



TRENDS AFFECTING GOVERNMENT AND SOCIETY

UNITED STATES
GOVERNMENT ACCOUNTABILITY OFFICE

Strategic Plan 2018–2023

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Note: GAO's 2018-2023 Strategic Plan consists of 3 parts: [Goals and Objectives](#) (GAO-18-1SP), [Key Efforts](#) (GAO-18-395SP), and [Trends Affecting Government and Society](#) (GAO-18-396SP).

FOREWORD

For nearly 100 years, the U.S. Government Accountability Office has stood at the vanguard of the U.S. government's efforts to ensure government accountability and effectiveness. To help support these efforts, GAO publishes a strategic plan every 4 years that emphasizes consideration of future issues that may affect the federal government and society as a whole.

As part of our strategic planning process, we emphasize foresight, continuous environmental scanning, and trend analysis as core activities. It is essential that we understand evolving trends and evaluate emerging issues to inform our decision making in the present. By exploring trends, key uncertainties, and their implications, we can better highlight national issues of greatest concern to the Congress and the American people in the years and decades ahead. Taking a longer view also helps us define the strategic context of our work and better address crosscutting and interconnected challenges that will require sustained collaboration and innovation.

GAO has long engaged in strategic foresight, both in conducting our engagements and managing our operations.

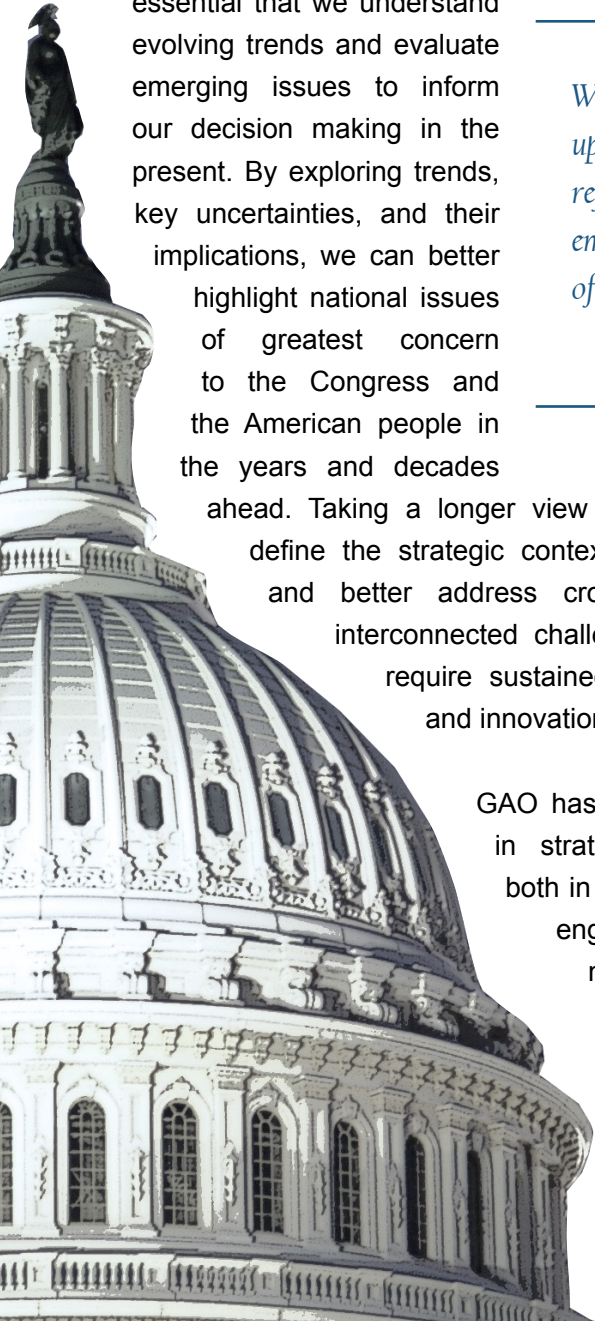
Forward-looking GAO work includes fiscal sustainability models showing the future of U.S. debt and deficits, technology assessments on key areas of technological innovation, and Comptroller General Forums that bring leading experts together to explore emerging issues of national importance.

What follows are eight trends we believe are having strong effects on both the federal government and society as a whole. In developing these trends, we researched extensively and consulted with a wide variety of experts both inside and outside the federal government. After reviewing the current state of affairs and our key assumptions, we explored uncertainties and the implications of these various trends over the near term (5 years) and long term (15 years). These trend papers do not seek to predict the future; rather, they explore the broader context in which we perform our mission

not only to ensure the Congress is aware and well-informed as it meets its constitutional responsibilities, but also to help improve the performance and ensure the accountability of the federal government for the benefit of the American people.

We are publishing these trend papers as part of GAO's strategic plan for fiscal years 2018-2023 to provide strategic context for our plan. We expect in the years that follow to update our trends, as appropriate, to reflect changes in external factors and new emerging issues. This continuous scanning of trends will help ensure GAO remains an agile and responsive organization.

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ABBREVIATIONS

AI	artificial intelligence
BLS	Bureau of Labor Statistics
CBO	Congressional Budget Office
DATA Act	Digital Accountability and Transparency Act of 2014
DOD	Department of Defense
DOE	Department of Energy
EPA	Environmental Protection Agency
GDP	gross domestic product
IC	Intelligence Community
ISIS	Islamic State of Iraq and Syria
MSA	Metropolitan Statistical Area
NAFTA	North American Free Trade Agreement
OECD	Organisation for Economic Co-operation and Development
R&D	research and development
STEM	science, technology, engineering, and mathematics

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DOMESTIC AND GLOBAL SECURITY



WHERE ARE WE?

Three decades after the Cold War, an increasingly volatile world presents new types of security threats.



WHAT DO WE KNOW?

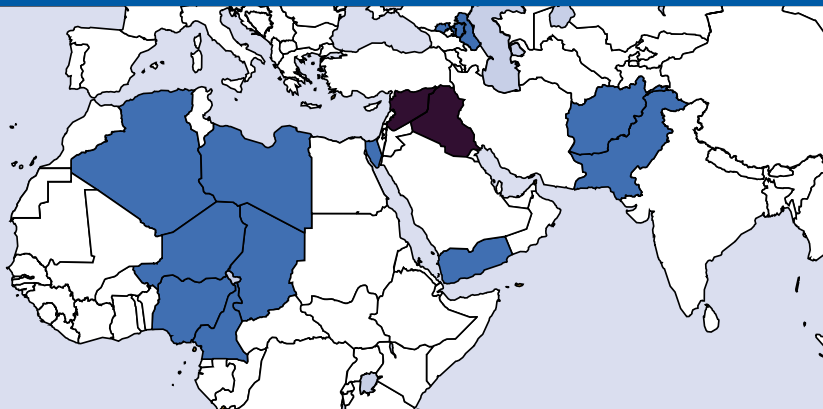
Domestically

- ✓ Cyber threats are challenging public trust in institutions and governance.
- ✓ Home-grown violent extremists remain an unpredictable terror threat.
- ✓ Social media is allowing extremists to find each other and meet—and gives them a platform for violent ideas.

Globally

- ✓ Major powers (e.g., Russia, China, and the United States) increasingly have competing interests.
- ✓ North Korea and Iran threaten regional and global order.
- ✓ Cyberattacks may be used against the United States and its allies to counter military advantages.
- ✓ The global threat from terrorism, including the Islamic State of Iraq and Syria (ISIS), will remain geographically diverse and multifaceted.

Foreign countries and regions with an established ISIS presence (as of June 2017)



- ISIS has established core territory
- ISIS has established a branch designated as a foreign terrorist organization by the Department of State

Sources: GAO analysis of Department of State data; Map Resources (map).



WHAT ARE THE IMPLICATIONS?



New threats will affect how U.S. agencies and the military are organized and equipped to respond to them.



Protecting U.S. cyber assets complicates national security and defense planning.



Rebalancing, rebuilding, and recapitalizing the U.S. military and its assets will take leadership, time, planning, and money.



EVOLVING GLOBAL POLITICAL AND TECHNOLOGICAL CONDITIONS AND THE COMPLEX CHALLENGES THEY POSE FOR U.S. AND GLOBAL SECURITY

WHAT DO WE KNOW?

