The implication being that any AI application is, by definition, only as good as the data that drives it. Government leaders need visibility into how data is currently managed in their agencies and new understanding of what needs to be changed or adapted in the context of AI, before making the new investments necessary to transform their agency's data ecosystem accordingly.

To refine algorithms and improve the accuracy and reliability of output, systems with learning capabilities need large amounts of high-quality data. However, different types of AI tools and applications require different types of data. For example, not all data is appropriate for specific AI advanced learning models and algorithms. Volume and type of data (e.g., unstructured), among other characteristics of the data can be critical when determining if data is appropriate for the intended AI use.

Data Management
"...the development, execution, and supervision of plans, policies, programs, and practices that deliver, control, protect, and enhance the value of data and information assets throughout their lifecycles."
Source: [13]

In many cases, agencies already have teams with specialized data management, use, and sharing skills and capabilities. In the best of cases, such teams perform important management activities such as ensuring access to high-quality data through sophisticated and effective data management, including the use of enterprise-wide and formalized data governance (See Figure 2).Among other key characteristics of a sophisticated and robust data ecosystem is access to skills and resources necessary for the development and use of policies and procedures for systematically identifying and eliminating bias in data.



Source: [13] Figure 2. Core elements of data governance

Recommendation # 2: Invest in an AI-Ready Workforce

Further, understanding the difference between training data and intended use data, and evaluating the output of AI based on data quality and potential embedded biases, then, more than ever, government agencies will want to have a group of skilled data professionals carrying out this work and informing executive leaders.

The giant leap of generative AI models could be a game changer in AI usage, drastically shaping the approach to content production and potentially other activities. In the future, it might be foreseeable that AI could be used not only by professionals or organizations but also by individuals. For example, individuals might easily generate fraudulent information when transacting with government agencies with the assistance of generative AI models. In that new but possible scenario, government leaders should consider AI as a double-edged sword that evolves with societal demands and fluctuations. As a result, government leaders should be aware that AI is not just a technological issue; instead, more social considerations should be adopted when it comes to the questions regarding how to monitor, regulate, or control citizens' AI usage behaviors when interacting with government agencies.

Government leaders need to invest in AI-related education and training programs for their agency workforce to increase awareness and understanding of the potential use of emerging AI technologies within government. Further, they need to build awareness of the possible types of misuse related to interactions between citizens and government.

In addition, applying AI to detect AI is another promising strategy that is already widely applied in various fields. For example, AI could be used for screening facial images or videos by analyzing specific patterns or digital traces, some of them produced by systems using AI. By introducing AI detection systems, abnormal files or information created by AI may be detected. These AI detection techniques, like other AI applications, are primarily offered by technical experts outside the government. Considering this, AI workforce training programs should not solely focus on increasing the technical skills of public employees. Instead, learning how to collaborate with data scientists or experts outside government agencies is another critical goal that workforce investment programs can strive to achieve.

Recommendation # 3: Engage Stakeholders to Build Trust around the Use of AI in the Public Sector

Building trust among stakeholders is key to creating the context necessary for advancing AI innovations in the public sector. Trust in the ability of government to undertake responsible use of AI must be built within the government and with those they serve. Building such trust requires government leaders to demonstrate their readiness to ask critical questions about the promises and pitfalls in the use of AI, for example, demonstrating capability to critically assess the public value potential, as well as the potential risks, of new AI functions within specific use contexts and to use new insights about the use of AI to inform investment decision making. Areas where trust building is necessary includes the development and use of tools to monitor the intended and unintended consequences of AI-related innovations and ensuring that new insights gained from such monitoring is shared with stakeholders and used to inform future decision making.

Trust building requires continuous attention. This is no less the case when considering the importance of stakeholder trust in AI innovations in the public sector. Stakeholder engagement throughout the stages of innovation can be done in a variety of ways. For example, in the initial stages of an initiative, stakeholders could be consulted about critical needs and priority problems that might benefit from the adoption and use of AI tools and applications. As initiatives are implemented, stakeholders could be engaged in efforts to ensure transparency into the outcomes, for example, of the use of AI-enhanced program and policy decision making, thereby increasing accountability and ideally, then trust.

