



IBM Center for
The Business of Government

Special Report Series

TRANSFORMING GOVERNMENT THROUGH TECHNOLOGY

Foreword

The federal government can reduce costs while improving services by adapting private sector cost reduction strategies and technologies to achieve similar benefits in government. This objective is highlighted by a recent report, led by the Technology CEO Council (TCC), in which the IBM Center for The Business of Government participated. In “The Government We Need,” TCC members detail how, if implemented effectively, technology-based reforms could reduce federal costs by more than \$1 trillion over the next decade.

This special report, “Transforming Government Through Technology,” is a companion piece to the more detailed TCC report, and builds on a similar report released in 2010. We highlight many key findings and recommendations that can assist government leaders in understanding how best to leverage and scale past successes to benefit citizens and taxpayers today and in the future. These insights are reinforced by many of the Center’s past studies that similarly examine opportunities for improving government operations through a business-like approach.

Driving change in the federal government requires more than new policies or the infusion of new technology; it requires a sustained focus on implementation to achieve positive and significant results. The practices and recommendations summarized in this special report provide a roadmap for government leaders to reach this objective.



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Introduction

The federal government can cut unnecessary costs to address continued deficits and debt. However, meaningful spending reduction will require an aggressive, disciplined, multi-faceted, and cross-agency approach integrated into early budget proposals and strategic plans. Technology-enabled capabilities can fundamentally transform the way government does business, allowing agencies to avoid across-the-board cuts that do not relate to an analysis of what works. Indeed, modern interconnected technologies and processes—such as those used in the private sector—offer the opportunity to realize sustainable cost reductions of more than \$1 trillion over the next 10 years.

Achieving these cost reductions, however, will require technological innovations that support improved processes and decision making. As the TCC report indicated, the government's existing technology infrastructure is widely outdated, expensive to maintain, not secure, and incompatible with new innovations. The government needs to expand current efforts to modernize its IT portfolio and associated processes. This will add value by enabling agencies to meet their missions more quickly and completely, with less overhead, lower costs, and reduced risk.

In addition to the tangible cost reductions that can be achieved by using existing technologies, the government has other opportunities to drive innovation, facilitate improved operations, and provide benefits to the public. For example, agencies can avoid significant costs by preventing problems before they occur, such as those incurred from cybersecurity attacks.

The following four strategies are key to this endeavor:

- Improve resource management
- Improve government decision making
- Invest in modern technology
- Optimize processes

Table 1 details the findings from the Technology CEO Council report, “The Government We Need,”¹ regarding the performance improvement and cost reduction opportunities in each set of strategies. These cost-reduction estimates were derived through analyzing specific examples featured throughout this report; they were extrapolated to reflect the size and scope of the federal government. Cost-reduction figures reflect the total estimated opportunity over a 10-year period, assuming effective implementation, and they may necessitate additional investments in people, processes, and technology.

Table 1: 10-Year Cost-Reduction Opportunities

Cost-Reduction Area	Est. 10-Year Cost Reduction
IMPROVING RESOURCE MANAGEMENT	
Shared Services	\$47 Billion
Fraud and Improper Payments Prevention	\$270 Billion
IMPROVING GOVERNMENT DECISION MAKING	
Analytics and Cognitive Computing	\$205 Billion
INVESTING IN MODERN TECHNOLOGY	
IT Modernization	\$110 Billion
Cybersecurity, Mobile, Internet of Things	Cost Avoidance and Improved Efficiencies
OPTIMIZING PROCESSES	
Supply Chain and Acquisition	\$500 Billion
Energy Use	\$3 Billion
Total 10-Year Cost-Reduction Potential	\$1.1 Trillion

The remainder of this report highlights opportunities to improve government in each of these areas.

1. http://www.techceocouncil.org/tcc_reports/the_government_we_need/?back=Reports

Cost-Reduction Opportunities

A. Improving Resource Management

Too often, critical data exists in disparate systems across disconnected agencies or operational areas, hiding the overarching operational picture and hindering effective coordination. The government can identify cross-agency opportunities and recognize risks that are not otherwise evident by integrating across domains and networks and raising the level at which decisions are viewed and organizational investments are aligned. Integration still allows for the continued protection of privacy, confidentiality, and security. By taking an enterprise perspective, the government can leverage technology enablers to drive consolidation of core services and improve analytical capabilities.

1. Shared Services

“Shared services” is an effective commercial strategy to reduce duplicative costs incurred by multiple organizational units independently delivering the same common administrative services, such as processing human resources and finance transactions. This is done by providing enterprise-wide services from a set of specialized providers. A shared services provider can offer more cost-effective services at scale and reduce duplicative services across the enterprise.