- ♦ The global landscape of potential threats and instability continues to evolve. Russia uses confrontational means to pursue its interests. North Korea and Iran pursue destabilizing policies that pose global threats. China pursues regional expansion that increases tensions, while also seeking international partnerships in such areas as peacekeeping and infrastructure construction.
- ♦ Terrorists, violent extremist groups, and transnational criminal organizations continue to subvert the international order and threaten global stability.
- ♦ Nuclear proliferation risks threaten nonproliferation regimes and threat-reduction efforts.
- ♦ Cyber threats are increasing the damaging reach and potential impact of nation-states, terrorist groups, and transnational criminal organizations.
- ♦ Advances in technology in areas such as artificial intelligence (AI), synthetic biology, and genome editing may result in new and disruptive threats.
- ♦ Various nations' international views and activities are changing.

KEY UNCERTAINTIES

- ♦ It is unclear how aggressively Russia, North Korea, and Iran will attempt to expand their reach and influence. The United States and like-minded nations might be unsuccessful in countering or influencing disruptive actions of nations such as Iran and North Korea.
- ♦ China's regional goals—and its assessment of possible actions by the United States and neighboring nations—may lead it to push more rapidly to achieve those goals.
- ♦ Violent extremist groups may converge or expand as polarization and social, economic, and other pressures influence greater numbers of people.
- ♦ While there is a potential for agreement on cyber norms of international conduct, a major cyberattack could prompt a violent response from a nation.

WHERE ARE WE?

Three decades after the end of the Cold War, the United States finds itself in an increasingly volatile world where the lines between traditional conflict, terrorism, and the use of unconventional means and weapons (such as cyberattacks) are blurred. This poses a significant threat to the United States and its allies.

The U.S. Intelligence Community and the National Intelligence Council highlight many global risks and their potential effects.¹ They stress that major world powers increasingly do not share common interests. Russia's aggressiveness is demonstrated by its annexation of Crimea, military intervention in Ukraine

¹The U.S. Intelligence Community is a group of 16 federal agencies that collect and analyze intelligence to support U.S. foreign relations and national security. The National Intelligence Council is drawn from government, academia, and the private sector and serves as a bridge between the intelligence and policy communities and as a source of expertise on regional and functional issues.

and Syria, use of offensive cyberspace weapons and influence, and development of a cruise missile in contravention to existing treaties. China continues to press territorial claims reinforced by military expansion in the South China Sea and has conducted offensive cyber operations against other nations. In other areas, however, China has been a global partner in such areas as peacekeeping and infrastructure construction in Asia.

There is increasing concern about the United States' global role and that the "rules-based" international order that emerged after the Second World War is eroding. Experts assess that Iran and North Korea both use terrorism, weapons of mass destruction, and cyberattacks to threaten regional and global order. The Department of State notes that Iran continues to be the foremost state sponsor of terrorism. As Iran adheres to the Joint Comprehensive Plan of Action, concerns remain about its development of missile technology and whether it may decide to build nuclear weapons in the future.²

Meanwhile, North Korea continues its nuclear weapons program. Iranian and North Korean efforts on nuclear weapons and other weapons of mass destruction (such as biological agents) may lead other nations to obtain similar weapons. Despite significant progress in securing nuclear and radiological materials, they remain widely dispersed and vulnerable to theft, diversion, and smuggling. The expansion of nuclear power could aggravate these risks and put further strain on international regimes and organizations that exist to ensure safe, secure, and peaceful uses of the atom.

The U.S. Intelligence Community's Worldwide Threat Assessment states that the global threat from terrorism will remain geographically diverse and multifaceted. The primary threat remains in the Middle East, Africa, and South Asia, though some groups will attempt attacks outside of these areas.

The Intelligence Community cites home-grown violent extremists as the most critical and unpredictable terror threat in the United States. Increasing pressures from refugees from regional conflicts, volatile economic conditions, and other disruptions will fuel the rise of violent extremist groups. The rise of social media, like all information-age technologies, has positive and negative influences. Social media's use as a mass communication tool or even as a weapon further exacerbates violent extremism.

The rise of social media, like all information-age technologies, has positive and negative influences. Social media's use as a mass communication tool or even as a weapon further exacerbates violent extremism.

Cyber threats are already challenging public trust in global institutions, governance, and international norms, most notably in the Russian effort to influence the 2016 U.S. presidential election and undermine faith in U.S. institutions. Cyberattacks also impose significant costs on the U.S. and global economies. As the use of personal electronic devices expands and Internet technologies become more integrated with critical infrastructure, cyber threats pose an increasing risk to national security, economic well-being, and public health and safety.

Rapid developments in AI and "big data" will make the threat landscape even more complex. Using cyber capabilities for espionage is considered by some to

²The Joint Comprehensive Plan of Action is an agreement, signed in July 2015, in which the United States, France, Germany, the United Kingdom, Russia, and China, with the High Representative of the European Union for Foreign Affairs and Security Policy, agreed to reciprocal commitments with Iran to provide sanctions relief if Iran implements commitments to curtail its nuclear program.

be an expected activity among nations; however, the use of offensive cyber operations to degrade or otherwise attack information or other systems could be far more destabilizing. Some state and nonstate actors will view offensive cyber capabilities as a tool to counter the military advantage of the United States and its allies.

IMPLICATIONS

Preserving the international order and securing U.S. interests globally will be increasingly difficult. This undertaking will involve the full and coordinated efforts of U.S. diplomatic and national security organizations. The importance of multilateral and binational treaties will continue, as will planning for the consequences of terminating those agreements.

The nature of some threats, such as terrorism and cyberattacks, confounds traditional definitions of overseas or homeland attacks. This trend will continue to have implications for how U.S. agencies are organized and authorized to detect and respond to threats and how they collaborate to achieve success. Doing so in the face of fiscal constraints will be among the top challenges for national leaders. How to plan for and conduct diplomatic activities throughout the world, while ensuring the security of U.S. citizens abroad in dangerous areas in the new environment, will be a complex organizational, planning, and fiscal challenge.

For the U.S. military, global security challenges will present a difficult set of trade-offs and choices. There is a fundamental stress between the need to conduct decades-long counterinsurgency operations and prepare and maintain readiness for the full range of contingencies and military operations. Rebalancing, rebuilding, and recapitalizing the U.S. military will take leadership, time, planning, and money. These factors compound existing and future challenges in

addressing weapon systems acquisition, contracting for key services, and human capital management. All of these are priorities and will occur at a time when U.S. forces will be engaged in operations overseas.

In addition, large portions of the U.S. nuclear forces are at or beyond their service lives. Nuclear modernization programs are projected to require significant funding over the next decade and cost more than planned budget scenarios indicate. The Departments of Energy and Defense will be challenged in managing key modernization programs and may need to reevaluate the sustainability and fundamental makeup of nuclear modernization programs.

U.S. national security and defense planning is continually complicated by the need to build and secure cyber systems that support and facilitate all aspects of domestic critical infrastructure and military operations and capabilities. At the same time, U.S. homeland security, intelligence, and military planners will likely work to develop and adapt new offensive and defensive cyber operations. The lack of international norms for how cyberattacks should be treated exacerbates these challenges. Further, new assessments of national and international law and policy will be necessary to anticipate and counter the potential nefarious use of advanced technologies such as AI, synthetic biology, and genome editing.





FISCAL OUTLOOK AND THE DEBT



WHERE ARE WE?

The federal government is on a long-term unsustainable fiscal path.

76%

Debt held by the public was **76 percent** of gross domestic product (GDP) at the end of FY17.

45%

This compares to an average of **45 percent** of GDP since 1946.

Source: 2017 Financial Report and GAO analysis of OMB data.



Absent policy changes, the debt-to-GDP ratio is projected to

surpass its historical high

of

106 percent

within

14–22 years.

Source: GAO analysis of GAO, CBO, and the 2017 Financial Report data.

Note: These projections do not reflect the effects of any legislation enacted after September 30, 2017.

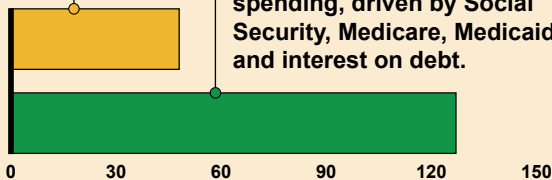


WHAT DO WE KNOW?

In FY17, the federal deficit increased to **\$666 billion**—up from \$587 billion in FY16.

Federal receipts grew **\$48 BILLION** due primarily to higher payroll and retirement receipts and individual income taxes.

But that was outweighed by a **\$127 BILLION** increase in spending, driven by Social Security, Medicare, Medicaid, and interest on debt.