Recommendation # 4: Focus on the Context-Specific Public Value Potential of AI

Enterprise-wide digital transformation is key to the public value generating potential of government, with AI increasingly seen as central to such transformations. While this may be the case, government leaders have a responsibility to test assumptions that AI-based systems and strategies are the right choice. As with any new or emerging technology, decisions about adoption and use must be grounded in understanding the problem to be solved, decisions to be made or opportunity being pursued. Further, such decisions must also be informed by deep understanding of the context of use.

Digital Transformation

Digital transformation is the use of digital technologies to innovate and change how organizations create value and prepare for the future.

As noted in CTG's Primer on Digital Transformation [39], the challenge ahead for government leaders is first, to understand how digital transformation might create value, in this case, through the adoption and use of AI, and second, and more importantly, what it takes to successfully achieve the envisioned digital transformation within a given use context. Four essential ideas, grounded in this perspective, guide government leaders looking to digital transformation to help meet their obligations to society and create public value within specific contexts, through the adoption and use of AI.

1. Sustainable digital transformation requires policy, management, and technology innovation.
2. Capability for innovation is a function of both internal and external context and is complementary and multidimensional.
3. Understanding the characteristics of an envisioned innovation and of the characteristics of the innovation context are precursors to judgements about whether relevant innovation capability exists.
4. Creating public value through digital transformation requires leadership commitment to an iterative process of systematic analysis of context and context-specific decision making.

The perspective that context matters is increasingly recognized by governments and international organizations as key to the success of digital transformation efforts. This perspective is operationalized through design thinking tools and techniques and as the foundational principle underlying innovation labs. It requires, at the very least, deep knowledge of the policy, program, and economic context within which a government is operating, deep knowledge of the problem itself, who is impacted by the problem and who would be served by various solutions to the problem.

CTG's Public Value Assessment Tool [7] provides an approach for conducting such systematic assessments of the public value potential of digital transformation initiatives. It helps decision makers avoid overrating potential risks or overvaluing the benefits. Use of systematic assessment tools such as the PVAT, which includes basic assessment questions like, good or valuable in what sense? for whom? by what mechanisms? and under what conditions, are key to creating shared understanding of how the societal context and institutional character of governments interact with technologies and shape the capabilities of those governments to create public value through digital transformation and AI is no exception to this.

Public Value Assessment Tool – Public Value Types

Efficiency – changes in the outputs or goal attainment with the same resources or obtaining the same outputs or goals with lower resource consumption.

Effectiveness – changes in the quality and/or quantity of the desired outcome.

Intrinsic enhancements – changing the environment or circumstances of a stakeholder in ways that are valued for their own sake.

Transparency – changes in access to information about the actions of government officials or operation of government programs that enhances accountability or citizen influence on government.

Participation – changes in frequency and intensity of direct citizen involvement in decision making about or operation of government programs or in selection of or actions of officials.

Collaboration – changes in frequency or duration of activities in which more than one set of stakeholders share responsibility or authority for decisions about operation, policies, or actions of government.

Source: [7]

A comprehensive assessment matrix, like the PVAT, helps build understanding of both the benefits and risks resulting from AI deployment within specific contexts. Through its use, teams can emphasize the development of a shared understanding of the potential value of digital transformation projects across multiple stakeholders in different policy domains and organizational boundaries. It helps teams distinguish between the intrinsic value of government as a societal asset and the instrumental value of government actions and policies that deliver specific benefits directly to individuals, groups, or organizations. This distinction extends the idea of public value beyond traditional, financial and other private returns and is broader than estimates of aggregate, economic or social benefits. This broader view includes public value resulting from greater integrity and transparency of government that leads to increased trust and satisfaction with the government overall.

Recommendation # 5: Ensure Transparency Around your Agency's Use of AI

Many government officials realize that being transparent about how and where AI is being used in their agencies is part of their responsibility as stewards of public resources. Disclosing both internally and to the public, that AI tools and applications are part of an agency's operational portfolio and how those tools and applications are being developed and deployed is key to responsible stewardship and building a culture of openness around AI.