For example, a shared services provider in the federal government, the Human Resources Line of Business (HR LOB) in the Office of Personnel Management, consolidated 26 agency payroll systems into four payroll shared service centers. It also migrated agency HR systems into one of six federal and four private sector HR shared service centers. As a consequence, the HR LOB reduced payroll and HR costs by an estimated \$1.6 billion between FY 2004 and FY 2015.

While agencies have traditionally set up shared services to support their internal departments, many in the shared services community have come to support a new “21st century delivery model.” In this new model, components will be provided with a focus exclusively on service and price to enable agency clients to shop for the provider best aligned with their service preferences. The General Services Administration’s (GSA) Unified Shared Services Management (USSM) office has established a framework based on this model in the hopes of creating a dynamic, competitive marketplace that includes common standards, interoperability, and the ability for agencies to change providers if service doesn’t meet agreed-upon performance levels.

In March 2015, the Partnership for Public Service, supported by commercial and government participants, released a Shared Services Roundtable report that estimated up to \$47 billion in cost reductions over the next 10 years through the increased use of shared services in six administrative categories.

2. Fraud and Improper Payments Prevention

The number of improper payments by the government continues to rise despite recent administrations’ efforts to reduce such payments. Federal agencies made an estimated \$137 billion in improper payments in FY 2015, and \$144 billion in FY 2016. The government should take advantage of advanced analytical models that have shown a strong capability to predict and prevent fraud.

The New York State Tax Administration implemented predictive modeling and advanced algorithmic capabilities that stopped \$1.2 billion in improper or questionable refunds from being paid. At the federal level, the Internal Revenue Service’s (IRS) Return Review Program (RRP) identified over \$10 billion in fraudulent tax returns in 2014 that would have otherwise been granted, and the Centers for Medicare and Medicaid Services (CMS) has established a fraud detection unit to help identify and stop fraudulent healthcare claims.

Federal agencies should work together to share fraud detection services and investments to produce greater economies of scale, reduce duplicative investments, develop best practices, and ultimately lower costs and improve performance. The New York experience demonstrates how leveraging predictive analytics can help identify and prevent 20 percent of improper or fraudulent payments across the federal government. Given the current level of improper payments identified above, the potential exists for federal agencies to reduce improper payments by approximately \$270 billion over 10 years.

B. Improving Government Decision Making

Analytics and Cognitive Computing

Some 2.5 quintillion bytes of data are created per day, while more than 50 percent of stored data is considered “dark” data whose value is unknown and untapped; the vast majority of this data is not effectively used. Clearly, government can more effectively leverage available data to make informed choices. Making existing data visible is a first step toward applying analytics, enabling better decisions, standardizing performance management, and improving outcomes.

Decisions based on better use of data and evidence have clear benefits. CMS set out in 2011 to reduce hospital-acquired infections by 10 percent. Assessing over 1 million such cases a year, analytics helped identify patterns, trends, and priorities to allow targeted interventions. The approach is working, as the Department of Health and Human Services has estimated that 50,000 fewer patients died in hospitals from 2010 to 2013 and approximately \$12 billion in healthcare costs were avoided as a result of fewer hospital-acquired infections.

Cognitive computing systems build knowledge, learn, understand natural language, reason, and interact more naturally with people than traditional programmable systems. Cognitive capabilities can help agencies identify meaningful and actionable information from both structured and unstructured data sets and transform that data into insights. That allows officials to reason and learn in a way that produces faster, more consistent decisions and optimizes the use of limited resources. Cognitive technologies can digest unstructured information (e.g., maps, images, etc.) and produce valuable real-time insights that supplement traditional analytics and improve human decision making to solve some of the most challenging and mission-critical problems facing the government today.

Using cognitive systems, the Federal Emergency Management Agency (FEMA) can leverage weather data to build knowledge that can help experts to better predict natural disasters and make decisions for planning and responses. The Centers for Disease Control and Prevention (CDC) can use public health data to help officials quickly learn from a wide variety of data sources and determine how best to mitigate the risk of epidemics. The Department of the Treasury and the Securities and Exchange Commission (SEC) can identify real-time trends in the financial markets and proactively take steps to reduce the likelihood of a financial crisis, thus providing a more stable economy.

The opportunity exists for the federal government to save an average of 10 percent on its operations and maintenance costs by implementing cognitive monitoring technologies. The Department of Defense alone spends over \$200 billion per year on operations and maintenance costs. Add that to the equipment maintenance per year for other large “power-user” agencies, such as the Department of Transportation or the GSA, and the opportunity to reduce costs by over \$20 billion per year—or \$205 billion over 10 years—becomes evident.