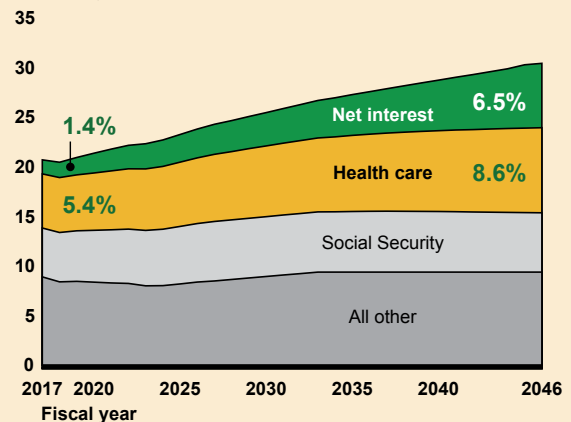


Dollars (in billions)

Source: 2017 Financial Report.

Federal spending on **health care programs** and **interest on debt** are the key drivers of long-term spending increases.

Percentage of GDP



Fiscal year

Source: GAO.

Note: GAO's simulations do not reflect the effects of any legislation enacted after September 30, 2017.



WHAT ARE THE IMPLICATIONS?

The large and growing federal debt will:



reduce national savings and income in the long term



increase the government's interest costs



limit lawmakers' ability to respond to unforeseen events



make a fiscal crisis more likely

The longer that action to address these **fiscal challenges** is delayed, the greater and more drastic the changes will have to be.

Source: CBO.



THE FEDERAL GOVERNMENT'S UNSUSTAINABLE LONG-TERM FISCAL PATH

WHAT DO WE KNOW?

- ◆ The federal deficit in fiscal year 2017 increased to \$666 billion—up from \$587 billion in fiscal year 2016 and \$439 billion in fiscal year 2015.
- ◆ In fiscal year 2017, federal receipts grew \$48 billion primarily due to higher payroll (social insurance) and retirement receipts and net individual income taxes. This revenue gain was outweighed by a \$127 billion increase in spending, driven by Social Security, Medicare, Medicaid, and interest on federal debt.
- ◆ Federal spending on health care programs and interest on debt held by the public are the key drivers of growing spending in the long term. Growth in federal spending on health care will be driven by increasing enrollment, in part stemming from the aging of the population, and health care spending per enrollee.
- ◆ Over the next decade, as many members of the baby boom generation age—and as life expectancy continues to generally increase—the number of people aged 65 or older is expected to rise by more than one-third. As of July 2017, the Medicare Trustees estimated that Medicare had about 59 million beneficiaries in 2017, and that number was projected to climb to 81 million in 2030.

KEY UNCERTAINTIES

- ◆ If Medicare cost containment provisions and other aspects of current law are not sustained over the long term, spending on federal health care programs may grow more rapidly than what is projected.
- ◆ The projected interest cost of financing the federal debt is also uncertain. In recent years, interest rates on Treasury securities have remained low, lowering interest costs. But the Congressional Budget Office (CBO) and others project interest rates will rise in the long term, increasing the interest costs on the debt. CBO's interest rate projections are also based on projections of underlying trends that are inherently uncertain.
- ◆ None of the long-term projections—GAO's, CBO's, or the ones in the *Fiscal Year 2017 Financial Report of the United States Government*—include certain other fiscal risks that could affect the federal government's financial condition in the future. These risks stem from crises, such as wars, natural disasters, and economic or financial crises to which the public expects a federal fiscal response.

WHERE ARE WE?

Long-term projections show that, absent a change in fiscal policy, the federal government is on an unsustainable fiscal path caused by a structural imbalance between revenue and spending. At the end of fiscal year 2017, debt held by the public was

76 percent of gross domestic product (GDP), up from an average of 45 percent of GDP since 1946. Absent policy changes, the debt-to-GDP ratio is projected to surpass its historical high of 106 percent within 14 to 22 years.

Medicare’s Hospital Insurance trust fund and Social Security’s Disability Insurance trust fund and Old-Age and Survivors Insurance trust fund face financial challenges that illustrate the importance of taking action to begin returning to a sustainable fiscal path.

The Medicare Trustees’ 2017 report projects that, with spending required by current law, as of 2029, Medicare’s Hospital Insurance trust fund will be depleted. That report also projects that revenues flowing into this trust fund in 2029 will cover only 88 percent of all hospital-related Medicare spending.

At the same time, Social Security is now paying out more in benefits than it receives in non-interest revenue. By 2028, the Disability Insurance trust fund will have only enough money on hand to pay 93 percent of benefits and, by 2035, the Old-Age and Survivors Insurance trust fund will cover only three out of four dollars of scheduled benefits.

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- ♦ limit lawmakers’ ability to respond to unforeseen events; and
- ♦ make a fiscal crisis more likely.

The longer that action to address these fiscal challenges is delayed, the greater and more drastic the actions will have to be.

Executive branch agencies and the Congress will need to take action to address the nation’s unsustainable fiscal path. It is important that executive branch agencies act as stewards of federal resources. Changes in spending and revenue to ensure long-term fiscal sustainability require legislative actions to alter fiscal policies.

The Congress will need to discuss the entire range of federal activities and spending—entitlement programs, other mandatory spending, discretionary spending—as well as revenue. Having a broader fiscal plan to put the federal government on a more sustainable long-term path would help with these tough decisions.

In taking action to change the federal government’s long-term fiscal path, it is important to recognize that as currently structured, the debt limit—a legal limit on the amount of federal debt that can be outstanding at one time—does not restrict the Congress and the President’s ability to enact spending and revenue legislation that affects the level of debt, nor does the debt limit otherwise constrain fiscal policy.

The debt limit is an after-the-fact measure: the spending and tax laws that result in debt have already

IMPLICATIONS

The economy faces negative long-term consequences as amounts of federal debt held by the public grow over the coming decades. This large and growing debt would also constrain future budget policy.

In particular, according to CBO, the projected amounts of debt would

- ♦ reduce national saving and income in the long term;
- ♦ increase the government’s interest costs, thereby putting more pressure on the rest of the budget;

been enacted. In other words, the debt limit restricts the Department of the Treasury's authority to borrow to finance the decisions already enacted by the Congress and the President. GAO has suggested that the Congress consider alternative approaches that would better link decisions about borrowing to finance the debt with decisions about spending and revenue at the time those decisions are made.





ECONOMICS AND TRADE



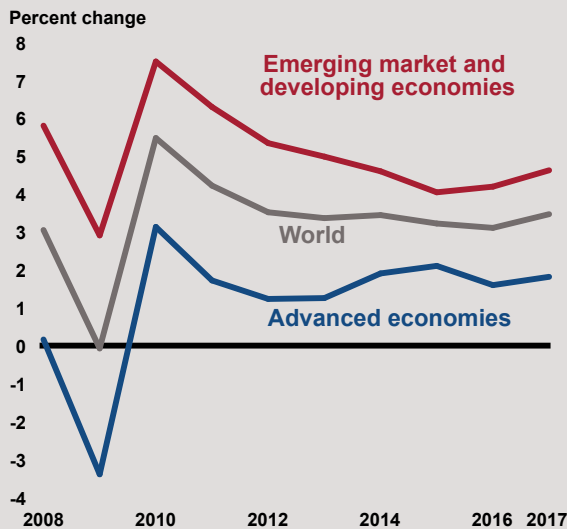
WHERE ARE WE?

National and global economies have experienced divergent growth since the financial crisis.



WHAT DO WE KNOW?

Economies Have Experienced Divergent Growth since the Financial Crisis, with Faster Growth in Emerging Markets



Source: International Monetary Fund.



Fiscal and monetary measures during the crisis left many countries with higher debt and lower interest rates.



Global economic growth has improved, especially in emerging markets.



International trade and technology have transformed the nature of work and consumption across the globe.



U.S. growth outpaced Europe and Japan, but with gains for only a portion of the population.



Key international trade agreements such as NAFTA haven't been updated in 25 years.



Domestic policies have not consistently or effectively addressed the needs of those adversely impacted by globalization and technological change.



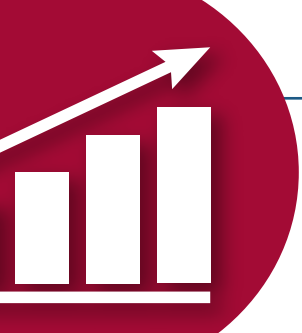
WHAT ARE THE IMPLICATIONS?



Many outcomes are possible as the choices and priorities of governments and institutions lead the global community to pursue collaborative, inclusive growth while accounting for nationalistic interests.



Opportunities to reinforce international cooperation lie in finding areas of common interest and addressing the consequences of globalization and technological change.



GLOBAL RESPONSES TO CHALLENGES POSED BY DIVERGENT ECONOMIC GROWTH

WHAT DO WE KNOW?