Starting the process of ensuring transparency, whether strategic or regulatory, begins with identifying and documenting the current and envisioned uses of AI tools and applications. High visibility, high autonomy AI, such as chatbots are easy to see and understand in terms of its potential risks and rewards. Being transparent about the use of low visibility, high autonomy is going to be harder to do, but may be more significant in terms of identifying potential issues including a lack of clarity on the return on investment or risks due to embedded bias from the use of a particular AI-based system.

This transparency of both current and intended use provides information decisions makers need to understand the legal context within which they are operating and how within that context, new expectations and requirements related to current or intended uses of AI are emerging or have been established. In response to reports of embedded biases, for example, many U.S. states have already passed or are proposing legislation requiring that all government organizations in those states disclose their use of AI. The disclosure of AI is in line with continued open government efforts created to allow feedback and learning while increasing accountability and oversight.

AI is presenting new and unique challenges in the regulatory context. Decision making about AI, in particular, decisions that might result in enterprise-wide digital transformation through the adoption and use of AI, requires an awareness of the dynamic and emerging AI regulatory context. Resources such as those provided by Brookings Institute [52], MIT Technology Review [21], and the Association for Computing Machinery's Global Technology Policy Council [1], among others, can help government officials understand this ongoing dialogue and build awareness of the issues and pending regulatory decisions, and how such regulation might impact local adoption and use of AI.

Challenges for AI Oversight

"The details really matter. Those 'details' surface three challenges for AI oversight:

> dealing with the velocity of AI developments,
> parsing the components of what to regulate, and,
> determining who regulates and how."

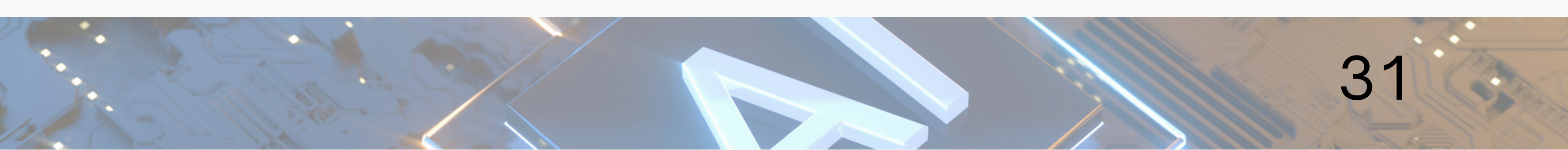
Sam Altman, CEO of OpenAI, in testimony to the US Senate Judiciary Committee, May 16, 2023

Source: [52]

Recommendation # 6: Recognize and create capability to address potential biases embedded in your data and AI-based (and other) systems Ensure Transparency Around your Agency's Use of AI

Embedded bias is a recognized consequence of automated decision making and is not a new issue with the advent of AI. However, the impact of embedded bias in AI-based systems and in the data that those systems are trained on is exacerbated by specific characteristics of some AI, such as low level of visibility, high level of self-adaptability and a high degree of autonomy. Increasingly, according to AI thought leader Wojciech Samak, Chair, Artificial Intelligence, Fraunhofer Heinrich Hertz Institute and Senior Editor at IEEE Transactions on Neural Networks and Learning Systems [23], as "AI becomes more advanced, humans are challenged to comprehend and retrace how the algorithm came to a result." [22]

Violet Turri of the Carnegie Mellon Software Engineering Institute identifies explainable AI as a tool for answering "critical how and why questions about AI systems that can be used to address rising ethical and legal concerns". [49] As AI-based systems become increasingly complex and opaque, Samak notes (2023), "new attention is being paid to the need for explainable AI." [42] Government leaders need to be aware of the challenges associated with answering these important questions and invest in capabilities in their agencies that make it possible to answer such how and why questions and to explain how relevant ethical principles are being, or can, be translated into decision frameworks to guide both data governance and algorithmic design [30].



Recommendation # 7: Develop Initial Guidelines for Using Generative AI

As generative AI increasingly becomes a useful tool for collaborating with public employees in various tasks such as memo writing, proofreading official documents, and drafting content intended for website posting, it is crucial to formulate clear instructions for integrating generative AI into daily organizational tasks. An example of this is the City of Boston, which recently issued its own guidelines for generative AI use. These guidelines explicitly highlight a variety of "Do's" and "Don'ts", such as 'Do use generative AI to edit and review content', but 'Don't include confidential or sensitive information in the prompt' [9]. The guidelines could serve as the check list that facilitate responsible and efficient use of generative AI tools within the public sector.

