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THE COMING AI PRODUCTIVITY BOOM

And how federal agencies can make the most of it

Artificial intelligence could unleash a productivity windfall for the U.S. government, worth up to $532 billion annually by 2028. Before this can happen, however, federal workers and executives need to be empowered to get the most from AI.

The rapid spread of artificial intelligence (AI) technologies promises huge productivity gains for workers.[1] This is especially true in the public sector, where red tape and other institutional constraints hamper productivity.

AI can empower government workers in two ways. The first is by automating repetitive tasks, freeing up time for higher value-added activities. As just one example, consider how tax compliance examiners might benefit. In much of the world, examiners' daily routines still involve laborious steps—interviewing taxpayers, combing through mountains of tax returns, and drafting audit reports. If AI were applied to such activities, examiners could instead focus on complex, high-stakes compliance issues that made better use of their expertise.[2]

The second way that AI can make public-sector workers more productive is by augmenting their capabilities. Historically, the ability to detect tax fraud was too often limited to analysis of existing filings. Today, the IRS is using AI to identify unforeseen connections in disparate external data, allowing the agency to target even non-filers as high-value tax cheats. (In one 2019 trial run, 84% of fraudulent returns detected by an experimental AI were subsequently missed by examiners.)[3]

The U.S. government, which already spends more on AI than any other government, is keen to extend its advantage.[4] In February 2019, President Trump unveiled the "American AI Initiative", an executive order to scale investment in AI across federal agencies.[5] According to market researcher IDC, U.S. government spending on AI will rise from about $250 million, in 2018, to almost $1 billion in 2023.[6]

The return on the government's AI investments could be enormous: productivity gains worth up to $532 billion annually by 2028, by our estimates.[7] To reap such rewards, federal agencies must begin taking actions—in the areas of training, strategy, and data—that empower workers and executives to make the most of AI.

The coming AI productivity boom

What exactly is artificial intelligence—and why are governments and companies scrambling to harness it? One reason AI is so heralded is that it is not a single technology, but many. Machine learning, natural-language processing, computer vision, and other AI technologies combine to analyze vast quantities of data, to offer previously unavailable insights and guidance.

Huge productivity breakthroughs of the kind promised by AI have occurred before. Think of transformative innovations like the wheel, the printing press, or the steam engine. Yet such technologies spread slowly. Today, innovations are diffused fast, allowing AI to be scaled across millions of workers in little time.

To quantify AI's potential to boost workers' productivity, Accenture previously developed a cross-industry econometric model that synthesized labor force data from 14 countries in the G20, a club of the world's largest economies (this model defined productivity as the amount of value added per hour worked).[8] That research suggested that the impact of augmentation and automation will be sweeping, affecting up to 90% of the time workers spend on daily tasks in the coming decades. It also indicated that organizations (and workers) are poorly prepared for such change, with up to $11.5 trillion in foregone economic growth, if skill-building fails to catch up with the new kinds of work that AI will create.