- ◆ International trade and technology have transformed the nature of work and consumption across the globe, increasing income, opportunity, and information for many. These transformations, however, also have distributional consequences and create challenges for some.
- ◆ Domestic policies have not consistently or effectively addressed the needs of those adversely affected by globalization and technological change.
- ◆ Efforts to update key international trade agreements, such as those from the World Trade Organization and North American Free Trade Agreement (NAFTA), which have not been significantly changed in 25 years, are underway.
- ◆ Despite the slowdown in world trade, national economies remain highly interdependent, which means domestic policy choices will have international implications.
- ◆ Despite the development of new technologies, some measures suggest productivity and innovation are slowing.
- ◆ As economic growth has continued, some cyclical economic and financial risks are also growing.

KEY UNCERTAINTIES

- ◆ It is not clear when and how growing cyclical economic and financial risks will coalesce.
- ◆ Questions surround the extent to which countries will have the capacity to respond effectively when cyclical risks emerge, as well as the willingness of those countries to coordinate responses internationally.
- ◆ It is difficult to anticipate how countries will respond to pressure to implement protectionist policies to address domestic distributional concerns.
- ◆ There is uncertainty about the extent to which existing trade agreements will be enforced or amended.
- ◆ It is not fully known how countries will respond to persistent and growing challenges and opportunities from new technologies.
- ◆ There is the question of whether a more inward-looking world will threaten growth opportunities in developed and developing countries.

WHERE ARE WE?

The United States and the global economy continue to work through the vestiges of the most severe economic crisis in decades. During the 2007–2009 financial crisis, countries around the globe undertook extraordinary monetary and fiscal measures, leaving many countries with a legacy of higher debt and lower interest rates.

Global economic growth has improved since the crisis, but it remains slow in parts of the developed

and developing world. Growth in emerging markets has generally been more robust, further increasing the economic weight of developing countries, especially China, in the global economy.

Growth in the United States, while outpacing that of peers in Europe and Japan, has yielded substantial increases in wealth and opportunity for only a small share of the population, despite low unemployment.

Lagging growth and opportunity have caused many to reconsider governments' roles in managing globalization and technology and have increased the appeal of populist and nationalist political movements. National governments—on their own and through international forums—will face a series of hard choices, under difficult circumstances, to manage current and emerging economic challenges.

On the other hand, opportunities to reinforce international cooperation could lie in finding areas of common interest, sharing honest assessments of the distributional consequences of globalization, and responding to the impacts of rapid technological change. With effective international coordination, potentially disruptive events could be more easily absorbed and trade wars avoided.

IMPLICATIONS

The world faces a range of possible outcomes as it stands at the precipice of balancing potentially more nationalistic interests with global economic growth. Populist policies and growing inequality could lead to political and social instability across regions and ineffective, uncoordinated policies that are less equipped to revive economic growth. In this fragile state where monetary and fiscal policy space is more limited by the legacy of the financial crisis, economic shocks could affect the world's economic growth.

Domestically focused policies may benefit some industries but could reinforce economic nationalism, prompting trade wars of varying intensity. Further, such policies may not effectively address the distributional and growth concerns that encouraged the retreat from global economic engagement in the first place.

In addition, less global cooperation could make it more difficult to address high-probability, high-impact events that require international coordination and collaboration, such as terrorism, cyber attacks, sovereign debt crises, and large-scale involuntary migration. Short-term agendas of divided nations could also serve as barriers to international efforts to help solve important global security, economic, and social problems, including those outlined in the United Nations' Sustainable Development Goals.

The global community could commit to policies and behaviors that foster equitable and inclusive growth. Such commitments could mark an emphasis on a multipolar, integrated world where domestic policies are employed to address unintended distributional consequences of an open economy.

Instead of following paths that either fully embrace isolation or fully pursue global cooperation, major global economies could choose varying policy paths— with a range of openness and inclusion—or fluctuate between more inclusive, cooperative time periods and periods of growing inequality or isolation. For example, more inward-looking nations might prioritize domestic agendas and successfully recalibrate policies to deal with the legacies of the financial crisis, growing inequality, and societal polarization—important issues that drive antiglobalization policies.

Instead of following paths that either fully embrace isolation or fully pursue global cooperation, major global economies could choose varying policy paths.

World trade and capital flows may shrink moderately at first, disrupting world growth. Once domestic goals were achieved and the economic drivers of anti-establishment populism were addressed, nations could reengage international partners in a manner more conducive to inclusive domestic and global growth.

Alternatively, nations might not heed the lessons and unintended consequences of globalization and rapid technological change—including falling incomes and

long-term unemployment covering increasingly large segments of society—which could foster greater dissatisfaction with the economic and political status quo.

How the global community pursues collaborative, inclusive growth while balancing nationalistic interests will depend on the choices and priorities of national governments and international institutions, as well as whether new policies to manage current economic challenges are put in place in time to respond to the inevitable realization of future economic risks.





JOBS AND EDUCATION



WHERE ARE WE?

Technological advances could change work, beyond any past experience.

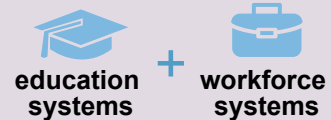
New technologies affect:

- ☑ types of jobs that are available
- ☑ specific job skills required

Accelerated innovation may lead to



These changes are straining



WHAT DO WE KNOW?



38 percent of employers report difficulty recruiting employees, due to candidates' lack of technical skills.



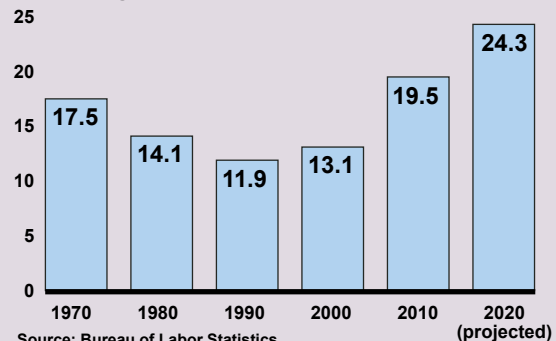
U.S. students lag behind their peers in **science** and **math**.



Many jobs require specialized **training**.

Workers aged 55+ are expected to comprise **24.3 percent** of the workforce by 2020.

Percentage of U.S. labor force



WHAT ARE THE IMPLICATIONS?



Closer alignment between education and workforce systems could:

- ☑ better prepare workers for the future
- ☑ use financial resources efficiently



Uncertainty about the impact of technological changes could:

- ☑ slow implementation of new technology
- ☑ drive some companies to relocate their operations to other countries as a result



Failure to develop effective retraining efforts could result in:

- ☑ challenges for special populations facing barriers to employment, such as older workers
- ☑ increased division in income and employment opportunities



PREPARING THE WORKFORCE OF THE FUTURE

WHAT DO WE KNOW?

- ◆ A recent survey found that 38 percent of human resource professionals report difficulty recruiting employees for full-time positions due to factors such as candidates' lack of technical skills.
- ◆ U.S. students lag behind their peers in other Organisation for Economic Co-operation and Development (OECD) nations in the areas of science and math, and sizable numbers of youths graduate unprepared for college or the workforce, or they drop out of school altogether.
- ◆ Projections from a Georgetown University study indicated that at least 65 percent of future jobs would require at least some postsecondary education. Yet, while the fraction of Americans achieving degrees has risen according to Census data, U.S. achievement in higher education lags that of several other OECD nations, college tuition rates have risen over the last decade, and student loan debt has risen as well. Among students who began repaying their loans in fiscal year 2014, about 11 percent had defaulted on their loans by the end of fiscal year 2016.
- ◆ One study cited by the National Intelligence Council projects that automation and AI could replace 45 percent of the activities that people are now paid to perform, including those performed by relatively highly paid workers.
- ◆ At the same time, the composition of the workforce is changing. For example, according to the Bureau of Labor Statistics (BLS), workforce participation among those aged 65 and older—19.3 percent in 2016—is projected to rise to 21.8 percent in 2026 (including about 37 percent among individuals 65-69 years old). In that same year, BLS estimates that 24.8 percent of the workforce will be composed of workers age 55 and older.
- ◆ Excluding unemployment, participation in the civilian workforce is shrinking. According to BLS, in 2016 about 7 million men and 16 million women aged 25-54 years old were not in the workforce.