C. Investing in Modern Technology

Private sector experience has demonstrated that strategic investments are key to achieving long-term cost reductions and can have a significant return on investment. It is imperative that the government invests in and capitalizes on innovation, and that it continues transforming into a modern, efficient enterprise. Identifying and prioritizing efforts for investment, integrating these priorities into agency and federal budget planning cycles, and applying appropriate measures to track the success of key efforts will enable paradigm-shifting solutions. Strategic investments in modern, cloud-enabled IT infrastructure, cybersecurity, and mobile services have additional substantial cost-savings potential.

1. IT Modernization

Federal IT spending is at an all-time high. Yet according to the Government Accountability Office (GAO), about 75 percent of spending on IT in 2016 was allocated to the operation and maintenance (O&M) of legacy systems that already are, or are rapidly becoming, obsolete. OMB has estimated that \$3 billion worth of federal IT equipment will reach end-of-life status in the next three years.

Duplicative and obsolete legacy systems should be eliminated wherever possible, and necessary systems should be replaced with modern technologies on more cost-efficient platforms. Many in Congress have recognized the challenge and expense posed by legacy systems, and lawmakers have considered legislation that would authorize working capital funds for federal agencies to upgrade and modernize IT systems.

Two agency examples demonstrate the feasibility of modernization efficiencies. The Federal Communications Commission (FCC) began its transition by moving from a capital expenditures model to an application model and making a relatively small up-front investment that enabled a move from legacy infrastructure to managed services, which left room in the FCC budget to effectively implement other necessary changes (e.g., migration, rationalization, etc.). In another example, the U.S.

Army Materiel Command Logistics Support Activity (LOGSA) migrated its procurement operation to an on-premises hybrid cloud model that now processes 40 million unique daily data transactions and is used by more than 150 Army suppliers around the world. LOGSA is saving more than \$2 million per month over previous contracts—a reduction of 40-50 percent—while delivering greater levels of service to Army customers.

A 2015 report by the Information Technology and Innovation Foundation (ITIF) suggests that state governments collectively could save \$11 billion over the next five years through increased productivity resulting from technology investments and adoption. Another report cited in ITIF's report estimates that every \$1 increase in new IT spending by a state government CIO led to as much as a \$3.49 reduction in overall state expenditures. Applied to the federal government, investing in new IT systems—and in so doing, increasing productivity by shifting spending from legacy O&M to modern systems—could yield billions in reduced costs. At the cost-reduction rate identified by ITIF, and assuming a shift of only five percent of approximately \$65 billion of federal O&M IT spending, the government could cut costs by over \$110 billion during the next decade.

2. Additional Opportunities: Cybersecurity, Mobile, and the Internet of Things (IoT)

As government modernizes by leveraging commercial technology, agencies will benefit from improved performance and cost reduction in numerous areas. Three areas that can yield near-term results include cybersecurity, mobile, and the Internet of Things (IoT).

Cybersecurity

The importance of strengthening and maintaining effective cybersecurity technologies and best practices for government cannot be overstated. The 2016 Ponemon Cost of Data Breach Study found the average consolidated total cost of a data breach grew to \$4 million, and that the average cost incurred for each lost or stolen record containing sensitive and confidential information increased to \$158. For example, OPM's 2015 personnel records data breach that compromised approximately 21.5 million personnel records has cost the government more than \$350 million thus far. Based on the Ponemon figures, this breach could ultimately cost more than \$3.3 billion.

The government must be proactive in preparing for and identifying cyberattacks by modernizing its infrastructure as

discussed above. With the estimated average cost of a distributed denial-of-service (DDoS) attack at \$40,000 per hour (and an average total cost of \$500,000 per incident), the cost avoidance potential for federal agencies is significant.

Mobile Computing

Mobile devices continue to transform the way Americans work, live, and learn, and how all enterprises do business. Continued expansion of mobile self-service and supporting infrastructure is essential to meet the needs and expectations of the federal workforce and the American public.

Mobile technologies are already critical to agencies that have agents and first-responders in the field—such as FEMA, which often has employees in remote or disaster locations. FEMA's CIO said, "Our strategy focuses on getting mobile technologies into the hands of those at the end of the spear... We want to ensure they have the tools to quickly get information and data incorporated into devices and transmitted." Improving and expanding mobile capabilities for these types of specialized roles has the potential to save lives.

In addition, several cities have begun applying mobile technologies not only to provide valuable services to employees and citizens, but also to help governments explore opportunities to reduce transportation spending, improve sustainability, manage infrastructure, and monitor public health and safety.

The TCC report noted that, on average, return on investment in mobile initiatives results in a seven percent increase in revenue and a six percent decrease in costs. Mobile technologies remain an essential component of the foundation for future government innovations.