To build feasible guidelines for generative AI, government leaders must first clearly define the core tasks and business processes within their current organizational context. That is, the focus should not solely be on the technological aspects of generative AI. Instead, understanding what tasks can be most effectively adopted into generative AI, and how these tasks can be performed, are the critical questions that need to be addressed before constructing the guidelines for generative AI. In addition, the guidelines can also outline standard operation procedures for mitigating potential risks that generative AI may pose to government agencies, including privacy breaches, a lack of accountability, and the dissemination of inaccurate information.

Glossary

Algorithm
An explicit set of instructions for solving a problem. It can be used for calculations, data processing, and making inferences and judgements by following a prescribed set of steps.

AI visibility
The extent to which users are aware of the AI's presence and operation when interacting with it.

AI autonomy
The level of human control and oversight when the AI system is executing or operating.

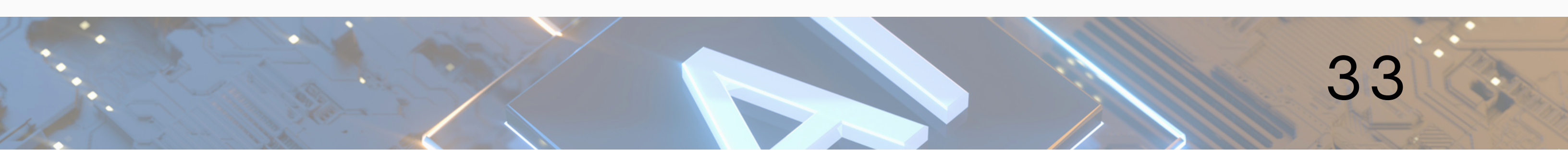
Artificial Intelligence
A human-designed system that integrates machines, algorithms, and data with the aim of imitating human intelligence and learning processes.

Data governance
A cross-functional framework designed to recognize data as a strategic asset within an organization. It commonly encompasses the establishment of data policies, procedures, and protocols that guide organizational decision-making related to data.

Digital transformation
The use of digital technologies to innovate and change how organizations create value and prepare for the future.

Machine Learning
Algorithms that allow systems to learn from data and optimize their performance, including supervised learning, unsupervised learning, and reinforcement learning.

Participatory AI framework
A structured approach to AI development that actively incorporate key stakeholder groups into AI design. Generally, it encompasses four progressive stages of engagement: consultation, contribution, collaboration, and co-design.



Public value
The goal of public managers, which aims to satisfy individual citizens' needs while also promoting broader benefits for society as a whole.

Reinforcement learning
A subcategory of machine learning that is designed to identify or discern patterns and clusters in an unlabeled dataset for possible exploration.

Supervised learning
A subcategory of machine learning where models are trained using human-labeled data that specifies what the desired outcome should be. It is commonly used for tasks such as classification and regression.

Unsupervised learning
A subcategory of machine learning technique that is designed to reduce or discern the deep structure of the unlabeled dataset for explanatory reasons.

Generative AI
AI models that can closely resemble the existing patterns in the training data to generate high-quality content on text, image, or vocal.

References

[1] Association for Computing Machinery. 2023. ACM Global Technology Policy Council. Retrieved September 28, 2023 from https://www.acm.org/public-policy/tpc

[2] Hind Benbya, Thomas H. Davenport, and Stella Pachidi. 2020. Artificial Intelligence in Organizations: Current State and Future Opportunities. MIS Q. Exec. 19, 4 (December 2020). DOI:https://doi.org/10.2139/ssrn.3741983

[3] Jamie Berryhill, Kévin Kok Heang, Rob Clogher, and Keegan McBride. 2019. Hello, World: Artificial intelligence and its use in the public sector. OECD, Paris. DOI:https://doi.org/10.1787/726fd39d-en