KEY UNCERTAINTIES

- ◆ The impact that data and analytics innovation and other technological changes will have on job tasks is not fully known, nor is the extent of mismatch between new skills requirements and current labor force characteristics. The future balance between job creation and job loss is difficult to predict.
- ◆ The pace at which displacements may occur and the extent of new technologies' effects on worker productivity are not clear.
- ◆ It is not known whether the rapidly evolving nature of technology will allow time to fill knowledge gaps and develop and implement new types of education and training to keep pace with the technological advances.
- ◆ There may be unique challenges associated with some special populations, such as older workers experiencing long-term unemployment, adults not participating in the labor force, students in high-minority and high-poverty schools, individuals with disabilities, and veterans.
- ◆ There is uncertainty surrounding whether fears of widespread displacement may lead to calls for slowing the use of new technology in order to protect jobs, and could in turn prompt some companies to relocate operations to other countries.

WHERE ARE WE?

Advances in information and communication technology, AI, and robotics have the potential to accelerate changes in work beyond any past experience. Historically, technological changes that at first diminished employment have later boosted employment and living standards by enabling new industries and sectors to emerge, creating more and better jobs than the ones displaced. New technologies would affect the types of jobs that are available and the specific job skills required. As accelerated innovation potentially leads to job creation as well as job loss, those with the requisite skills are likely to be in high demand, and those without such skills may have difficulty finding and sustaining employment.

Some experts worry that the accelerated pace of change is straining the education and workforce systems' capacity to adapt, leaving societies struggling to find workers with relevant knowledge, skills, and training. Jobs with specialized skills may require extended schooling, leading to higher rates of employment and wages among those who attain the necessary degrees or credentials.

However, recent evidence shows that students—especially students of color—are graduating from high school less prepared to face the demands of a college education than in past years. Rapid adaptation of the K-12 curriculum to new skill demands will require, among other approaches, effective teacher training—an area in which the federal investment has been significant but results have been largely unknown.

Increasingly sophisticated work may exert pressure on primary and secondary education systems to help more students achieve the higher levels of education and training necessary for skilled work. This development

may call for both broadly applicable skills (such as creativity and critical thinking) as well as more-focused skill sets. The accelerated pace of change may also place increasing pressure on postsecondary schools to develop short, targeted educational paths and certifications. Fiscal constraints will make it increasingly important for students, employers, and policymakers to understand the effectiveness of new and existing training and educational programs.

IMPLICATIONS

The accelerated pace of technological advances suggests the need for closer alignment between education and workforce systems, thereby fully leveraging the role of each in preparing workers for the future world of work. Bridging the gap between the accelerated complexity of work and lack of preparedness among some high school graduates signals an opportunity to better integrate traditional education and workforce training systems. For example, students could pursue an industry-recognized credential through a pathway that is faster and less expensive than traditional college and extends the opportunity to master key skills. These types of credentials would be portable from one employer to the next.

Closer alignment and coordination between the education and workforce training systems can also help make more efficient use of limited financial resources in an increasingly constrained fiscal environment. The Workforce Investment Opportunity Act, which requires closer collaboration between federal education and workforce programs and their state and local-level partners, holds promise.

It is uncertain what net impact technological changes will have on employment, from vehicle drivers

Some experts worry that the accelerated pace of change is straining the education and workforce systems' capacity to adapt, leaving societies struggling to find workers with relevant knowledge, skills, and training.

and assembly-line workers to relatively highly paid individuals like financial managers, physicians, and senior executives. If future technological developments dampen job opportunities in the United States or those opportunities are available only to the most-skilled workers, a new kind of digital divide could be created—one that applies to work and income opportunities.

In addition, employers may require that many lower- and middle-wage workers engage in retraining to develop new skills. Federal, state, and local governments can serve an important role in incentivizing employers to offer retraining by providing them with funding and other incentives. However, special populations facing barriers to employment—for example, older workers experiencing long-term unemployment—could face challenges without the development of successful retraining efforts.





DEMOGRAPHICS AND SOCIETY



WHERE ARE WE?

Demographics are shifting in ways that affect U.S. society and the economy.



WHAT DO WE KNOW?

Population

54%

Between 1970 and 2013, the U.S. population grew 54%.

26%

Between 2013 and 2050, the U.S. population is expected to grow about 26% (while the world population is expected to grow about 33%).

33%

Sources: U.S. Census and United Nations.

Longevity

The U.S. population is aging.



In 2018, an average of about 10,200 people will turn 65 each day.

<10% → ~20%

The percentage of U.S. adults over age 65 was less than 10% in 1970

but is expected to be about 20% by 2030.

Sources: U.S. Census and Social Security Administration.

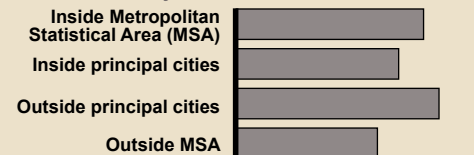
Diversity and income inequality

U.S. society has become increasingly diverse, but median incomes vary by demographics.

Median income by race



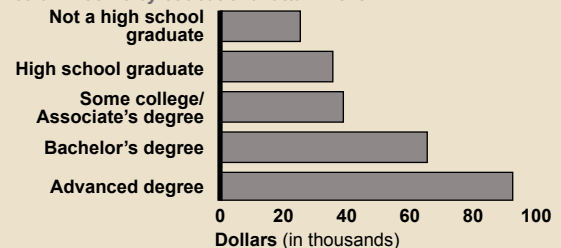
Median income by urban/rural



Median income by gender



Median income by educational attainment



Source: U.S. Census Bureau, Current Population Survey, 2015 and 2016 Annual Social and Economic Supplements.



WHAT ARE THE IMPLICATIONS?

These trends affect the nation's future economic performance and the basic fabric of society. They will pose challenges to:

- federal programs such as **Social Security** and **Medicare**
 - public policies in areas such as **health care**, **education**, and **income support**
- with major effects on government budgets at all levels: federal, state, and local.



CHANGES IN PEOPLE AND SOCIETY

WHAT DO WE KNOW?

- ◆ From 1970 through 2013, the U.S. population grew 54 percent. From 2013 through 2050, however, it is expected to grow by less than half that amount—about 26 percent.
- ◆ Worldwide, population growth is also beginning to slow, though it is projected to grow at a faster rate than in the United States—about 33 percent—with the world population growing from about 7.2 billion in 2013 to more than 9.6 billion by 2050, according to United Nations (UN) projections.
- ◆ According to the U.S. Census Bureau, immigration is projected to overtake births as the major driver of future U.S. population growth.
 - In 2016, foreign-born workers comprised 16.9 percent of the U.S. labor force, up from 13.3 percent in 2000, according to BLS.
- ◆ As in most other developed countries, the role of births in U.S. population growth has decreased as household composition has changed and women's educational attainment has increased (women with more education tend to have fewer children and to wait longer before having children).
- ◆ The proportion of older adults in the United States is rising and will continue to grow significantly in the future.
 - In 1970, those aged 65 and over accounted for about 9.7 percent of the population. By 2030, however, they are expected to account for about 20 percent, reflecting long-term decreases in birth rates and increases in life expectancy, as well as the aging of the baby boom generation.
- ◆ The first baby boomers began receiving Social Security retirement benefits in 2008, and growing numbers will become eligible for Social Security in coming years.
 - In 2018, an average of about 10,200 individuals in the United States will turn 65 years old each day.
- ◆ Rising living standards have led to considerable increases in longevity in the United States and many other countries have experienced similar increases in longevity.
 - Among those age 65 in 1950, men could expect to live an additional 17.62 years, to age 82, and women could expect to live an additional 20.27 years, to age 85. But in 2010, men's average life expectancy at age 65 had been extended by an additional 3.29 years, to age 85, and women's average life expectancy at age 65 by an additional 3.16 years, to age 88.
- ◆ U.S. society has become increasingly diverse.
 - Since the 1970's, the nation's foreign-born population has been growing, both in number and as a share of the total population, with the majority of immigrants coming from Latin America and Asia.
 - The U.S. Census Bureau projects that by 2050, Hispanics will comprise nearly one-third of the population.
- ◆ Income inequality in the United States has intensified over the last few decades, with incomes increasingly concentrated among top earners, according to the Federal Reserve.

- ◆ Census data indicate that there are significant racial, gender, education, and urbanicity dimensions to this growing income inequality.

- Median incomes vary widely based on race and ethnicity.
- There is also increased income disparity on the basis of educational attainment.
- In terms of gender, the gap in earnings persists: the unadjusted female-to-male earnings ratio was 0.81 in 2016, and according to Census, has not experienced an annual increase since 2007.
- Those living in the suburbs (inside a metropolitan statistical area, but outside the principal city) have substantially higher median incomes compared with those living in rural areas.

- ◆ Understanding the various dimensions of income inequality will be important to reducing poverty and improving the living standards of middle-income families moving forward.