IoT

By adopting Internet of Things (IoT) technologies and supporting the interoperability that enables systems to work together, substantial cost savings are possible across a range of applications and industries. The TCC report suggested that strategic IoT deployment could potentially grow the global economy by \$4 trillion to \$11 trillion per year by 2025. This would be achieved through improvements including better operations management in industrial production, enhancements in retail sector productivity, and more efficiencies in city services.

Cities around the world are using IoT to deliver services at lower costs, among other benefits. For example, Barcelona's adoption of numerous IoT technologies has resulted in: an estimated \$58 million in savings from the reduced use of water, an increased parking revenue of \$50 million per year, and

decreased lighting costs of \$37 million per year. Applying similar technologies and capabilities to U.S. federal resources would likely yield similar benefits, but potentially on a much larger scale.

D. Optimizing Processes

As effective management, decision-making structures, and processes take shape, it is critical that the government reinforces the need to continually improve operations. Optimizing the federal supply chain and procurement processes—and enabling more efficient energy consumption—has the potential to unlock substantial cost reductions, ensure timely delivery of quality goods and services, and streamline the use of existing resources.

1. Supply Chain and Acquisition

Federal agencies purchase more than \$450 billion of goods and services annually. Despite efforts to consolidate acquisition efforts across the federal government, these activities continue to be performed through a range of independent department and agency processes. The opportunity to leverage the collective buying power of the federal government remains largely untapped.

Cognitive tools can capture and use structured and unstructured data about suppliers, markets, and prices from internal and external data sources to assist and accelerate the market intelligence process for procurement agents. Further, these tools can capture seemingly unrelated data—like weather—and correlate them to potential supply chain risks. Such approaches have also helped to simplify access to complex procurement regulations, including the Federal Acquisition Regulations (FAR) and Defense Federal Acquisition Regulations (DFAR), enabling federal acquisition specialists to receive guidance through a Virtual Agent Assistant. Most importantly, these cognitive tools learn from every interaction to enable more targeted and relevant data capture and to offer better advice, consistent with how a supply chain practitioner would address a problem.

The government's recent shift to considering category management a Cross-Agency Priority (CAP) goal is a positive step toward reforming federal procurement. The government can continue this progress by using category management to coordinate the acquisition of common IT and support services through standard platforms. The United Kingdom has demonstrated success implementing similar programs. Over the course of five years, the UK reduced costs by over \$13 billion using category management to streamline its supply chain.

In the commercial industry, similar efforts have enabled substantial savings. Commercial firms have reduced supply chain costs by 10-20 percent through strong category management, better use of supply chain assets, leveraging cognitive approaches and advanced analytics, and making process improvements. By implementing similar improvements effectively, and assuming a cost reduction impact at the low end of the commercial range (10 percent), the federal government could see spending efficiencies of more than \$500 billion over the next 10 years.

2. Energy Use

Although the government's energy use has been declining since its peak in the 1970s, there is an opportunity to reduce energy use further.

Using flash technology, the Indiana Office of Information Technology realized a 69 percent reduction in power and cooling costs and a 70 percent decrease in floor space, while improving operational efficiency. Similarly, the Transportation Security Administration removed on-site server racks, which decreased cooling costs and reduced floor space needs to save \$2 million annually. In the private sector, companies are using cognitive technologies to reduce fuel consumption, cut costs, and optimize routes, which yields significant environmental benefits from reduced emissions.

Real industry experience demonstrates that applying efficient technologies can achieve a 10 percent reduction in power and cooling costs. Based on current government estimates for its energy expenditures, the government can reduce non-petroleum-based energy costs by approximately \$3 billion over 10 years.

Implementation: How to Get It Done

Cost-reduction opportunities are valuable only to the degree that they can be successfully implemented. Understanding how, where, and when to engage will be critical to incorporating these opportunities into government-wide priorities and realizing the benefits.

Actions highlighted in the TCC report that can increase successful implementation include:

1. **Empower the federal CIO** to advise the OMB Director with input on all budget areas impacted by IT and prioritize coordination of efforts across all agency CIOs.
2. **Take an enterprise/cross-government perspective** by empowering the CIO Council as the implementing body for technology deployment, with the President's Management Council serving as a board of directors and working closely with the Chief Financial Officers Council, Chief Acquisition Officers Council, and Chief Human Capital Officers Council to ensure alignment.
3. **Incorporate industry best practices** through consulting with private sector leaders on tech-enabled change management and leveraging emerging commercial technologies.
4. **Prioritize and sequence implementation**, including early actions that start with the 2018 budget, as well as promoting multi-year cost estimates that allow small up-front investments to catalyze large changes.



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