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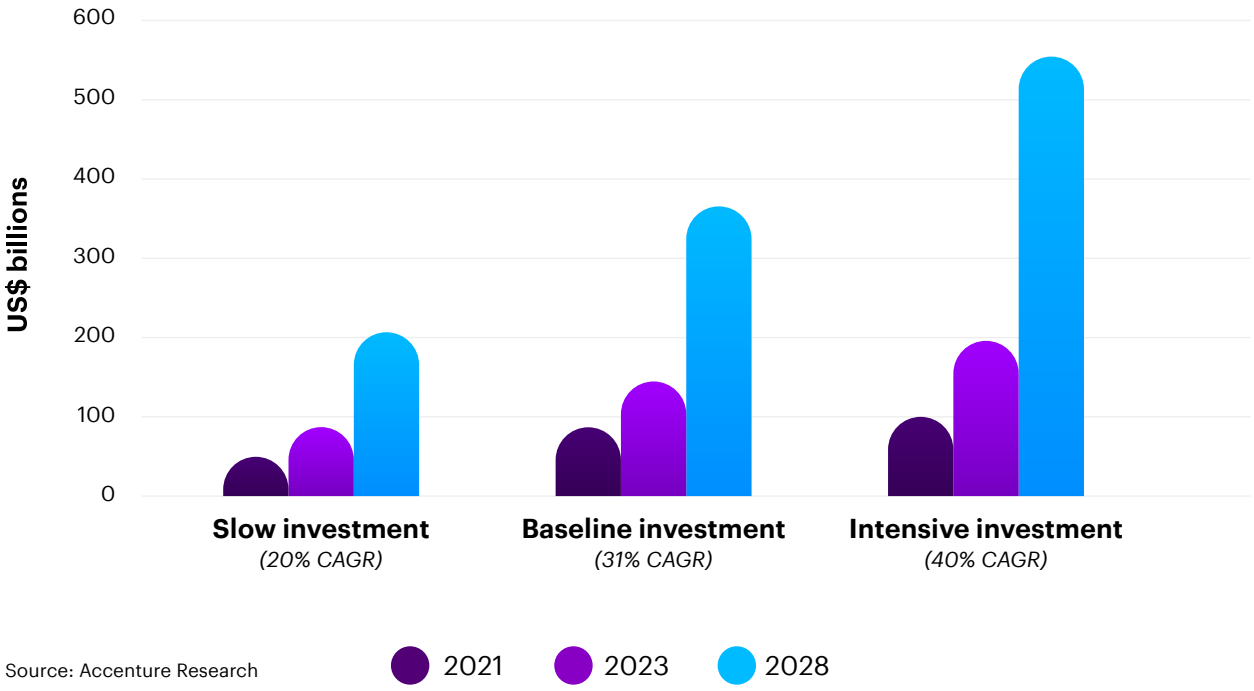
This paper refocuses that model, to quantify how varying levels of AI investment by the U.S. government—"slow", "baseline" (i.e., current trends), and "intensive"—would increase the productivity of its workforce (Figure 1). We use 2018 as our baseline year and project that ongoing AI investments will grow at variable rates, as described; anticipated productivity increases build upon this baseline and reflect the cumulative effect, within the specified year, of investments to date. (For more on the assumptions behind our model, see Appendix.) Here's what we found.

Figure 1: AI investment projections and estimated productivity gains



Source: Accenture Research

In the slow (most conservative) scenario, we estimate that $439 million invested in AI in 2021 would yield $49 billion in productivity gains that same year; $634 million invested in 2023 would yield $87 billion in gains in 2023; and $1.6 billion invested in 2028 would deliver $205 billion in productivity gains in 2028.

In the baseline scenario, we estimate that $600 million invested in AI in 2021 would yield $84 billion in productivity gains that same year; $976 million invested in 2023 would yield $143 billion in gains in 2023; and $3.8 billion invested in 2028 would deliver $364 billion in productivity gains in 2028.

In the intense (most optimistic) scenario, we estimate that $697 million invested in AI in 2021 would yield $104 billion in productivity gains that same year; $1.4 billion invested in 2023 would yield $196 billion in gains in 2023; and $7.4 billion invested in 2028 would deliver $532 billion in productivity gains in 2028.

PRODUCTIVITY, CONSIDERED

To put productivity gains of $532 billion (our high-end estimate) in perspective, consider that the amount would equal about 2.4% of America's GDP of $21.73 trillion in 2019; and it would be 1.7 times greater than the U.S. government's civilian payroll of $298 billion in fiscal year 2020.[9]

When thinking about our productivity estimates, two caveats are also in order. The first is that productivity gains from AI may reveal themselves in non-conventional ways. "Intangibles such as better responsiveness to customers and increased coordination with suppliers do not always increase the amount or even intrinsic quality of output," observed MIT's Erik Brynjolfsson, in an influential 1994 paper, The Productivity Paradox of Information Technology. "But they do help make sure it arrives at the right time, at the right place, with the right attributes for each customer."[10] What applied to past IT breakthroughs may well apply to future AI breakthroughs.

The second caveat: our productivity projections assume that federal workers and executives are widely empowered to make the most of the new AI tools at their disposal. At present, this is not the case.

Such a productivity surge would confer enormous benefits. To name only a few: it would generate vast savings, which could be reinvested in innovation and R&D; and it would reduce delivery backlogs, allowing citizens to receive services more promptly.