- ◆ In recent years, significant disparities in life expectancy have emerged.

- Increases in longevity have been enjoyed disproportionately by those with higher income, higher levels of education, and in urban and suburban areas. At the same time, segments of the population with lower income or less education, or who live in rural areas, have seen little or no improvement, and some have even seen decreases in life expectancy.
- There have been similar differences in health status and labor force participation.

- ◆ The magnitude of longevity increases and their varying effects on particular populations are not clearly understood.

- ◆ There are uncertainties associated with the sources of rising income inequality and identifying policies to address them.

WHERE ARE WE?

Significant demographic shifts are under way, and they will affect society and the economy both domestically and around the world. These trends will have important implications for our nation’s future economic performance and the basic fabric of American society.

These trends will also pose challenges to federal programs such as Social Security and

Medicare, and public policies in areas such as health care, education, and income support—all with major impacts on the federal budget.

As the population ages, more resources will be needed for older Americans in terms of health care, housing, transportation, and other services.

IMPLICATIONS

Declining birthrates, shifting immigration patterns, and an aging population all pose important challenges for the nation. As in much of the advanced industrialized world, a decreasing birth rate has affected population growth. As birth rates have fallen, immigration to the United States has helped lessen the impact of this trend on economic growth, and debate over national immigration policy will have consequences for future economic performance and federal programs.

Further, increasing life expectancy leads not only to people living longer but also to spending more years in retirement. All of these trends are contributing to Social Security’s financing problem, as more years in retirement will increase Social Security benefit

KEY UNCERTAINTIES

- ◆ The key sources of population growth in the future are unknown.

outlays, and a declining dependency rate leads to fewer workers supporting a growing number of Social Security beneficiaries.

An aging population will also have effects beyond retirement security. As the population ages, more resources will be needed for older Americans in terms of health care, housing, transportation, and other services. Meanwhile, efforts to ensure an educated and well-trained labor force may compete for resources as well. In this scenario, strengthening Social Security and providing adequate protection for vulnerable populations, such as low income individuals, older women, and minorities, will be important.





SCIENCE AND TECHNOLOGY



WHERE ARE WE?

Five emerging technologies will potentially transform society.

1. Genome Editing



Genome editing: A technique used to make specific and intentional additions, deletions, or alterations to genetic material. It could:

- prevent, treat, or cure medical conditions
- create unintended and unforeseen genetic changes in the population

2. Artificial Intelligence and Automation



Artificial intelligence (AI) could:

- produce smarter machines that perform more sophisticated tasks
- disrupt the job market by eliminating jobs and creating others with new skill requirements



While its use is expected to grow, AI that is as intelligent as a human is not expected to occur in the next 20 years.

3. Quantum Information Science



Quantum information science: uses the behavior of atoms or molecules to obtain and process information in ways that existing systems cannot. It could:

- drastically improve information acquisition, processing, and transmission

4. Brain/Augmented Reality



Brain-computer interfaces: systems that connect the human brain to an external device. Research is ongoing to create implantable versions that could, for example, compensate for vision loss or hearing impairment.



Augmented reality: superimposing a digital image onto a view of the real world through a device, such as a smartphone camera. It is a new trend in entertainment, education, and health care.

5. Cryptocurrencies and Blockchain



Cryptocurrencies: virtual currencies—digital representations of value that are not government-issued—that operate online and verify transactions using a public ledger called **blockchain**.

Cryptocurrencies offer:

- benefits such as anonymity and lower transaction costs
- drawbacks such as making it harder to detect money laundering and other financial crimes

Blockchain could:

- reshape financial services
- have more security vulnerabilities as quantum computing, an area of quantum information science, develops



WHAT ARE THE IMPLICATIONS?

Continued **debate, study, and evaluation** are needed in the public sector to consider the potential implications:



economic



ethical



privacy



safety



security



societal



HARNESSING THE POTENTIAL OF SCIENCE AND TECHNOLOGY TO ADVANCE THE ECONOMIC, SOCIAL, AND ENVIRONMENTAL WELL-BEING OF THE UNITED STATES

WHAT DO WE KNOW?

- ◆ Science and technology advances are key to economic, social, and environmental well-being.
- ◆ The traditional models of federal and nonfederal research and development (R&D) support that have existed since World War II are changing and face increased scrutiny.
- ◆ Since the 1950s, federal R&D funding was characterized by sustained growth, reaching a height of about \$147 billion in fiscal year 2010. However, since fiscal year 2010, the level of federal R&D funding has become more variable on an annual basis.
- ◆ Other countries and regions are significantly increasing their investment in R&D. Overall global R&D spending has been growing rapidly since 2000.
- ◆ Much of this growth, however, is occurring outside the United States. China has invested heavily in R&D in recent years, and some have projected that China's R&D spending could surpass U.S. spending by the early-to-mid 2020s. Other countries, such as South Korea, have also significantly increased their R&D spending overall.
- ◆ Recognizing the contribution of highly skilled workers to the economy, many countries have changed their laws to make it easier for such workers—who are increasingly mobile—to immigrate.
- ◆ Science and technology advances demonstrate the potential for concurrent, possibly disruptive

technological revolutions. Key areas include

- genome editing,
- AI and automation,
- quantum information science,
- brain-computer interfaces and augmented reality, and
- blockchain and cryptocurrencies.

- ◆ Science and technology advances can raise complex ethical and regulatory issues. For example, advances in genome editing raise the potential for improvements in human health by preventing, treating, or curing medical conditions or diseases, among other potential benefits. However, genome-editing advances could also create unintended and unforeseen genetic changes in the population or provide a way for people to enhance their genome, such as by enhancing mental capacity or physical strength.

Advances in AI and robotics systems will result in smarter machines that can perform more sophisticated tasks, potentially resulting in the automation of tasks and changing the job market in some fields.

- ◆ Advances in AI and robotics systems will result in smarter machines that can perform more sophisticated tasks, potentially resulting in the automation of tasks and changing the job market in some fields. In turn, such changes could have potentially disruptive social impacts and create the need for workers with drastically different job skills, which would cause worker shortages.
- ◆ Quantum information science has the potential to drastically improve information acquisition, processing, and transmission by using the behavior

of individual atoms or molecules to obtain and process information in ways that existing systems cannot. Both China and the European Union have announced significant research programs focused on quantum computing.

- ◆ Research is ongoing to create implantable brain-computer interface systems that would be able to provide precision communication between the brain and the digital world. Such research could lead to new medical therapies that could compensate for vision loss or hearing impairment. However, augmented reality and other brain-computer interface technologies could raise concerns about irreversible changes to the brain and how such technologies could be used; for example, protection of privacy of thought could be a concern with future devices.
- ◆ Virtual currencies and the blockchain technology used to transact them have grown in popularity in recent years as they present an alternative to traditional currencies issued by governments and allow for a secure method of conducting digital asset transfers in near real time. Such services could reshape financial services or affect the security of critical financial infrastructures.

KEY UNCERTAINTIES

- ◆ The U.S. government and the public at large have not yet resolved ethical considerations and other risks posed by technological advances like genome editing and brain-computer interfaces. How these issues are resolved and, in particular, how government agencies incorporate regulation as a component of attempts to address these issues could affect the development of these technologies.
- ◆ While applications for specialized AI are expected to grow, AI that exhibits broadly applicable intelligence comparable to that of a human is not expected to occur in the next 20 years.
- ◆ Current quantum computers are developmental, have limited uses, are less powerful than the world's

most powerful supercomputers, and continue to face considerable technical challenges operating reliably at scale. While technological advances have the potential to greatly increase efficiency for industry, they may also disrupt the job market. Uncertainty in how technologies will develop creates challenges to predicting, preparing for, and ultimately harnessing their impacts.

- ◆ Increased reliance on virtual currencies like Bitcoin could have myriad unforeseen impacts on government operations and taxation in support of public services.
- ◆ Disagreements exist about the sufficiency of the current supply of STEM workers in the United States. Some have concluded that the United States has a sufficient supply of STEM workers; others have found that the education system is not producing enough STEM graduates to fill the jobs available in STEM occupations.

WHERE ARE WE?

Advances in science and technology play an increasingly important role in our society as they can profoundly affect economic growth as well as the social and environmental well-being of the United States. Although science and technology advances will remain central to the prevailing issues of our day—including economic competitiveness, improved medical care and the prevention of disease, and information security—the ability of the United States to lead these advances is increasingly challenged.