[4] Jeff Burt. 2023. Homeland Security, CISA builds AI-based cybersecurity analytics sandbox. The Register. Retrieved February 6, 2023 from https://www.theregister.com/2023/01/10/dhs_cisa_cybersecurity_sandbox/

[5] Peter André Busch and Helle Zinner Henriksen. 2018. Digital discretion: A systematic literature review of ICT and street-level discretion. Inf. Polity 23, 1 (January 2018), 3–28. DOI:https://doi.org/10.3233/IP-170050

[6] Madalina Busuioc. 2021. Accountable Artificial Intelligence: Holding Algorithms to Account. Public Adm. Rev. 81, 5 (2021), 825–836. DOI:https://doi.org/10.1111/puar.13293

[7] Center for Technology in Government. 2011. Open Government and Public Value: Conceptualizing a Portfolio Assessment Tool. Retrieved from https://www.ctg.albany.edu/media/pubs/pdfs/PVAT_ConceptualizingtheTool.pdf

[8] Alex Chohlas-Wood and E. S. Levine. 2019. A Recommendation Engine to Aid in Identifying Crime Patterns. Inf. J. Appl. Anal. 49, 2 (March 2019), 154–166. DOI:https://doi.org/10.1287/inte.2019.0985

[9] City of Boston. 2023. Guidelines for Using Generative AI. Retrieved from https://www.boston.gov/sites/default/files/file/2023/05/Guidelines-for-Using-Generative-AI-2023.pdf

[10] Mallory E Compton, Matthew M Young, Justin B Bullock, and Robert Greer. 2022. Administrative Errors and Race: Can Technology Mitigate Inequitable Administrative Outcomes? J. Public Adm. Res. Theory (September 2022), muac036. DOI:https://doi.org/10.1093/jopart/muac036

[11] Customs and Border Protection. 2023. CBP Biometrics. Retrieved February 6, 2023 from https://biometrics.cbp.gov/

[12] Caitlin Dewey, Missouri Independent June 5, and 2023. 2023. Artificial intelligence is used widely, but few states have set rules. *Missouri Independent.* Retrieved June 28, 2023 from https://missouriindependent.com/2023/06/05/artificial-intelligence-state-rules/

[13] Susan Earley and Deborah Henderson. 2017. DAMA-DMBOK: data management body of knowledge (Second edition ed.). Technics Publications, Bradley Beach, New Jersey.
[14] David Freeman Engstrom, Daniel E. Ho, Catherine M. Sharkey, and Mariano-Florentino Cuéllar. 2020. Government by Algorithm: Artificial Intelligence in Federal Administrative Agencies. Retrieved May 16, 2023 from https://www.ssrn.com/abstract=3551505
[15] European Commission. 2019. A definition of Artificial Intelligence: main capabilities and scientific disciplines. Retrieved January 1, 2023 from https://digital-strategy.ec.europa.eu/en/library/definition-artificial-intelligence-main-capabilities-and-scientific-disciplines
[16] General Services Administration. 2023. Solicitation Review Tool (SRT). Retrieved March 16, 2023 from https://www.section508.gov/buy/solicitation-review-tool/
[17] Aaron Gifford. 2023. AI Now Used to Mentor Teachers in Several States. GovTech. Retrieved June 22, 2023 from https://www.govtech.com/education/k-12/ai-now-used-to-mentor-teachers-in-several-states
[18] Molly Griffard. 2019. A Bias-Free Predictive Policing Tool?: An Evaluation of the NYPD’s Patternizr 21st Century Justice: Rethinking Investigations, Trials, and Victimhood. Fordham Urban Law J. 47, 1 (2020 2019), 43–84.
[19] Andrea L Guzman and Seth C Lewis. 2020. Artificial intelligence and communication: A Human–Machine Communication research agenda. New Media Soc. 22, 1 (January 2020), 70–86. DOI:https://doi.org/10.1177/1461444819858691
[20] Kathrin Hartmann and Georg Wenzelburger. 2021. Uncertainty, risk and the use of algorithms in policy decisions: a case study on criminal justice in the USA. Policy Sci. 54, 2 (June 2021), 269–287. DOI:https://doi.org/10.1007/s11077-020-09414-y
[21] Melissa Heikkiläarchive. 2023. Our quick guide to the 6 ways we can regulate AI. MIT Technology Review. Retrieved September 28, 2023 from https://www.technologyreview.com/2023/05/22/1073482/our-quick-guide-to-the-6-ways-we-can-regulate-ai/
[22] IBM. 2023. What is explainable AI? Retrieved September 28, 2023 from https://www.ibm.com/topics/explainable-ai
[23] IEEE. 2023. Wojciech Samek - IEEE Xplore Author Profile. Retrieved September 28, 2023 from https://ieeexplore.ieee.org/author/38511334900
[24] Thaddeus L. Johnson, Natasha N. Johnson, Denise McCurdy, and Michael S. Olajide. 2022. Facial recognition systems in policing and racial disparities in arrests. Gov. Inf. Q. 39, 4 (October 2022), 101753. DOI:https://doi.org/10.1016/j.giq.2022.101753