Consider, again, the benefits for tax collection. In 2017, the Internal Revenue Service fielded just 53% of the calls to its public hotline, with callers waiting 17 minutes for service, on average.[11] (That year, an answered call cost the IRS $41.) Investing in AI-powered chatbots to answer calls would cut waiting times sharply, as chatbots fielded routine questions and human operators took the most difficult queries.[12]

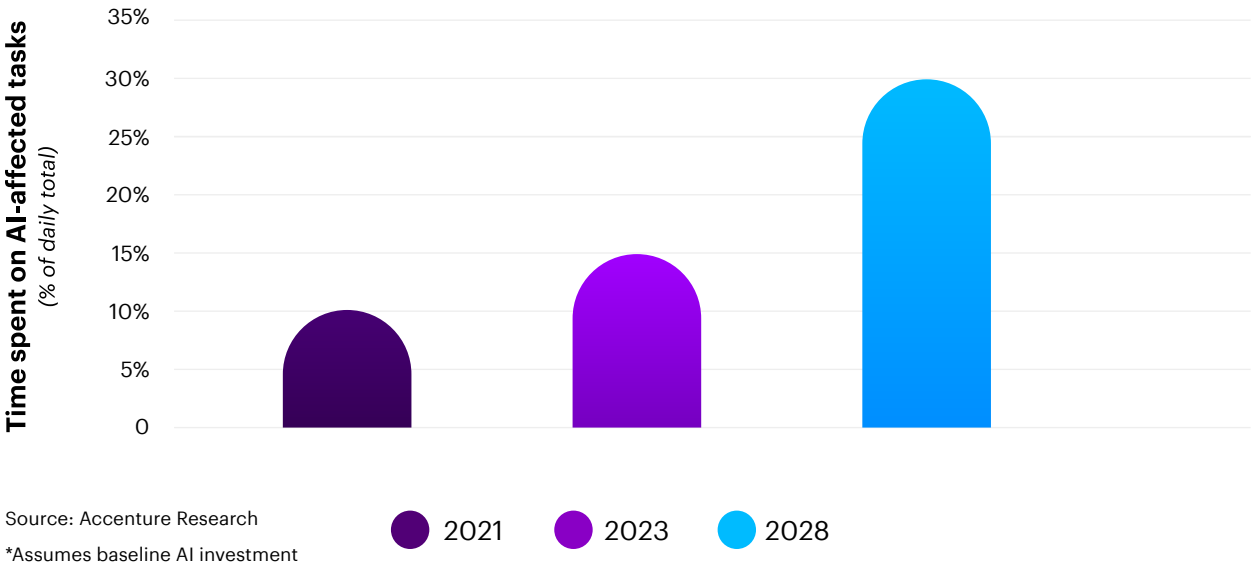
Whether at the IRS or the U.S. Copyright Office or the Veterans Benefits Administration, more productive workers would deliver better services, improving lives and increasing citizens' satisfaction with their government.

Is the federal workforce ready for AI?

Artificial intelligence will soon be applied to a significant share of the work that U.S. government workers perform. Our cross-industry model projects that, in our intensive investment scenario, nearly half (49%) of the time that federal workers spend on current tasks could be augmented in the next 10 years. This is 5% higher than the average for all 15 industries analyzed. (Note: the public sector is classified as a stand-alone industry in our model.) Indeed, the only industries with a higher share of workers' time exposed to augmentation are "education" (63% of workers' time), "human health and social work" (52%), and "financial activities" (51%).

In 2021, in our baseline investment scenario, AI is *expected* to be used on tasks that consume about 10% of federal workers' time; in 2028, we *forecast* that figure to jump to 30% (Figure 2). But AI won't affect all federal jobs equally.