In part, these challenges arise from growing constraints on the federal budget—a major source of R&D support. Federal spending constraints raise questions about whether the United States will be able to sustain its current level of science and technology investment and whether the United States will be in a position to drive the science and technology advances of the future. U.S. leadership in science and technology is also challenged by international competitors as other

countries increasingly invest significant resources in an attempt to capture the benefits of future advances.

IMPLICATIONS

The extent to which the United States is able to focus R&D investment in key technology areas will be a key factor in U.S. competitiveness in the global economy. In turn, U.S. competitiveness in the global economy will determine the extent to which the U.S. economy will benefit from the potential future growth associated with emerging technology areas.

In an environment of increasingly constrained resources, particularly at the federal level, investing in R&D efforts in a strategic and coordinated way will be critical. Understanding the implications of emerging technology areas for the U.S. economy and society as well as federal policymaking is a necessary step for the Congress and federal agencies to be able take strategic action.

It will also be important to assess how well federal R&D activities achieve their desired results, protect intellectual property, and translate scientific advances into technology innovations.

Without sustained attention to evaluating the effectiveness of U.S. R&D investments, it will be difficult for the federal government to maximize the use of its constrained resources, which could then increase the risk that the United States will not be able to harness the potential of future science and technology advances.





GOVERNMENT AND GOVERNANCE



WHERE ARE WE?

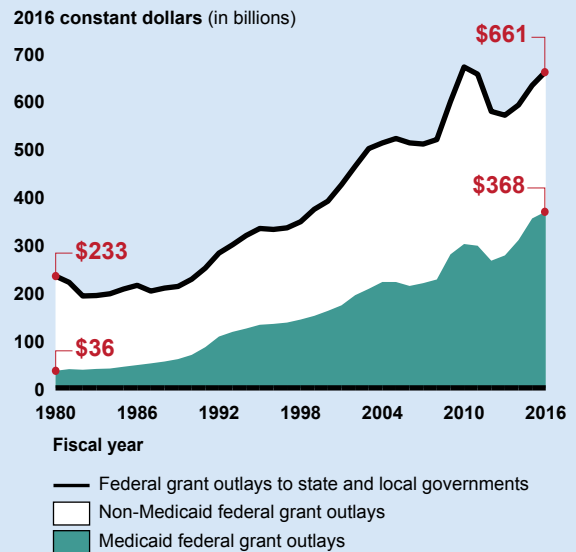
The world is changing, and the government will need to develop new approaches and partnerships to get things done.



WHAT DO WE KNOW?

- ✓ The federal government increasingly relies on third parties to get its work done.
- ✓ The government does not always have the right people, tools, and data in place to manage these partnerships.
- ✓ Requirements for far-reaching programs, such as health care and transportation infrastructure, are constantly evolving.
- ✓ As technology and the workforce change, the government struggles to keep up.
- ✓ Public confidence in the federal government is at historic lows.
- ✓ Initiatives such as the DATA Act and Performance.gov promise transparent information on federal spending and performance but face challenges in implementation.

Total Federal Outlays for Grants to State and Local Governments, FY 1980–2016



WHAT ARE THE IMPLICATIONS?

Achieving national policy objectives in this interconnected environment will require



developing whole-of-government strategies



systematically managing risk



collaborating across boundaries and borders



building communication and civic engagement



THE RISKS, CHALLENGES, AND OPPORTUNITIES ASSOCIATED WITH INCREASINGLY COMPLEX GOVERNANCE RELATIONSHIPS AND PRACTICES

WHAT DO WE KNOW?

- ◆ The federal government works with state and local governments, as well as other partners, to achieve a wide range of policy goals, with substantial federal spending flowing through contracts and grants.

In fiscal year 2016, the federal government provided state and local governments nearly \$661 billion in federal grants, funding programs in health care, transportation, income security, education, job training, social services, community development, environmental protection, and other areas. In the last 10 years, grants to states for Medicaid have nearly doubled, and outlays for all other grants to state and local governments increased 22 percent.

In 2015, 10 percent of the nation's bridges were rated as structurally deficient, and bridge conditions may become more challenging to address as a growing proportion approach the end of their 50-year design life.

In March 2016, the Congressional Budget Office estimated that \$107 billion in additional funding would be required to maintain current spending levels plus inflation from 2021 through 2026.

- ◆ The state and local government sector continues to face fiscal pressures driven primarily by the growth in health-related costs. Although the sector's fiscal situation has recently improved as its tax receipts have slowly increased, absent policy changes, the sector could continue to face a gap between revenue and spending in the coming years. In the long term, GAO's model suggests a gradual increase in the sector's total tax revenues.

- ◆ The nation's surface transportation system—including highways, maritime ports, and rail systems—is under growing strain, and the cost to repair and upgrade the system to meet current and future demands is estimated in the hundreds of billions of dollars. The oldest portions of the Interstate Highway System are approaching 60 years of age.
- ◆ In 2015, 10 percent of the nation's bridges were rated as structurally deficient, and bridge conditions may become more challenging to address as a growing proportion approach the end of their 50-year design life. At the same time, traditional funding sources are eroding, and the federal government lacks a long-term sustainable strategy for funding surface transportation.

- ◆ Federal fiscal exposures cut across boundaries. U.S. territories and insular areas, which receive hundreds of millions of dollars in federal grants, face serious economic and fiscal challenges.
- ◆ Mission-critical skills gaps in the federal workforce pose a high risk to the nation. These gaps are in government-wide occupations, such as cybersecurity and acquisitions, as well as in agency-specific occupations, such as nurses at the Veterans Health Administration.
- ◆ The federal government has taken steps toward increased transparency, including publishing federal agencies' strategic plans, performance reports, and other important performance information on Performance.gov. Agencies are also making progress toward greater financial transparency.

For example, once fully implemented, the Digital Accountability and Transparency Act of 2014 (DATA Act) offers the promise of improving the usefulness, accuracy, and transparency of federal budget and spending information published on USA Spending.gov. However, agencies continue to face challenges that will affect the quality of their data.

which themselves are constrained and face serious fiscal challenges.

Further, changing technological and workforce needs pose challenges to federal agencies' efforts to effectively and efficiently achieve their missions, whether through direct provision of programs, oversight of implementation partners, or issuance of regulations.

Changes in technology and the media also affect the ways the federal government has traditionally assured transparency, accountability, and public reporting. Citizens' faith in the federal government is at historic lows, according to recent polls.

KEY UNCERTAINTIES

- ◆ Uncertainties are inherent to such a complex system of governance. They include shifting demographics, economic changes, the capacity—including fiscal capacity—of implementation partners, new and evolving risks, and technological innovation.
- ◆ Challenges to the nation's surface transportation system are amplified by shifting demographics, the need to transport goods and services in support of a growing economy, and rapid development of new technologies.
- ◆ Rapidly evolving vehicle technologies present new opportunities but also pose challenges to creating a statutory and regulatory framework that will allow people to use these technologies while addressing privacy and other concerns they raise. Climate change also poses risks to existing transportation assets.

IMPLICATIONS

These governance complexities could impede the federal government from cost-effectively serving the public and achieving results. It will be essential for government leaders to exercise foresight and strategic planning and to rethink the role of government, governmental missions, and programs.

Effective collaborations, networks, and partnerships across domestic and global boundaries will be vital to achieving national policy objectives. The federal government will also need to improve its capacity to anticipate crises and mitigate risk.

To do so, policymakers and program administrators must work across the government enterprise, using foresight, strategic planning, risk management, and performance measurement systems to better manage uncertainty, tailor policies, prioritize responses, and allocate scarce resources in the coming years.

Governments must continually identify high-risk areas that can create significant fiscal exposures or are vulnerable to fraud, waste, abuse, and mismanagement. Governments will also need

WHERE ARE WE?

The United States operates in an increasingly interconnected and complex world characterized by the largely free flow of capital, goods, services, people, and information, as well as intricate monetary, fiscal, and economic systems.

To implement policy initiatives and programs, the federal government increasingly relies on third parties, such as contractors, regulated entities, and grant recipients, including state and local governments,

to systematically integrate the identification and management of risk into their strategic and program planning.

To address these challenges, the federal government will need new technology infrastructure and a workforce with the knowledge and skills to effectively use those technologies.

To restore public confidence, the federal government must find new approaches to communicate and interact with an increasingly diverse citizenry, operate with greater efficiency, embrace innovation, and recruit and retain those with the skills and talent to help solve the complex problems facing government.





ENVIRONMENT AND SUSTAINABILITY



WHERE ARE WE?

Our environment is increasingly stressed, and solutions require balancing competing needs among society, economy, and natural resources.



WHAT DO WE KNOW?



Agriculture, communities, and energy producers are increasingly competing for water.