[25] Junie Joseph, Mike Lynch, Joann Ginal, and Cleave Simpson. 2023. Wildfire Detection Technology Pilot Program. Retrieved from https://leg.colorado.gov/bills/sb23-032
[26] Allen Kim. 2020. Some Florida seniors isolated with Alzheimer's and dementia due to the pandemic are getting robotic therapy pets. CNN. Retrieved April 11, 2023 from https://www.cnn.com/2020/04/27/us/therapy-robot-pets-wellness-trnd/index.html
[27] Lauraine Langreo. 2023. Can AI Do Teacher Observations and Deliver PD? In Some Schools, It Already Does. Education Week. Retrieved June 22, 2023 from https://www.edweek.org/leadership/can-ai-do-teacher-observations-and-deliver-pd-in-some-schools-it-already-does/2023/05
[28] Laura Maggi. 2020. Bringing Artificial Intelligence to Everything from Cattle Branding to Cybersecurity. Route Fifty. Retrieved March 16, 2023 from https://www.route-fifty.com/tech-data/2020/10/artificial-intelligence-utah-cattle-branding-cybersecurity/169013/
[29] SZCZEPANSKI Marcin. 2019. Economic impacts of artificial intelligence. European Parliamentary Research Service. Retrieved from https://www.europarl.europa.eu/thinktank/en/document/EPRS_BRI(2019)637967
[30] Rony Medaglia, J. Ramon Gil-Garcia, and Theresa A. Pardo. 2023. Artificial Intelligence in Government: Taking Stock and Moving Forward. Soc. Sci. Comput. Rev. 41, 1 (February 2023), 123–140. DOI:https://doi.org/10.1177/08944393211034087
[31] Albert Meijer and Martijn Wessels. 2019. Predictive Policing: Review of Benefits and Drawbacks. Int. J. Public Adm. 42, 12 (September 2019), 1031–1039. DOI:https://doi.org/10.1080/01900692.2019.1575664
[32] Billy Mitchell. 2023. State Department considers generative AI for contract writing. FedScoop. Retrieved June 22, 2023 from https://fedscoop.com/state-department-considers-generative-ai-for-contract-writing/
[33] NASCIO. 2021. AI Meets the Moment: How a pandemic has shaped AI adoption in state government and what it means for the future. Retrieved December 23, 2022 from https://www.nascio.org/resource-center/resources/ai-meets-the-moment/
[34] Natural Resources Conservation Service. 2023. Snow Survey and Water Supply Forecasting Program. Natural Resources Conservation Service. Retrieved March 14, 2023 from http://www.nrcs.usda.gov/resources/data-and-reports/snow-survey-and-water-supply-forecasting-program
[35] Oak Ridge National Laboratory. 2022. Deep learning underlies geographic dataset used in hurricane response. Phys.org. Retrieved February 6, 2023 from https://phys.org/news/2022-11-deep-underlies-geographic-dataset-hurricane.html