Figure 2: By 2028, AI could be applied to tasks that consume up to 30% of federal workers' time*

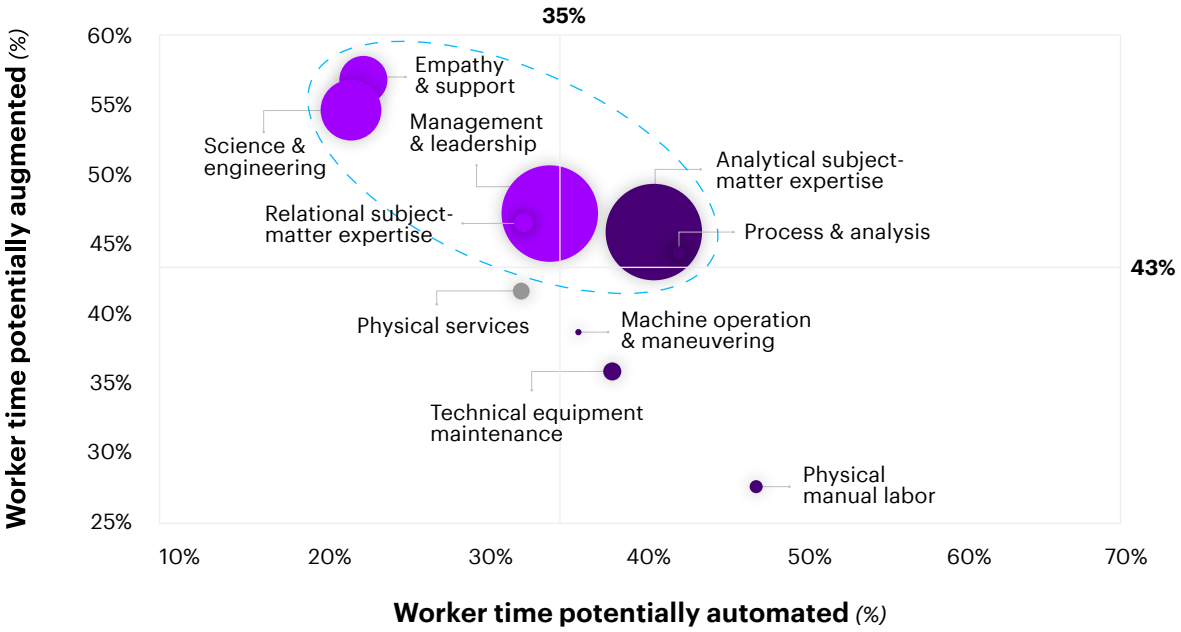


Source: Accenture Research

*Assumes baseline AI investment scenario described above.

For a closer look at how AI will reshape the federal workforce, we modeled the percentage of workers' time affected in different types of jobs (depicted as circles in Figure 3) if investment in AI approached the intensive scenario described previously. (We focused on underlying tasks—not on, say, job titles—because many roles involve a range of tasks.) Figure 3 shows, for example, that workers who are employed in "technical equipment maintenance" jobs may have up to 36% of their time affected by augmentation, that workers in "process and analysis" jobs may have up to 44% of their time augmented, and that workers in "science and engineering" jobs may have up to 54% of their time augmented.

Figure 3: Percentage of workers' time affected by automation and augmentation, by job type



Source: Accenture Research

Size of bubbles reflects size of workforce

Quadrants defined according to the average worker. Worker time augmentation and automation refers to maximum possible impact.

Human-centered role

Highly-augmentable role

Highly-automatable role

As Figure 3 makes clear, AI will soon affect the work of many federal employees, albeit unevenly. But are workers prepared for the big changes ahead?

Accenture's previous interviews with federal executives offer some cause for concern. A 2019 survey, for instance, found that 35% of federal executives believe that up to half of the entire federal workforce could be made redundant by AI if their skills are not upgraded.[13] In the same survey, more than half of federal agencies that already use AI reported that they lack "strong expertise" in such technologies.

Another Accenture survey found that 85% of federal executives believe that "collaboration between humans and machines will be critical to innovation in the future." However, the same survey found that only 18% were preparing their workforce to interact with collaborative, interactive, and explainable AI-based systems.[14]

These findings, among others, indicate that more must be done to make the most of the government's surging investment in AI. Indeed, our model suggests that, under the current baseline investment scenario, the U.S. government could see up to $66.5 billion in AI productivity gains vanish in 2028 if a "human + machine" workforce is not in place—i.e., one where workers are retrained to complement machines, allowing both to work together in new ways.[15]

Making the most of AI

Three actions would greatly empower federal workers and executives to maximize the benefits of artificial intelligence.