Energy is critical to our economy, but some drivers of growth may adversely affect air and water quality and potentially change the climate.

Over the last decade, extreme weather and fire events have cost the government **>\$350 billion**, including:



\$205 billion for domestic disaster response and relief



\$34 billion for wildland fire management



\$28 billion for maintenance and repairs to federal assets



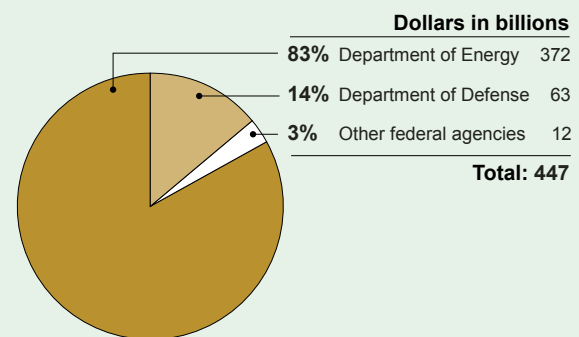
\$90 billion for crop and flood insurance



The federal government must balance competing priorities for the vast amount of resources it owns and manages, including:

- ✓ **>640 million acres** of federal land
- ✓ rights to minerals underlying **>700 million acres**
- ✓ **1.7 billion acres** of the Outer Continental Shelf

Total Reported U.S. Environmental Liability, FY 2016



Source: GAO analysis of the Financial Report of the U.S. Government, FY 2016.



WHAT ARE THE IMPLICATIONS?



Key stresses and interdependencies **cut across agency missions** and pose challenges that are larger than any one federal agency can manage.



Increasingly complex environmental and natural resource challenges emphasize the need for analysis of **forward-looking policy options** for Congress.



BALANCING NATURAL RESOURCE DEVELOPMENT AND SUSTAINABILITY IN AN INCREASINGLY STRESSED AND INTERDEPENDENT ENVIRONMENT

WHAT DO WE KNOW?

A stressed environment—pressure on the environment caused by human activities or natural events—makes it more difficult to balance natural resource development and sustainability to meet the needs of the present without compromising the needs of future generations.

- ◆ At any given time from 2000 through 2015, at least 20 percent of the United States was in drought. At one point in 2012, over 70 percent of U.S. land area was in drought, according to the U.S. Drought Monitor. As a result, land and water resources are showing increasing signs of stress through

more catastrophic wildfires, shrinking aquifers, and the destruction of wildlife habitat. In addition, competition for water is growing among various interests, including agriculture, communities, and energy producers.

- ◆ Water and air quality also require continued attention. Almost 39,000 water bodies are considered impaired by pollutants and do not meet Environmental Protection Agency (EPA) and state water quality standards. The nation faces costly upgrades to aging, deteriorating, and unsafe drinking water and wastewater infrastructure. Moreover, nationwide air quality has improved over the past few decades, yet EPA reports that in 2016, approximately 123 million people lived in counties with pollution levels considered harmful to public health and the environment.
- ◆ The federal government's estimated liability for environmental cleanup activities, including nuclear

waste cleanup and environmental cleanup at military installations, has grown to \$447 billion. Specifically, in 2016, the Department of Energy estimated that cleanup of radioactive waste from weapons production at sites in 11 states will cost \$257 billion. Federal liability estimates are likely understated as they do not include the costs of cleaning up certain types of contaminated sites, such as abandoned mines.

- ◆ The volume of imported foods is increasing, and consumers are eating more raw and minimally processed foods. Shifting demographics mean that

more of the U.S. population is, and increasingly will be, susceptible to food-borne illnesses. Moreover, diseases that spread between livestock and humans, such as antibiotic-resistant infections, could have serious consequences for human health. In addition,

given the risks and potentially devastating effects of agroterrorism, food security continues to pose concerns.

Interdependence among society, economy, and the environment makes it challenging to keep natural resource development and long-term sustainability in balance to meet current needs without compromising the needs of future generations.

- ◆ Energy is critical to our economy, but sustaining economic growth raises complex questions about the unintended consequences of some of the drivers of that growth. For example, automobiles, fertilizer use, and electricity-generating plants can adversely affect air or water quality, raise safety concerns, and

Almost 39,000 water bodies are considered impaired by pollutants and do not meet Environmental Protection Agency (EPA) and state water quality standards.

potentially change the climate. The production of biofuels, which requires large amounts of fertilizers and pesticides, may negatively affect water quality. The development of oil and gas resources can produce large volumes of wastewater that must be disposed of or treated to allow for reuse.

- ◆ Management of the nation's land and water resources is complicated by competing demands. The federal government owns and manages a vast amount of resources, including over 640 million acres of federal land; rights to minerals underlying over 700 million acres; 1.7 billion acres of the Outer Continental Shelf; and fisheries as far as 200 miles offshore. Debates over balancing natural resource development on federal lands with other competing priorities, including recreation and preservation of habitat, illustrate challenges facing policy makers.
- ◆ Climate change and extreme weather pose risks to environmental and economic systems—including agriculture, infrastructure, and human health—and present a significant financial risk to the federal government. According to the President's fiscal year 2017 budget proposal, over the last decade the federal government has incurred direct costs of more than \$350 billion due to extreme weather and fire events, including \$205 billion for domestic disaster response and relief; \$90 billion for crop and flood insurance; \$34 billion for wildland fire management; and \$28 billion for maintenance and repairs to federal facilities and federally managed lands, infrastructure, and waterways.

KEY UNCERTAINTIES

- ◆ People may continue to move to areas of the country with little water, putting additional stress on water resources.
- ◆ What were considered to be rare weather and climate events may become more common and intense. The full effects of such shifts are unknown

and may vary widely depending on location, but they could include rising sea levels, lower agricultural productivity, and depleted water resources.

- ◆ Given the numerous recoverable global shale oil and gas resources, research into potential environmental and public health effects could help educate stakeholders to make the best decisions moving forward.
- ◆ If the fragmentation in food safety laws is lifted and coordination is more effective, food-borne illness prevention and response may improve.
- ◆ Public demand for clean air may result in market-based or other new approaches to reduce emissions.
- ◆ Vulnerability assessments and resiliency plans for infrastructure could help meet the billions of dollars in unmet water, transportation, and energy infrastructure needs.

WHERE ARE WE?

Natural resources essential to life—air, land, and water—are increasingly stressed to meet growing demand. For example, droughts have strained water supplies and infrastructure, highlighted competing demands for water use, and caused wildland fire seasons to grow longer and more severe. Ongoing changes in the climate may amplify such stresses. In addition, significant financial costs incurred while responding to these issues will further contribute to the importance of their proper management.

Natural resource issues are increasingly interdependent. For example, growing production and development of biofuels affects land use and food production and requires fertilizers and pesticides, which can affect human health and water quality. In addition, natural resource issues involve multiple federal agencies and other stakeholders, from the international level to private individuals. For example,

sustaining ocean health will require coordinated efforts across many sectors—from governmental monitoring, protection, and research to coordination with private interests, such as the energy-development industry and fisheries.

IMPLICATIONS

Balancing the trade-offs between natural-resources development and long-term sustainability requires thinking about environmental problems in a different way because key stresses and interdependencies cut across agency missions and pose challenges that are larger than any one federal agency can manage. International, state, local, tribal, and private-sector decision makers also have important roles to play.

Collaboration among all levels of stakeholders—global, federal, state, local, tribal, and the private sector—is difficult, but it can be enhanced and sustained through prospective actions. These actions may include establishing clear leadership and roles and responsibilities; defining and articulating a common outcome; establishing strategies to leverage resources to avoid duplicative efforts; and developing mechanisms to monitor, evaluate, and report results, among other practices.

This prospective approach is reflected in, for example, the United Nations Sustainable Development Goals, which call for, among other things, countries to strengthen the resilience to and adaptive capacity for climate-related hazards and integrate climate change measures into national policies, strategies, and planning.

Environment and natural resource challenges have broad implications for how GAO does its work, with an increased emphasis on providing the Congress with forward-looking analysis of policy options to address increasingly complex, stressed, and interdependent environmental issues.



ADDITIONAL INFORMATION

IMAGE SOURCES

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STRATEGIC PLANNING AND PERFORMANCE DOCUMENTS

GAO's 2018-2023 Strategic Plan ([GAO-18-1SP](#)), Key Efforts ([GAO-18-395SP](#)), and Trends Affecting Government and Society ([GAO-18-396SP](#)) are available on GAO's [Strategic Planning website](#).

Documents related to GAO's [performance planning](#) and GAO's annual [performance reporting](#) are also available online.

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