[36] OECD. 2022. OECD Framework for the classification of AI systems. Retrieved from https://www.oecd.org/publications/oecd-framework-for-the-classification-of-ai-systems-cb6d9eca-en.htm
[37] OECD. 2023. Advancing accountability in AI: Governing and managing risks throughout the lifecycle for trustworthy AI. OECD, Paris. DOI:https://doi.org/10.1787/2448f04b-en
[38] Amanda Pampuro. 2023. Colorado bill to fund AI-equipped cameras to detect and fight wildfires advances. Courthouse News Service. Retrieved June 23, 2023 from https://www.courthousenews.com/colorado-bill-to-fund-ai-equipped-cameras-to-detect-and-fight-wildfires-advances/
[39] Theresa A Pardo and Meghan E Cook. 2022. Digital Transformation and Public Value: A Primer for Government Leaders. Retrieved from https://www.ctg.albany.edu/media/pubs/pdfs/CTG_UAlbany__Digital_Transformation_and_Public_Value_FINAL.pdf
[40] PricewaterhouseCoopers. 2018. The macroeconomic impact of artificial intelligence.
[41] David Kiron Riedl Elizabeth J. Altman, and Christoph. 2023. Workforce ecosystems and AI. Brookings. Retrieved May 30, 2023 from https://www.brookings.edu/research/workforce-ecosystems-and-ai/
[42] Wojciech Samek. 2023. Explainable deep learning: concepts, methods, and new developments. In Explainable Deep Learning AI, Jenny Benois-Pineau, Romain Bourqui, Dragutin Petkovic and Georges Quénot (eds.). Academic Press, 7–33. DOI:https://doi.org/10.1016/B978-0-32-396098-4.00008-9
[43] Science and Technology. 2022. CAP-M: CISA Advanced Analytics Platform for Machine Learning. Retrieved from https://www.dhs.gov/sites/default/files/2023-01/23_0105_st_CISAAdvancedAnalyticsPlatformMachineLearning_December22_0.pdf
[44] Michael R. Sisak. 2019. Modern policing: Algorithm helps NYPD spot crime patterns. AP NEWS. Retrieved April 8, 2023 from https://apnews.com/article/police-us-news-ap-top-news-artificial-intelligence-crime-84fb03384368458db3d85763b5bf5b94
[45] The Colorado Department of Labor and Employment. 2023. CDLE expands career resources with new technology partner to benefit job seekers. Retrieved April 25, 2023 from https://cdle.colorado.gov/press-releases/press-release-cdle-expands-career-resources-with-new-technology-partner-to-benefit
[46] The Department of Veterans Affairs. 2022. Robotic Process Automation - DigitalVA. Retrieved February 6, 2023 from https://digital.va.gov/robotic-process-automation/

[47] The Government of the United Kingdom. 2019. A guide to using artificial intelligence in the public sector. Retrieved January 1, 2023 from https://www.gov.uk/government/publications/understanding-artificial-intelligence/a-guide-to-using-artificial-intelligence-in-the-public-sector
[48] The White House. 2023. Biden-Harris Administration Takes New Steps to Advance Responsible Artificial Intelligence Research, Development, and Deployment. The White House. Retrieved May 29, 2023 from https://www.whitehouse.gov/briefing-room/statements-releases/2023/05/23/fact-sheet-biden-harris-administration-takes-new-steps-to-advance-responsible-artificial-intelligence-research-development-and-deployment/
[49] Violet Turri. 2022. What is Explainable AI? Carnegie Mellon University Software Engineering Institute Blog. Retrieved September 28, 2023 from https://insights.sei.cmu.edu/blog/what-is-explainable-ai/
[50] US Congress. 2020. National Artificial Intelligence Initiative Act of 2020. Retrieved May 22, 2023 from http://www.congress.gov/
[51] Chris Vallance. 2023. AI could replace equivalent of 300 million jobs. BBC News. Retrieved May 30, 2023 from https://www.bbc.com/news/technology-65102150
[52] Tom Wheeler. 2023. The three challenges of AI regulation. Brookings Institute. Retrieved September 28, 2023 from https://www.brookings.edu/articles/the-three-challenges-of-ai-regulation/
[53] Bernd W. Wirtz, Jan C. Weyerer, and Carolin Geyer. 2019. Artificial Intelligence and the Public Sector — Applications and Challenges. Int. J. Public Adm. 42, 7 (May 2019), 596–615. DOI:https://doi.org/10.1080/01900692.2018.1498103

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