ACTION 01:
Emphasize training

Many federal workers worry that they are receiving inadequate training for AI. A 2019 Accenture survey, for example, found that 61% believed that they were poorly prepared to handle AI technologies.[16] Insufficient funding is partly to blame—in the same survey, 55% of workers said that training costs were the biggest deterrent to upgrading their skills.

What kinds of skills will workers need to develop? Research by Accenture and others suggests that an aptitude for things like complex reasoning, creativity, and emotional intelligence will rank highly.[17]

Narrow job descriptions will also become less prevalent, as federal workers are asked to do a wider range of tasks. Where more specialized skills are required, the emphasis will shift. Demand for engineers, data scientists, linguists, ethicists, and others who can train, sustain, and explain AI will rise.

A promising training model might be the kind of "pop-up" workshops used in 2019 by the Federal Cybersecurity Reskilling Academy, which made hands-on training in the field available to workers across the U.S. government.[18] Innovative solutions to the challenge of reskilling can come from many places, including crowdsourcing and prize contests. The National Science Foundation used both techniques with its "Career Compass Challenge" (also launched in 2019), which invited the public to design worker-training programs.[19] Federal agencies can also use online learning platforms, such as those available from Udacity and Accenture Academy, to continuously reskill their workforces in digital, IT, and analytics education.

To get the most out of AI, federal workers will need to be empowered to make the most of the opportunity. The same 2019 survey found that nearly three-quarters of workers received little guidance on how AI will affect their jobs in coming years. In addition to better top-down communication, workers' input should be solicited on how AI might be used to make them more productive.

ACTION 02:
Prioritize strategy

AI investment is rising fast, but budgets are not unlimited. Inevitably, the trendiest AI technologies won't always be best suited to every agency's needs. Agency executives should invest strategically.

To identify strategic priorities, better communication and collaboration between business and IT teams is needed. So is a long-term vision. To create one, seek input from workers on where they see potential AI application and collaboration opportunities. Focus on ways that AI might strengthen an agency's mission. And think about how to connect AI with existing systems, to avoid duplication.

Another way to encourage strategic behavior is by making agencies less rigid. Federal agencies that can trim unnecessary bureaucracy, overcome departmental siloes, and reduce dependence on legacy systems are better able to shift priorities as conditions change. This flexibility can allow them to reconfigure operations to better align with AI's strengths.

A 2018 Accenture survey of federal executives, for instance, found that nearly half believed that over-reliance on legacy systems hinder their ability to create innovative operating models and processes.[20] The most agile federal agencies increasingly favor fluid open-source development, where platforms are virtualized, containerized, and automated. Such agencies encourage the prototyping of AI technologies, too.

Executives should also focus on scaling AI strategically. They might begin their efforts by answering this question: How could our teams, processes, and technologies be restructured to facilitate scaling?

ACTION 03:
Rethink data

To get the most out of AI, agencies will also need to rethink how they collect, manage, and use their data. Begin by strengthening governance procedures and protocols, to better source and store the vast amounts of data that are required to train AI. Opportunities to converge data sources, across departments and agencies, can be identified as well.

Cloud-based computing—which offers big advantages on cost, efficiency, security, and flexibility—should become widespread. An Accenture study released last year, however, found that only two-thirds of federal executives said that migrating their IT systems to the cloud in the coming years was a priority.[21]

Workers and executives, empowered

Some federal agencies are beginning to reap the rewards of their investments in artificial intelligence. The Department of Veterans Affairs is prototyping an AI technology that can spot kidney failure days before symptoms appear, allowing patients faster access to life-saving treatments.[22] When Hurricane Florence struck America's east coast in 2018, the Department of Defense's new Joint Artificial Intelligence Center used another AI prototype to direct rescuers to victims.[23]

The General Services Administration (GSA) is deploying AI-powered bots across its work. There's a GSA bot to help new hires navigate the agency.[24] Another bot engaged in financial record-keeping has saved GSA workers some 70,000 hours of labor.[25] A GSA call-center bot has been used by 45,000 people, 75% of whom did not need further assistance.[26]

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The Department of Health & Human Services (HHS) has prototyped an AI that offers guidance on when to outsource work to government contractors. The technology, which cost HHS $300,000 to develop, identified $100 million in potential savings.[27]

There are promising signs of inter-agency collaboration on AI, too. One group, the Robotic Process Automation Community of Practice (CoP), has more than 750 executives drawn from over 50 agencies. In January 2020, CoP, which seeks to spread best-practices on robotic process automation across the U.S. government, released its first RPA Program Playbook. "If the government deployed RPA at scale and achieved only 20 hours of workload elimination per employee [per year]," says Gerard Badorrek, the GSA's Chief Financial Officer and CoP Chair, "the net capacity gained would be worth $3 billion."[28]

These examples illustrate the incredible compelling promise of AI to raise the productivity of federal workers. Rising investment in AI in the coming years will raise the potential gains higher still. To get the most out of AI, however, more must be done to empower workers and executives to use such technologies effectively.

APPENDIX: MODELING AI'S EFFECT ON FEDERAL WORKERS' PRODUCTIVITY

The following is a snapshot of the steps and assumptions that went into our model.

FIRST,

we sought to understand how AI technologies will affect specific work tasks and skills, through automation and augmentation. Here's how we calculated the shift in labor demand associated with AI:

- We used datasets—from O*Net Database of the U.S. Department of Labor, the International Labour Organization (ILO), and the U.S. Office of Personnel Management—to calculate the total time worked by workers in each country and industry (based on the task frequency of work activities for occupations derived from these datasets).
- Our subject matter experts tagged tasks according to how AI would impact a given task.
- We computed the total potential time susceptible to automation and augmentation for different occupations, based on the frequency with which such occupations perform the analyzed work tasks.
- We measured time savings and productivity gains based on assumptions about investment levels in AI, using elasticity coefficients from regression analysis performed on a panel of 14,000 global companies.
- And we assumed that labor supply matches labor demand at the average unemployment rate of the past five years.

SECOND,

we examined the supply of skills (whether AI can produce value-added growth depends on the capacity of labor supply to satisfy the new demand for skills). Here's how we calculated labor supply in 2028:

- We used population projections from the United Nations (using its moderate growth scenario), for ages 15–64.
- We used labor participation rates from the ILO (the average of the last five years available).
- And we used unemployment rates from the ILO (average of the last five years available), to calculate potential employment.

THIRD,
we modeled GDP growth for 2018–28 under different investment scenarios:

- We used baseline labor productivity growth by industry and country, sourced from Oxford Economics.
- We multiplied projected labor productivity by employment levels, in 2028, to obtain value-added growth in the baseline scenario.

FOURTH,
we calculated AI investment levels, at the country and industry levels, using data sourced from the IDC Worldwide Semiannual Artificial Intelligence Systems Spending Guide -2018H2 (published August 2019), with Accenture Research estimates extending the forecasts to 2028.

FIFTH,
to create the role clusters shown in Figure 3, we conducted the following analysis:

- We employed principal component factor analysis to analyze the skills, abilities, and work activities based on the above datasets. This generated six distinct factors for skills and abilities, and five distinct factors for work activities.
- The importance of each of these factors was used to tag occupations into six groups for skills/abilities and five groups for work activities.
- We cross-referenced the groups against one another to identify the clusters that grouped at least 35% of workers within a skill/ability group. The result was 10 such groups, which represent our 10 clusters.
- We used these 10 clusters to categorize the workforce composition of 14 G20 countries and the U.S. government. We did this by creating conversion tables that matched each occupation code to U.S. occupation codes.
- Under the assumption that the same occupation utilizes similar skills and performs similar tasks across countries, the categorization of occupations within clusters was then applied to other countries and to the U.S. government.

Resources

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[7] We concluded our modeling before the COVID-19 outbreak shuttered much of the global economy. Nevertheless, we believe the key insights discussed in this paper remain true.

[8] https://www.accenture.com/us-en/insights/future-workforce/transforming-learning; This model also included other "intelligent technologies" like virtual reality and Internet of Things that were omitted from our U.S. federal government study.

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